

Curriculum and Syllabus

Bachelor of Technology in Computer Science and Engineering

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 2.0

FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson

Board of Studies

Member Secretary Academic Council

Vision

To become a Globally Recognized University from North Eastern Region of India, Dedicated to the Holistic Development of Students and Making Society Better

Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators.
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

Programme Details

Programme Overview (not more than 100 words)

Bachelor of Technology in Computer Science and Engineering is an Under Graduate Degree awarded for the programme of Computer Science and Engineering. As one of the best computer engineering colleges, we intend to create a cohesive learning experience with the latest technological developments to that of industry demand.

I. Specific Features of the Curriculum

The B. Tech CSE curriculum, guided by the outlined Program Specific Outcomes (PSOs), emphasizes a comprehensive educational framework. It prepares students for competitive exams through updated and focused syllabi. It integrates advanced research principles with sustainable technology applications, ensuring graduates possess the necessary engineering and management skills for societal impact. The curriculum fosters effective communication, teamwork, and project management in multidisciplinary settings. Additionally, it incorporates contemporary industrial and research trends, encouraging innovation and entrepreneurial proficiency. This holistic approach equips students to develop novel software engineering solutions, addressing real-world problems with cutting-edge techniques and strategies.

II. Eligibility Criteria:

Minimum 45% with English, Physics & Mathematics in HS.

III. Program Educational Objectives (PEOs):

- **PEO 1:** To produce graduates who have strong foundation of knowledge and skills in the field of Computer Science and Engineering.
- **PEO 2:** To produce graduates who can provide solutions to challenging problems in their profession by applying Computer Engineering theory and practices.
- **PEO 3:** To produce graduates who are employable in industries/public sector/research organizations or work as an entrepreneur, as well as can provide leadership and are effective in multidisciplinary environment.

IV. Program Specific Outcomes (PSOs):

PSO 1: Educational Advancement

Graduates will be prepared for state, national and international competitive examinations with

focused and updated syllabi.

PSO 2: Advanced Research

Graduates will have a holistic comprehension of engineering and management principles required for application of sustainable technologies for societal development, and also will be able to communicate effectively in oral, written, visual and graphic modes as a member and leader in a team, to manage projects in multidisciplinary environments.

PSO 3: Entrepreneurial Proficiency

Graduates will be acquainted with the contemporary trends in industrial/research environments and also will capable of innovating novel solutions to prevailing problems by applying software engineering techniques and strategies.

V. Program Outcome: (8-12)

- PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

VI. Total Credits to be Earned:

The total credit to be earned is 176

VII. Career Prospects:

A B. Tech in Computer Science and Engineering (CSE) offers diverse and promising career prospects. Graduates can pursue roles such as software developers, data scientists, cybersecurity analysts, and AI/ML engineers in top tech firms. They are well-suited for positions in research and development, working on cutting-edge technologies. The curriculum also prepares them for competitive exams, enabling careers in public sector and government organizations. Additionally, the strong emphasis on entrepreneurial skills allows graduates to innovate and launch their own start-ups. With rapid advancements in technology, CSE graduates remain in high demand across various industries, ensuring robust career opportunities.

EVALUATION METHODS

The student performance shall be evaluated through In-semester (Sessional) and semester-end examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

A. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting insemester (sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks
		Allotted
1.	In-Sem Exam – I (ISE-I) (Written Examination)*	30
2.	In-Sem Exam – II (ISE-II) (Written Examination)*	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

INSTRUCTION

- If a student fails to appear in the any of the component without any valid reason he/she shall be
 marked zero in that component. However, the course teacher at his discretion may arrange for the
 missed test on an alternate date for the absentee students after determining ground with
 genuine/valid reasons for the absent.
- 2. The report of evaluation of an activity towards the in-semester (sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.
- 3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

B. SEMESTER END EXAMINATION:

Time table for end semester examination is published at least 25 days prior to the start of Examination.

I. Pre-Examination:

Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

II. Admit Card:

Admit card for the examination may be downloaded through ERP where the system will generate a Unique ID Cards through online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

III. Pattern of Question Papers:

The question paper shall follow the principles of Bloom's Taxonomy. Table

S. N.	Level	Questions /verbs for test
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.
3	Apply	Predict, apply, solve, illustrate, determine, examine, modify
4	Analyse	Classify, outline, categorize, analyze, diagrams, illustrate, infer, etc.
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.
6	Create	Design, Formulate, Modify, Develop, integrate, etc.

Note: No course is to be evaluated on basis of all 6 knowledge levels.

The format of the question paper across all the program follow a unique pattern and the total marks is 60

Table 1: Question paper pattern for End semester examination

Sl no	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

IV. Examination Duration:

Each paper of 60 marks shall ordinarily be of two hours duration.

V. Practical Examinations, Viva-Voce etc.:

- i) Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

VI. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the centre may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the exam with new answer sheet or may expel the student from appearing the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribe expulsion form. The student may not be allowed to write that examination.

VII. Instruction to the Students:

- (i) The students shall not bring to the Examination Hall, any electronic gadget used as a means of communication or record except electronic calculator, if required.
- (ii) The students shall not receive any book or printed or hand written or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during course of examination.
- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.

- (iv) The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi) The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix) The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

VIII. Provision for an Amanuensis (writer):

- (i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by Medical Certificate from a competent Medical Officer.
- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.
- (iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

C. Credit Point:

It is the product of grade point and number of credits for a course, thus, $CP = GP \times CR$

i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

- (i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.
- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in Table 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

Table 2: Letter Grades and Grade Points

Letter Grade	Grade Points	Description
0	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
С	5	Average
P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

iv. Grade Point Average:

a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} C_{i}G_{i}}{\sum_{i=1}^{n} C_{i}}$$
(1.1)

The SGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

b. CGPA (Cumulative Grade Point Average)

- (i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrolment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrolment.
- (ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and Ci is the Credit (weight)of that Course.

$$CGPA = \frac{\sum_{i=1}^{N} C_{i}G_{i}}{\sum_{i=1}^{N} C_{i}}$$
(1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

D. Post-Examination

i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

- (i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.
- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a University appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or viva voce and wish to appear again may apply to be evaluated can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of Vice Chancellor.
- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.

(ix)	If as a result of revaluation of the candidate attracts the provision of condonation of deficiency,
	the same may be applied to his/her only for fresh attempt.

INSTRUCTION TO TEACHERS AND STUDENTS

(Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centric classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- a. **Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programme the student has to undergo project-based learning at least 4 months duration. This approach will help the student to think critically, evaluate, analyze, make decisions, collaborate, and more.
- **b.** Inquiry-Based Learning: The teacher/ students are supposed to list at least five questions in each contact hour and student solve these question or search for answer which becomes the home work for the students "question-driven" learning approach. The teacher may look for the correctness of the solution or the best possible answer and discuss in the successive class. This will help in the preparation for various competitive examination and develop a habit for search for solutions.

- c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watchvideo or lecture prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time inclassroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are more passive to an approach where students are active participants. As a result, this approach is also a student- centric teaching method.
- **d.** Cooperative Learning: The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence of	
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

Inquiry-based approach has to be followed in all of the classes

The teacher has to distribute the topics to be considered for teaching by the above-mentioned approaches and prepare a lesson plan for execution and maintain a file.

Curriculum Framework

Breakdown of Credits

Category	Total credits
University Core (UC)	13
University Elective (UE)	18
Program Core (PC)	114
Program Elective (PE)	24
Faculty Elective (FE)	7
	176

Breakdown by category of courses:

Sl. No	Category	Credits	%
1	Science	22	13.10%
2	Engineering	119	70.83%
3	Commerce and Management	35	20.83%
	Total	176	100%

	B.Tech CSE Curriculum 2022-26														
	Sl. No	Course Title	Course Code	Category	C re di t	L	Т	P	S	R	O/F	Max In- Sem Mar ks [The ory]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	Total Marks
	1	Engineering Mathematics I	22BTCS11 1R	DSC (Minor) PC	/ 4	3	1	0	0	0	0	40	60	0	100
	2	Introduction to Basic Mathematics, Logic and Coding	22BTCS11 2R	DSC (Minor) PC	/ 4	2	1	2	0	0	0	40	60	100	200
Semester I	3	Engineering Physics	22BTCS11 3R	DSC (Minor) PC	/ 4	2	1	2	0	0	0	40	60	100	200
	4	Basic Electrical Engineering	22BTCS11 4R	DSC (Minor) PC	/ 4	2	1	2	0	0	0	40	60	100	200
	5	Workshop Manufacturin g Practices	22BTCS11 5R	DSC (Minor) PC	/ 3	1	0	4	0	0	0	40	60	100	200
	6	Introductory English for Engineers	22UBPD1 14R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	7	Extra- Curricular Activity	22UBEC1 11	Extra- Curricular / UC	a 1	0	0	0	4	0	0	0	0	100	100
			22	3 2	1 4	1 8	1 8	4	0	200	500	900	1700		
	Sl. No	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	Total Marks
	1	Engineerin g Mathemati cs II	22BTCS121 R	DSC(Mi nor) / PC	4	3	1	0	0	0	0	40	60	0	100
Semester II	2	Engineerin g Chemistry	22BTCS122 R	DSC (Minor) / PC	4	2	1	2	0	0	0	40	60	100	200
	3	Programmi ng for Problem Solving	22BTCS123 R	DSC (Minor) / PC	4	3	0	2	0	0	0	40	60	100	200
	4	Engineerin g Graphics and Design	22BTCS124 R	DSC (Minor) / PC	3	1	0	4	0	0	0	40	60	100	200
	5	Techno Profession	22BTCS125 R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100

		al Skills I													
	6	Effective English for Engineers	22UBPD124 R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	7	MOOCS I : Enhancing Study Skills	22MOSY12 4R	AEC / CBCS / FE	1	0	0	0	0	0	0	0	0	100	100
	8	Universal human values and Profession al Ethics	22UUHV10 1R	VAC / UC	2	1	0	2	0	0	0	40	60	0	100
	9	Computati onal Systems and Digital World	22UCDL10 3R	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	10	Co- Curricular	22UBCC12 1	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Extra- Curricular	22UBEC121	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
					24	1 0	2	1 8	8	0	0	200	300	900	1400
					Ī				l						
	SI .N o	Course Title	Course Code	Catego ry I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theo ry]	Max End- Sem Marks [Theo ry]	Max End Sem Practi cal Marks	Total Marks
	1	Analog Electronic Circuits	22BTCS21 1R	DSC (Minor) / PC	4	3	0	2	0	0	0	40	60	100	200
	2	Digital Electronic Circuits	22BTCS21 2R	DSC (Minor)	3	2									
				/ PC	_	2	0	2	0	0	0	40	60	100	200
G	3	Data Structure & Algorithms	22BTCS21 3R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
Semester III	4	Structure & Algorithms Biology for Engineers		DSC (Major)											
		Structure & Algorithms Biology for Engineers Mathematics III (Differential Calculus)	3R 22BTCS21	DSC (Major) / PC DSC (Minor)	4	3	0	2	0	0	0	40	60	100	200
	4	Structure & Algorithms Biology for Engineers Mathematics III (Differential Calculus) Techno Professional Skills II	3R 22BTCS21 4R 22BTCS21	DSC (Major) / PC DSC (Minor) / PC DSC (Minor)	4 2	3	0	2	0	0	0	40	60	100	200
	5	Structure & Algorithms Biology for Engineers Mathematics III (Differential Calculus) Techno Professional	3R 22BTCS21 4R 22BTCS21 5R 22BTCS21	DSC (Major) / PC DSC (Minor) / PC DSC (Minor) / PC	2	2	0 0	0 0	0 0	0 0	0 0	40 40 40	60 60	0 0	200 100 100
	5	Structure & Algorithms Biology for Engineers Mathematics III (Differential Calculus) Techno Professional Skills II Basic Life Saving	3R 22BTCS21 4R 22BTCS21 5R 22BTCS21 6R 22UULS21	DSC (Major) / PC DSC (Minor) / PC DSC (Minor) / PC SEC / PC	2 2	3 2 2	0 0 0	2 0 0 2	0 0 0	0 0 0	0 0 0	40 40 40	60 60 0	100 0 0	200 100 100 100

		y for Engineers													
	10	MOOCS II	2MOCECS 217R	MDC / FE	1	0	0	0	0	0	0	0	0	100	100
	11	Co- Curricular	22UBCC21 1	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	12	Extra- Curricular	22UBEC21 1	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
					23	1 2	0	1 6	8	0	0	200	300	1000	1500
	Sl. No	Course Title	Course Code	Catego ry I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theo ry]	Max End- Sem Marks [Theo ry]	Max End Sem Practi cal Marks	Total Marks
	1	Computer Organizati on & Architectu re	22BTCS221 R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	Operating Systems	22BTCS222 R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	Design & Analysis of Algorithm	22BTCS223 R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
	4	Discrete Mathemati cs	22BTCS224 R	DSC (Minor) / PC	4	3	1	0	0	0	0	40	60	0	100
Semester IV	5	Environme ntal Science	22BTCS226 R	VAC / UE	2	2	0	0	0	0	0	40	60	0	100
	6	Techno Profession al Skills III	22BTCS225 R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	English Language Proficienc y for Engineers	22UBPD223 R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS III: Web Application Developme nt with Java Script and Mongo DB	22MOCS22 1R	SEC / FE	1	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC22 1	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC221	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Basic Acclimatiz ing Skills (BAS)	22UULS221 R	MDC / UE	1	0	0	2	0	0	0	40	60	0	100

					23	1 4	1	1 0	8	0	0	240	360	600	1200
	Sl. No	Course Title	Course Code	Category I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theory	Max End- Sem Marks [Theory	Max End Sem Practi cal Mark s	Total Marks
	1	Signals and Systems	22BTCS311 R	DSC (Minor) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	Database Manageme nt Systems	22BTCS312 R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	Formal Language and Automata Theory	22BTCS313 R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
Semester V	4	Object Oriented Programmi ng	22BTCS314 R	DSC (Major) / PC	5	3	0	4	0	0	0	40	60	100	200
	5	PE I	22BTCS316 R	PE	3	3	0	0	0	0	0	40	60	0	100
	6	Techno Profession al Skills IV	22BTCS315 R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	Competent English for Engineers	22UBPD314 R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS IV	MOOCSCE CS4	MDC / FE	2	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC31 1	Co- Curricula r / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC311	Extra- Curricula r / UC	1	0	0	0	4	0	0	0	0	100	100
		T	Г	Т	25	1 5	0	1 2	8	0	0	200	300	700	1200
	Sl. No	Course Title	Course Code	Category I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theory]	Max End- Sem Marks [Theory	Max End Sem Practi cal Mark s	Total Marks
Semester VI	1	Compiler Design	22BTCS321 R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	0	100
	2	Computer Networks	22BTCS322 R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	PE II	22BTCS317 R	PE	3	3	0	0	0	0	0	40	60	0	100
	4	PE III	22BTCS318 R	PE	3	3	0	0	0	0	0	40	60	0	100
	5	Project I	22BTCS323	DSC	4	0	0	8	0	0	0	0	0	100	100

			R	(Major) / PC											
	6	Techno Profession al Skills V	22BTCS324 R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	Corporate Proficiency for Engineers	22UBPD324 R	VAC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS V	MOOCSCE CS5	MDC / FE	2	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC32 1	Co- Curricula r / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC321	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
					25	1 2	0	1 8	8	0	0	160	240	700	1100
	<u>Sl.</u> <u>No</u>	Course Title	Course Code	Category I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theory	Max End- Sem Marks [Theory	Max End Sem Practi cal Mark s	TOTAL Marks
	1	Software Engineerin	22BTCS411 R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	100	100
Semester	2	PE IV	22BTCS414 R	PE	3	2	1	0	0	0	0	40	60	0	100
VII	3	PE V	22BTCS416 R	PE	3	2	1	0	0	0	0	40	60	0	100
	4	Project II	22BTCS412 R	DSC (Major) / PC	6	0	0	1 2	0	0	0	0	0	100	100
	5	Summer Internship	22BTCS413 R	Summer Internshi p / PC	2	0	0	0	0	0	0	0	0	100	100
	6	Techno Profession al Skills VI	22BTCS125 R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
					18	7	2	1 4	0	0	0	120	180	400	600
_	<u>Sl.</u> <u>No</u>	Course Title	Course Code	Category I	Cre dit	L	Т	P	S	R	O/ F	Max In- Sem Marks [Theory	Max End- Sem Marks [Theory	Max End Sem Practi cal Mark s	TOTAL Marks
Semester VIII	1	PE VI	22BTCS127 R	PE	3	3	0	0	0	0	0	40	60	0	100
	2	PE VII	22BTCS128 R	PE	3	3	0	0	0	0	0	40	60	0	100
	3	PE VIII	22BTCS129 R	PE	3	3	0	0	0	0	0	40	60	0	100
	4	Project III	22BTCS421 R	DSC (Major) / PC	7	0	0	1 4	0	0	0	0	0	100	100
					16	9	0	1	0	0	0	120	180	100	400

		4				

List o	of Program Electives	s (PE)Paper
Semester	PE s No.	Electives Name
V	PE-I	1. Foundation of Data Science
V	PE-I	2. Neural Network
	PE-II	1. Artificial Intelligence
VI	FE-II	2. Data Mining
V I	PE-III	1. Machine Learning
	1 L-111	2. Big Data Analytics
	PE-IV	1. Data Handling and Visualization
VII	1 L-1 V	2. Computer Vision
V 11	PE-V	1. Predictive Analysis
	TL-V	2. Social Network Analysis
	PE-VI	1. Natural Language Processing
	112-41	2. Speech and Video Processing
	PE-VII	1. Advanced Data Mining
VIII	1 L- V II	2. Data Modeling and Simulation
		1. Introduction to Virtual and
	PE-VIII	Augmented Reality 2. Cryptography and
		Network Security

Semester	Credit	L	Т	P	S	R	O/F	Max In- Sem Marks [Theory]	Max End- Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
1	22	32	14	18	18	4	0	200	500	900	1700
2	24	10	2	18	8	0	0	200	300	900	1400
3	23	12	0	16	8	0	0	200	300	1000	1500
4	23	14	1	10	8	0	0	240	360	600	1200
5	25	15	0	12	8	0	0	200	300	700	1200
6	25	12	0	18	8	0	0	160	240	700	1100
7	18	7	2	14	0	0	0	120	180	400	600
8	16	9	0	14	0	0	0	120	180	100	400
Total	176	111	19	120	58	4	0	1440	2360	5300	9100

		List of MOOCS		
Sl. No	MOOCS Course No	Name of the Course	Course Code	Semester
1		ENHANCING STUDY SKILLS	22MOSY124R	
2	MOOCS I	COMMUNITY ENGAGEMENT AND SOCIAL RESPONSIBILITY	22MOSY125R	II
1	MOOCS II	HTML	2MOCECS217R	III
2	MOOCS II	FOUNDATION OF CYBERSECURITY	2MOCECS218R	111
1	MOOCS III	WRITING, RUNNING AND FIXING CODE IN C	22MOCS221R	IV
2	MOOCS III	FOUNDATIONS OF DIGITAL MARKETING AND E-COMMERCE	22MOCS222R	I V
1	MOOCS IV	JAVASCRIPT, JQUERY, AND JSON	MOOCSCECS4	V
2	MOOCS IV	INTERMEDIATE POSTGRESQL	MOOCSCECS5	v
1	MOOCS V	MEAN STACK	MOOCSCECS6	1/1
2	MOOCS V	JAVA FULL STACK DEVELOPER	MOOCSCECS7	VI

		SEMESTER – I							
Course Title		Engineering Ma	themat	ics I					
Course code	22BTCS111R	Total credits: 4	L	T	P	S	R	O/F	С
		Total hours: 39T	3	1	0	0	0	0	4
Pre-requisite	Mathematics	Co-requisite		1	ı		Nil		-1
Programme	Bachelor	of Technology in Comp	uter Sc	ienc	e & :	Engi	neerii	ng	
Semester		1							
(Minimum 3)	some special functions To provide the applicat	evaluate definite and implike Beta and Gamma fundon of differential and interconvergence and diverge	ction megral cal	ust b lculu	e int s.	roduc	ed.		
CO1	Understand definite interproficiency in integration	egrals and computation of on techniques.	f surfac	e are	as a	nd vo	lume	s, demor	strating
	mastery.	and mean value theorem							
	for functions.	of sequences and series, a							
	derivatives and Lagrang	•							
CO5	•	ce in matrix operations, ng linear algebra principle	•	alue	con	nputa	tions,	and or	thogonal
Unit-No.	Co	ntent	Conta Hou		Le	arnir	ıg Ou	tcome	BL
I	and improper integrations and their pro-	es; Evaluation of definite als; Beta and Gamma operties; Applications of valuate surface areas and s.	8		impr Beta func integ surfa volu	roper a ar tions grals ace	ind ; to c area	nite and ntegrals, Gamma applies calculate s and of	3, 5
II	Taylor's and Mac	Mean value theorems, aurin theorems with minate forms and ima and minima.	12		Und Roll Mea Theo Tayl serie rema L'Ho tech	erstar e's in orems lor/M es ainde ospita nique	nd an To	with ule, and finding	
III	-	ence and series, tests for series, Taylor's series,	8		sequ appl	ence	s/serie	ence of es, analyze series,	3, 4

	series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.		and study Fourier series, half-range expansions, and Parseval's theorem.	
IV	Multivariable Calculus(Differentiation): Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	6	Understand and apply limits, continuity, partial/directional/total derivatives, tangent planes, extrema, Lagrange multipliers, and gradient, curl, and divergence concepts.	2, 3
V	Matrices: Inverse and rank of a matrix, rank- nullity theorem; System of linear equations; Symmetric, skew-symmetric	5	Understand and apply matrix inverses, rank, rank-nullity theorem, solve linear systems, and analyze symmetric and skew-symmetric matrices.	2, 3

TEXT BOOKS:

- **T1:** G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", 9th Edition, Pearson, Reprint, 2002.
- **T2:** Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
- **T3:** Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2010.

REFERENCE BOOKS:

- R1: N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2008
- **R2:** B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

OTHER LEARNING RESOURCES:

O1: https://archive.nptel.ac.in/courses/111/105/111105121/

O2: https://www.geeksforgeeks.org/engineering-mathematics-tutorials/

O3: https://www.udemy.com/course/mathematics-for-engineering/

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand definite integrals and computation of surface areas and volumes, demonstrating proficiency in integration techniques.	1,2, 3, 4, 5, 10, 12
2	Utilize Rolle's Theorem and mean value theorems to analyze functions, ensuring conceptual mastery.	1,2, 3, 4, 5, 10, 12
3	Evaluate convergence of sequences and series, applying tests and constructing power series for functions.	1,2, 3, 4, 5, 10, 12
4	Analyze multivariable functions, determining limits, continuity, and extrema using partial derivatives and Lagrange multipliers.	1,2, 3, 4, 5, 10, 12
5	Demonstrate competence in matrix operations, eigenvalue computations, and orthogonal transformations, applying linear algebra principles.	1,2, 3, 4, 5, 10, 12

MAPPING TABLE

Course code	Course Name	CO s	PO 1	PO 2	P O 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	3	2	3	3	3					3		2
22DTCC11	Engineeri	CO 2	2	2	2	2	2					3		2
22BTCS11 1R	ng Mathemat ics I	CO 3	2	2	2	2	2					3		2
		CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

		SEMES'	ΓER	- I						
Course Title	Int	roduction to Bas	ic M	athem	atics	, Logi	ic and	d Cod	ing	
Course code	22BTCS112R	Total credits: 4		L	T	P	S	R	O/F	С
		Total hours:		2	1	2	0	0	0	4
		45T+30P								
Pre-requisite	NIL	Co-requisite	!					Nil		
Programme	Bachel	or of Technolog	y in (Comp	uter S	Scienc	e & 1	Engin	eering	
Semester				1						
Course	To understand and		_	_						atics
Objectives	To develop the abil	•	_				_	•		
(Minimum 3)	To become confide	~	matic	es, logi	ic, rea	sonin	g and	codir	ng to analy	ze and
	solve problems in re									
CO1	The students will	be able to demo	onstr	ate the	e abil	lity to	und	lerstar	nd the co	ncepts of
	mathematics, logic,									
CO2	Students will be ab		-		of co	oncept	s in	other	discipline	s such as
	engineering, compu									
CO3	Solve and devise so	olutions to a range	e of	elemer	ntary 1	real-w	orld	proble	ems in ma	thematics
	and programming									
CO4	Explore and apply l		-							
CO5	Enable students to		se in	nforma	tion i	in orc	der to	eval	luate evid	ence and
	construct reasoned									
Unit-No.	Con	tent	(Contac Hour		Lea	rnin	g Out	come	BL
I	Basics of Set	Theory and	d	10		Inders	stand		sets,	2, 3
	Functions:				c	ardina	ılity,	O	perations	
					(ι	ınion,	inte	ersecti	ion), De	
	Sets: Basic defin	itions, cardinalit	y		N	Iorgai	n	laws,	Venn	
	of a set, principle	of exclusion an	d		d	iagrar	ns,		relations,	
	inclusion, combi	nation of sets	s:		fı	ınctio	ns,		number	
	union, intersect	ion, difference	e,		S	ystem	s,	and	basic	
	complement etc.,	De Morgan laws	S,		O	perati	ons.			
	Venn Diagram									
	Cartesian Produc	cts and Relations	s:							
	Basic Definitions,	binary relations								
	- composition an	d inverse, binar	y							
	relation on a s		-							
	reflexive, irrefle	· •								
	anti-symmetric,	transitive	´							
	equivalence relati	ons, partial orde	er							
	relations									
	Functions: Basic	•								
	and co-domain, i									
	identity function,									
	onto function									
	characteristic fund	-								
	of functions, inve									
	operations on sets:									
	idempotence, bir	• •	-							
	associativity, com	mutativity								

I	Number systems: Natural numbers,			
	1			
	whole numbers, integers, rational numbers, real numbers, operations			
	on numbers: addition, subtraction,			
II	multiplication and division Introduction to Mathematical	8	Loam touth values logical	2, 3
11	Logic and Induction:	o	Learn truth values, logical operators, De Morgan	2, 3
	Logic and induction.		laws, propositional logic	
	Mathematical Logic: Truth values		concepts (constants,	
			*	
	,		variables, tautology), and	
	formulas in mathematical logic,		principles of mathematical	
	logical operators - AND, OR, NOT		induction.	
	etc, De Morgan Laws, Truth values			
	of formulas, Truth tables			
	Propositional Logic: Constants,			
	variables, assignment of variables in			
	a formula, tautology, contradiction			
	and satisfiability, truth table of a			
	formula, equivalence of formulas,			
	proving formulas and equivalences			
	by truth table method			
	Mathematical Induction: Principle			
	of mathematical induction –			
	induction basis and induction step,			
	examples			
III	Introduction to Logic and	10	Master alphanumeric	3, 4
III	Reasoning:	10	series, direction sense,	3, 4
III	9	10	•	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data	10	series, direction sense,	3, 4
III	Reasoning: Alphanumeric series, Direction,	10	series, direction sense, logical reasoning, data	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data	10	series, direction sense, logical reasoning, data sufficiency, ranking,	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order ,	10	series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations,	3, 4
IV	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy,	10	series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming	2, 3
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch),	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C'		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control	ĺ
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch),	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions.		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement, Types of ifelse block, Switch case		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding. Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	ĺ

	Concept of Loop, For loop, While			
	loop, Do- while loop, jumping in			
T 7	Loop, break and continue statement	_	XX 1 (17)	
V	Introduction to Arrays, Strings and Functions Arrays: One Dimensional Arrays, Two-Dimensional Arrays, Multidimensional Arrays, Dynamic Arrays. Strings: Implementing String Variables, String handling Functions. Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.	7	Understand arrays (1D, 2D, multidimensional, dynamic), string implementation and functions (user-defined, system-defined, function parameters and passing mechanisms).	2
	Practical Con	mponent		
		-		
Practical 1	Write a C program to find sum and average of three numbers. Write a C program to find the sum of individual digits of a given positive Write a C program to generate the first n terms of the Fibonacci sequence	3	Develop proficiency in C programming: calculate sums/averages, manipulate digits, generate Fibonacci sequence, using variables, loops, and arithmetic for problem-solving.	3
Practical 2	Write a C program to generate prime numbers between 1 to n. Write a C program to Check whether given number is Armstrong Number or Not.	3	Master C programming skills: generate prime numbers and verify Armstrong numbers, demonstrating proficiency in loops, conditionals, and mathematical operations.	3
Practical 3	Write a C program to evaluate algebraic expression (ax)/ (ax-b). Write a C program to check whether given number is perfect number or Not Write a C program to check whether given number is strong number or not.	3	Master C programming: evaluate algebraic expressions, verify perfect numbers, and determine strong numbers, applying arithmetic, loops, and conditional statements effectively.	3, 4
Practical 4	a) Write a C program to find the roots of a quadratic equation.b) Write a C program perform arithmetic operations using switch statement.	3	Achieve proficiency in C programming by solving quadratic equations for roots and performing arithmetic operations with switch statements	3

			effectively.	
Practical 5	Write a C program to find factorial of a given integer using non-recursive Function. Write a C program to find factorial of a given integer using recursive function.	3	Master factorial computation in C: implement non-recursive and recursive functions, demonstrating understanding of functions, loops, and recursion for problem-solving.	6
Practical 6	Write C program to find GCD of two integers by using recursive function. Write C program to find GCD of two integers using non-recursive function.	3	Achieve proficiency in C programming: compute GCD of integers using recursive and non-recursive functions, applying logical and iterative problem-solving techniques efficiently.	3
Practical 7	Write a C program to find both the largest and smallest number in a list of Integers Write a C Program to Sort the Array in an Ascending Order. Write a C Program to find whether given matrix is symmetric or not.	3	Master C programming: find largest/smallest numbers in a list, sort arrays in ascending order, and determine matrix symmetry accurately using logical operations.	3, 4
Practical 8	Write a C program to perform addition of two matrices. Write a C program that uses functions to perform Multiplication of Two Matrices.	3	Achieve proficiency in C programming: add two matrices and multiply matrices using functions, demonstrating mastery of matrix operations and function usage.	3
Practical 9	Write a C program to use function to insert a sub-string in to given main string from a given position. Write a C program that uses functions to delete n Characters from a give position in a given string.	3	Master C programming: insert a substring into a main string and delete characters from a specified position using functions effectively and accurately.	6
Practical 10	Write a C program using user defined functions to determine whether the given string is palindrome or not. Write a C program that displays the position or index in the main string S where the sub string T begins, or -	3	Achieve proficiency in C programming: determine palindrome strings and locate substring positions using user-defined functions effectively and accurately.	3

1:00			
1 111 5	doesn't contain T.		1
			Ì

TEXT BOOKS:

- **T1:** Byron Gottfried, "Schaum's Outline of Programming with C", Third Edition.
- T2: E. Balaguruswamy, "Programming in ANSI C", Eight Edition.
- T3: Lipschitz, Lipsonand and Patil, "Discrete Mathematics", Revised Third Edition
- T4: Sastry and Nayak, "A Textbook on Discrete Mathematics"

REFERENCE BOOKS:

- R1: R S Agarwal, "A Modern Approach To Verbal & Non Verbal Reasoning", Revised Edition.
- R2:Sijwali B S, "Analytical and Logical Reasoning", Revised Edition.
- **R3:** Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Second Edition.
- R4:Lipschutz and Lipson, "2000 Solved Problems in Discrete Mathematics".

OTHER LEARNING RESOURCES:

- O1: https://www.javatpoint.com/discrete-mathematics-tutorial
- **O2:** https://www.khanacademy.org/test-prep/lsat/lsat-lessons/logical-reasoning/a/logical-reasoning-article

getting-started

O3:https://www.javatpoint.com/c-programming-language-tutorial

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding	1,2, 3, 4, 5, 10, 12					
2	Students will be able to apply of applications of concepts in other disciplines such as engineering, computer science, physics, etc.	1,2, 3, 4, 5, 10, 12					
3	Solve and devise solutions to a range of elementary real- world problems in mathematics and programming	1,2, 3, 4, 5, 10, 12					
4	Explore and apply key concepts in logical thinking to business problems.	1,2, 3, 4, 5, 10, 12					
5	Enable students to critically analyse information in order to evaluate evidence and construct reasoned arguments.	1,2, 3, 4, 5, 10, 12					

MAPPING TABLE

Course	Course	CO	PO	PO	PO	PO	РО	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Introducti	CO 1	2	3	3	2	2					2		2
	on to Basic Mathemati cs, Logic	CO 2	3	3	3	2	2					2		2
2BTCS11 2R	and Coding	CO 3	3	3	2	2	1					2		2
		CO 4	3	3	3	3	3					2		2
		CO 5	3	3	3	3	3					2		2

		SEMESTE	ER – I										
Course Title		Engi	neering l	Physi	ics								
Course code	22BTCS113R	Total credits: 4	L	T	P	S	R	O/F	C				
		Total hours:	2	1	2	0	0	0	4				
		40T+30P											
Pre-requisite	Basic knowledge	Co-requisite			Mathematics								
	of Physics												
Programme	<u> </u>	 lor of Technology i	n Comp	uter S	Scien	ce &	Engin	eering					
Semester	Bachelor of Technology in Computer Science & Engineering 1												
Course	To understand the theories of physics												
Objectives	To apply the concepts in practical problems												
(Minimum 3)	1 1	physics of any proce											
CO1	_	eld and potential		ons,	Com	pute	the v	ectors a	nd scalar				
		orces and nature of for		ŕ	,								
CO2	•	tics in dielectric m		nserv	ative	and	non-c	onservativ	e forces,				
		and energy equation							ĺ				
CO3		non-inertial frames,		c osc	illator	and	forced	oscillatio	ns.				
CO4	•	standing of magneto											
		measuring instrume				C		•	Č				
CO5		ic characteristics of		ners a	nd el	ectric	al mac	chines.					
Unit-No.	Con	ntent	Contac	ct Learning Outcome					BL				
			Hour				O						
I	Electrostatics in va	acuum	8	S	Study		ele	ctrostatic	2				
					•	nena	in	vacuum:					
				_				electric					
								Gauss's					
						•		viour of					
				С	harge	s and	fields						
II	Magnetostatics		8	I	Learn		magı	netostatic	2				
					rincip			ot-Savart					
				la	aw,	magn	etic	field of					
				c	urren	ts, A	Ampèr	e's law,					
				n	nagne	tic 1	materi	als, and					
				a	pplica	ations		in					
			netism.	•									
III	Faraday's law		8	J	Jnder	stand	Farad	ay's law:	2				
								nduction,					
				iı	nduce	d	elect	romotive					
				f	orce	(emf)), Ler	nz's law,					
								enerators					
							mers.						
IV	Displacement c	urrent, Magnetic	8	E	Explor	e	disp	lacement	4				
	field due to time-	dependent electric		c	urren	t, m	nagnet						
	field and Maxwell	-		f	rom t	ime-v	arying	g electric					
		_			ields,	an		Maxwell's					
			i	1									
				e	quatio	ons		linking					
					•		nagne	linking tism, and					

V	Electromagnetic waves	8	Study electromagnetic	2
			waves: properties, wave	
			equations, propagation in	
			vacuum and media,	
			polarization, and	
			applications in	
			communication and	
			technology.	
	Practical Con	mnonent	teemology.	
	Tractical Col	шропен		
Practical 1	To verify the ohm's law and hence		Demonstrate	
	determine the unknown resistance of		understanding and	
	the given material of the wire.		application of Ohm's Law	
	8		to determine unknown	
		6	resistance of wire material	3
			through experimental	
			verification and	
			calculation.	
Practical 2	To find the value of a given	3	Achieve proficiency in	
1 Tactical 2	resistance by using meter bridge.	3	using a meter bridge to	
	resistance by using meter bridge.			
			accurately measure the	2
			resistance of a given	3
			material through	
			experimental observation	
			and calculation.	
Practical 3	To convert the galvanometer in to	6	Master the process of	
	voltmeter and hence calibrate it with		converting a galvanometer	
	a standard resistance and ammeter.		into a voltmeter,	
			calibrating it using a	6
			standard resistance, and	
			verifying accuracy with an	
			ammeter.	
Practical 4	To determine the internal resistance	6	Achieve proficiency in	
	of a cell by using potentiometer.		determining the internal	
			resistance of a cell using a	
			potentiometer through	3
			accurate experimental	
			measurements and	
			calculation techniques.	
Practical 5	To determine the frequency of a	3	Achieve proficiency in	
	tuning fork by Melde's apparatus.		determining the frequency	
			of a tuning fork using	
			Melde's apparatus through	3
			precise experimental setup	
			and frequency	
			measurement techniques.	
Practical 6	To determine the moment of inertia	3	Achieve proficiency in	
i ractical 0		3	_	3
	of a body about an axis passing		determining the moment	3
	through its center of gravity and		of inertia of a body by	

	perpendicular to its length.		accurately measuring its mass distribution and rotational properties experimentally.	
Practical 7	To determine the ECE of copper by using copper voltmeter and ammeter.	3	Achieve proficiency in determining the Electrical Conductivity (ECE) of copper using a copper voltmeter and ammeter through precise experimental measurements and calculations.	3

TEXT BOOKS:

T1: K G Mazumdar and B.Ghosh, "A Textbook on Practical Physics", Sreedhar Publishers, 209B, Kolkata.

T2: David Griffiths, "Introduction to Electrodynamics", Prentice Hall, Upper Saddle River, New Jersey, 07458

T3: IE IRODOV, "Basic Laws of Electromagnetism".

T4: C L Arora, "BSc Practical Physics", S. Chand Publishing, 2001.

REFERENCE BOOKS:

R1: P R Sasi Kumar, "Practical Physics", Phi Learning Private Ltd,2011.

R2: Sijwali B S, "Analytical and Logical Reasoning", Revised Edition.

R3: G. L. Squires, "Practical Physics", Cambridge. University Press, 30 Aug 2001.

R4: Resnick Halliday, "Principles of physics".

OTHER LEARNING RESOURCES:

O1:https://www.sciencedirect.com/science/article/pii/S0951832022005142

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply electric field and potential calculations, Compute the vectors and scalar representation of forces and nature of forces.	1,2, 3, 4, 5, 10, 12					
2	Analyze electrostatics in dielectric media, conservative and non-conservative forces, angular momentum and energy equations.	1,2, 3, 4, 5, 10, 12					
3	Compute basics of non-inertial frames, harmonic oscillator and forced oscillations.	1,2, 3, 4, 5, 10, 12					
4	Demonstrate understanding of magnetostatics in linear magnetic media, and the usage of common electrical measuring instruments.	1,2, 3, 4, 5, 10, 12					

5	Understand the basic characteristics of transformers and	1,2, 3, 4, 5, 10, 12
	electrical machines.	

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	3	2	1					2		3
	Engineeri ng	CO 2	3	3	3	2	2					2		3
22BTCS11 3R	Physics	CO 3	3	3	3	2	1					2		3
		CO 4	3	3	3	2	2					2		3
		CO 5	3	3	3	2	2					2		3

		SEMESTI	ER – I						
Course Title		Basic Ele	ectrical E	ngin	eerin	g			
Course code	22BTCS114R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours:	2	1	2	0	0	0	4
		30T+30P							
Pre-requisite	NIL	Co-requisite					Nil		
Programme	Bach	elor of Technology i	n Comp	uter S	Scien	ce &	Engir	eering	
Semester			1						
Course	Evaloin onomativo	minainla of themselour	nam vrvith i	hoolee	****	d of n		ia aimanita	
Objectives		principle of transform		_			iagnei	ic circuits	•
(Minimum 3)	Classify and comp	pare different types of	Electric	ai ma	cnine	S•			
CO1	Analyze and apply	basic electric and m	agnetic c	ircuit	ts.				
CO2	Understand the wo	orking principles of e	lectrical	mach	ines a	nd po	wer c	onverters.	
CO3	Understand the co	mponents of low-vol	tage elec	trical	instal	latior	ıs.		
CO4		age of common elect			-				
CO5		working and basic	charact	eristic	cs of	trar	sform	ners and	electrical
	machines.								
Unit-No.	Co	ntent	Contac	et	Lea	arnin	g Out	come	BL
			Hour						
I	voltage and	elements (R,L,C), current source, nt and voltage law, simple circuit, Norton and eorem	5	fi in v K a ('	earn undan nducto roltage Kirchh nalysi Theve	nenta ors, e/curr off's is enin,	ent laws	circuit resistors, apacitors, sources, circuit methods Norton,	2
П	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single phase accircuits consisting of R,L,C.RL,RC,RLC combination(series and parallel), voltage and current relationship in star and delta connection			e w re c a R	ppare R, L,	als: orms, entations nt), a	on, (real, and ar	circuit inusoidal phasor power reactive, nalysis of onents in tions.	2
	star and delta cor	meetion							
III	Transformer:	meetion						sformers:	2

	Magnetic materials, ideal and practical transformer, equivalent circuit, losses in transformer, regulation and efficiency, auto transformer, three phase transformer connection	6	vs. practical models, losses, regulation, efficiency, auto transformers, and three-phase connections for power distribution systems.	
IV	Electrical Machines: Generation of rotating magnetic fields, construction and working of three phase induction motor, torque-slip characteristics, losses and efficiency, Single phase induction motor, working of synchronous Generator	6	Study electrical machines: rotating magnetic field generation, three-phase induction motors, torque-slip characteristics, losses, efficiency, single-phase induction motors, and synchronous generator operation.	2
V	Power converter and electrical installation: DC-DC buck and boost converter, single phase and three phase voltage source inverter, Fuse, MCB, ELCB, MCCB Earthing, wires and cables, types of batteries Practical Co.	6 mponent	Learn power converters: DC-DC buck and boost converters, single-phase and three-phase voltage source inverters, electrical installations including fuses, breakers, earthing, cables, and batteries.	2
	11404044	inponent		
Practical 1	To Study specification and uses of instruments	3	Understand and apply knowledge of instrument specifications and uses, ensuring accurate selection and utilization for various technical applications.	2
Practical 2	To Study Ohm's Law for DC Circuits	3	Understand and apply Ohm's Law to analyze and solve problems in DC circuits through experimental verification and calculations.	2
Practical 3	To verify KCL and KVL Circuits	3	Verify Kirchhoff's Current and Voltage Laws (KCL and KVL) through practical circuit analysis, enhancing understanding of electrical network behaviour.	4
Practical 4	To verify The venin's Theorem	3	Verify Thevenin's Theorem through circuit experiments,	4

			demonstrating the ability	
			to simplify complex	
			circuits into equivalent	
			single-source	
			representations.	
D	To waife Name 's Theorem	2	*	
Practical 5	To verify Norton's Theorem	3	Verify Norton's Theorem	
			by conducting circuit	
			experiments,	
			demonstrating proficiency	4
			in converting complex	
			circuits into equivalent	
			current-source models.	
Practical 6	To verify Maximum Power Transfer	3	Verify Maximum Power	
	Theorem		Transfer Theorem through	
			circuit experiments,	
			ensuring maximum power	4
			delivery from source to	
			load under optimal	
			resistance conditions.	
Practical 7	To verify super position Theorem	3	Verify Superposition	
			Theorem by analyzing	
			circuits with multiple	
			sources, demonstrating the	4
			ability to determine	
			individual effects on	
			overall circuit behaviour.	
Practical 8	To Study transformation ratio of	3	Understand and determine	
	single-phase transformer		the transformation ratio of	
			a single-phase transformer	_
			through experimental	2
			analysis and accurate	
			measurement techniques.	
Practical 9	Mini-project	6	At the end of the mini-	
	p	•	project, students will	
			demonstrate fundamental	
			knowledge and practical	2, 3
1			initiations and practical	
			skills in Basic Electrical Engineering concepts.	

T5: D. P. Kothari and I. J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

REFERENCE BOOKS:

R1:D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

R2:E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

OTHER LEARNING RESOURCES:

O1: https://nptel.ac.in

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Analyze and apply basic electric and magnetic circuits.	1, 2, 3, 4, 5, 6, 9,10, 11, 12							
2	Understand the working principles of electrical machines and power converters.	1, 2, 3, 4, 5, 6, 9,10, 11, 12							
3	Understand the components of low-voltage electrical installations.	1, 2, 3, 4, 5, 6, 9,10, 11, 12							
4	Understand the usage of common electrical measuring instruments.	1, 2, 3, 4, 5, 6, 9,10, 11, 12							
5	Understand the working and basic characteristics of transformers and electrical machines.	1, 2, 3, 4, 5, 6, 9,10, 11, 12							

Course	Course	CO	РО	РО	PO	PO	РО	PO	PO	PO	РО	PO1	PO1	PO1
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	3	2	2	1			1	2	1	3
22BTCS1	Basic	CO 2	3	3	3	2	2	1			1	2	1	3
1R	Electrical Engineeri	CO 3	3	3	3	2	2	1			1	2	1	3
	ng	CO 4	3	3	3	2	2	1			1	2	1	3
		CO 5	3	3	3	2	2	1			1	2	1	3

		SEMESTER – I								
Course Title		Vorkshop Manufacturing I				[a 5	0.75			
Course code	22BTCS115R	Total credits: 3 Total hours: 10T+30P	L 1	T 0	P 4	S R 0 0	0/F 0	C 3		
Pre-	NIL	Co-requisite	1	U	4	Nil	U	3		
requisite	14II									
Programme	Rachalar of T	 echnology in Computer Sc	pianca &	Fn	ain	aarin	т			
Semester	Dacheloi of 1	1	ience &	1711	giii	eerm	5			
Course		1								
Objectives (Minimum 3)	manufacturing. Apply fundamental knowled Recognize components usin	earning this course will lead you to understand basic concepts of workshop and anufacturing. pply fundamental knowledge of workshop and manufacturing in day-to-day life. ecognize components using different materials.								
CO1	1	ufacturing methods like cast		min	g, n	nachii	ning et	c.		
CO2	^^	ding in automation of Machi								
CO3		fitting operations and its ap	plication	in	ind	ustrie	S.			
CO4	Different machining operati	<u> </u>								
CO5	Learning the different types	of welding and its field of a	pplication	n.						
Unit-No.	Con	Content								
I	Manufacturing Methods Casting, forming, machinanufacturing methods		Hour 3		Stu man men cas formate join tech and pro pro induction efficients.	nufacting, ting, ming, chining nnique adv nufact cesses ducin ustria npone cientle	es, anced curing s for g l nts y and	4		
Π	CNC machining, Additive Overview of CNC machin additive manufacturing	e Manufacturing ning process, overview of	2		made pro over included pro and oper Union add man	ratior dersta litive nufact	g: g ming	3		

			producing	
			objects layer	
			by layer.	
III	Carpentry & Fitting operations	1	Learn	2
	Carpentry tools, carpentry operations, fitting tools,		carpentry:	
	fitting operations		tools and	
			operations for	
			woodwork.	
			Understand	
			fitting: tools	
			and	
			operations for	
			assembling	
			components	
			accurately in	
			manufacturing	
			and	
			construction.	
IV	Machining operations	2	Study	4
	Turning, milling, turning processes, milling		machining	
	processes		operations:	
			learn turning	
			and milling	
			processes,	
			including	
			techniques,	
			tools, and	
			applications	
			in	
			manufacturing	
			precision	
T 7	*** 1 11		components.	
V	Welding	2	Learn welding	2
	Arcwelding & gas welding, brazing		techniques: arc welding,	
			gas welding, and brazing	
			methods,	
			covering	
			processes,	
			safety	
			measures, and	
			applications	
			in metal	
			fabrication	
			and	
			construction.	

Practical 1	Abriefintroductionofworkshop		Students gain	
Fractical I	_			
	Machineshop,Fittingshop,carpentryshop,weldingshop		introductory	
			knowledge of	
			workshop	
			areas:	
			Machine	
			shop, Fitting	
		5	shop,	2
		J	Carpentry	2
			shop, Welding	
			shop,	
			emphasizing	
			basic	
			operations	
			and safety	
			protocols.	
Practical 2	Machine shop	10	Students will	
Tractical 2	Plainturning, Taperturning, Stepturning	10	demonstrate	
	Traintarning, rapertarning, steptarning		proficiency in	
			plain turning,	
			taper turning,	3
			_	3
			1	
			turning	
			techniques in	
			machine shop.	
Practical 3	Carpentry shop	5	At the end of	
	Dovetailjoint,T-lapjoint,Cross-lapjoint,Corner-		the session,	
	lapjoint		students will	
			demonstrate	
			proficiency in	
			constructing	3
			dovetail, T-	
			lap, cross-lap,	
			and corner-lap	
			joints in	
			carpentry	
			shop.	
Practical 4	Welding shop	5	Students will	
	Arcwelding(Buttjoint,T-joint,Lapjoint,Cornerjoint)		demonstrate	
			proficiency in	
			arc welding	2
			techniques for	3
			butt, T-joint,	
			lap, and	
			corner joints.	
Practical 5	Fitting shop	5	Students will	
I I uculcui J	Angle fitting, square fitting, corner fitting		demonstrate	
	range mang, square mang, corner mang		proficiency in	3
			angle fitting,	
			angie mung,	

	square fitting,	
	and corner	
	fitting	
	techniques in	
	fitting shop.	ļ

TI: Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K, "Elements of Workshop Technology", Vol I 2008 and Vol II 2010, Media promoters and publishers private limited, Mumbai.

REFERENCE BOOKS:

R1:Manufacturing Technology – I, Pearson Education, 2008.

R2:Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

OTHER LEARNING RESOURCES:

O1: https://easyengineering.net/introduction-to-basic-manufacturing-process-workshop-technology

O2:

https://www.academia.edu/30316555/Introduction_to_Basic_Manufacturing_Processes_and_Workshop_Technology

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Introduction to various manufacturing methods like casting, Forming, machining etc.	1, 2, 3, 4, 5, 6, 10, 12						
2	Application of computer coding in automation of Machines.	1, 2, 3, 4, 5, 6, 10, 12						
3	Introduction to Carpentry & fitting operations and its application in industries.	1, 2, 3, 4, 5, 6, 10, 12						
4	Different machining operations like turning, milling.	1, 2, 3, 4, 5, 6, 10, 12						
5	Learning the different types of welding and its field of application.	1, 2, 3, 4, 5, 6, 10, 12						

Course	Course	CO	РО	РО	PO	PO	PO	РО	РО	РО	РО	PO1	PO1	PO1
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1												
			3	2	2	2	3	2				1		2
	Workshop	CO												
	Manufactur	2	3	3	3	3	3	3				3		3
22BTCS11	ing Practices	CO												
5R	2 2 3 3 3 3 3	3	3	2	2	2	3	2				1		2
		CO												
		4	3	2	2	2	3	2				1		2
		CO												
		5	3	3	2	2	3	2				1		2

		SEMESTE	ER – I							
Course Title		Introductory	y English	for	Engi	neers				
		(Communicati	ive Engli	sh &	Soft	Skills)			
Course code	22UBPD114R To	otal credits: 2	L	T	P	S	R	0/	/F	С
	T	otal hours: 30P	0	0	4	0	0	0)	2
Pre-requisite	NIL	Co-requisite					Nil			
Programme	Bachelor	of Technology in	n Compi	iter S	Scien	ce &]	Engin	eerin	ıg	
Semester			1							
Course	To capacitate the stud	ents with mastery	over Bas	sic Eı	nglish	gram	mar.			
Objectives	To enable the student	s to communicate	e confide	ntly v	with a	a focu	s on 1	isteni	ing a	nd speaki
(Minimum 3)	skills.									
	With the help of the	basics of Phone	tics, the	stude	ents v	will b	e able	to p	rono	unce wor
	correctly.									
	To interact successful	ly and with decor	um.							
CO1	Analyze and apply t	the rules of Parts	s of Spe	ech i	n co	nstruc	ting g	gramr	natic	ally corre
	sentences.									
CO2	Evaluate sentence str		varied se	nteno	ce typ	pes, a	nd de	mons	trate	effective
	comprehension skills.									
CO3	Assess listening skills	s, identify factors i	influenci	ng lis	tenin	g, and	imple	ement	t stra	tegies for
	improved listening.									
CO4	Demonstrate effectiv		, includi	ng se	elf-int	troduc	tion,	pronu	uncia	tion, and
	extempore speech del	<u> </u>						1 '11		1.
CO5	Apply communication communication situat		gnıze ba	rriers	s, an	d enf	nance	SK1II:	s for	r diverse
	communication situat	ions								
TT *4 NT			C 4		T	•	0 4			DI
Unit-No.	Conte		Contac	t	Le	arnin	g Out	come)	BL
			Contac Hour							
Unit-No.				L	earn	grai	nmar	bas	sics:	BL 2
	Conte			L	earn arts	gran of s	nmar peech	bas ı (no	sics:	
	Conte		Hour	L p v	earn arts erb,	gran of s	nmar peech	bas n (no	sics: oun, tc.),	
	Conte			L p v	earn arts erb,	grai of s adje s (a	nmar peech	bas n (no n, et	sics: oun, tc.), he),	
	Grammar Parts of Speech		Hour	L p v a a	earn arts erb, rticles	grai of s adje s (a	nmar speech ective,	bas n (no n, et n, th	sics: oun, tc.), he),	
	Grammar Parts of Speech Articles	nt	Hour	L p v a a a a	earn arts erb, rticles uxilia	gran of s adjo s (a ary ative	nmar speech ective, ar	bas n (no n, et n, th ve	sics: oun, tc.), he),	
	Grammar Parts of Speech Articles Auxiliary Verbs	nt	Hour	L p v a a a se	earn arts erb, rticles uxilia ffirms	gran of s adjo s (a ary ative	nmar speech ective, ar and acture	bas n (no n, en n, th ve nega	sics: oun, tc.), he), erbs, tive	
I	Grammar Parts of Speech Articles Auxiliary Verbs	nt	Hour	L p v a a a a so	earn arts erb, rticles uxilia ffirma enten	gran of s adjo s (a ary ative	nmar speech ective, ar and acture	bas n (no n, en n, th ve nega	sics: oun, tc.), he), erbs, tive	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg	nt	Hour	L p v a a a se	earn arts erb, rticles uxilia ffirms enten- earn eterm	gran of s adje s (a ary ative ce stru	mmar speech ective, ard and acture mar e	bas n (no n, et n, th ve nega s.	sics: oun, tc.), he), erbs, tive	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners	gative Sentences	Hour	L p v aa aa aa se	earn arts erb, rticles uxilia ffirms enten- earn eterm	gran of s adjo s (a ary ative ce stru gram niners,	nmar speech ective, ard and acture mar e	basa (no , et n, th ve nega s. ssenti	sics: oun, tc.), he), erbs, tive	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction	rative Sentences	Hour	L p v aa aa aa aa see L d	earn arts erb, rticles uxilia ffirms enten earn eterm onstru	gran of s adjo s (a ary ative ce stru gram niners,	mmar speech ective, and acture mar e	basa (no , en n, ti ve nega s. ssenti	sics: oun, tc.), he), erbs, tive	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences	rative Sentences	Hour	L pp v a a a a a so	earn arts erb, rticles uxilia ffirms enten earn eterm onstrue	gran of s adje s (a ary ative ce stru gram niners, uction ces	mmar speech ective, and acture mar e	basa (no , et n, ti ve nega s. ssenti sente pes assert gree	sics: oun, tc.), he), erbs, tive ials: ence of ive, of	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences of Imperative, etc.)	eative Sentences On (Assertive,	Hour 5	L p v a a a a so	earn arts erb, rticles uxilia ffirms enten earn onstruenten mpera	gran of s adjo s (a ary ative ce stru gram niners, uction ces ative),	nmar speech ective, and acture mar e	basa (no , et n, ti ve nega s. ssenti sente pes assert gree	sics: bun, tc.), he), rbs, tive ials: of cive, of	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences (Imperative, etc.) Degree of Comparison	eative Sentences on (Assertive,	Hour	L p v a a a a so	earn arts erb, rticles uxilia ffirms enten earn eterm onstrue npera ompa	gran of s adjo s (a ary ative ce stru gram niners, uction ces ative), arison,	mmar speech ective, ard and acture mar ed, ty (a deg and ion	basa (no , et n, th ve nega s. ssenti sente pes assert gree prac exerc	sics: bun, tc.), he), rbs, tive ials: of cive, of	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences of Imperative, etc.)	eative Sentences on (Assertive,	Hour 5	L p v a a a a second constant	earn arts erb, rticle: uxilia ffirma enten earn onstru enten ompera ompra ompr	gran of s adjo s (a ary ative ce stru gram niners, uction ces ative), arison, ehens ll devo	and acture mar e deg and ion elopm	basa (no part), en part (no part), the part (no part) sente (no part) sente (no part) practicular (no part) pr	sics: bun, tc.), he), rbs, tive ials: ence of cive, of ctice cises	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences of Imperative, etc.) Degree of Comparison Comprehension Exe	eative Sentences on (Assertive,	Hour 5	L p v a a a a so L d c c c c f c	earn arts erb, rticles uxilia ffirms enten earn eterm onstrue ompa ompr or ski	gran of s adjo s (a ary ative ce stru gram niners, uction ces ative), arison, ehens ll devo	and acture mar e deg and ion elopm	basa (not), et not, the negation of the negati	sics: bun, tc.), he), rbs, tive ials: ence of ive, of tice ises	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences (Imperative, etc.) Degree of Comparison	eative Sentences on (Assertive,	Hour 5	L p v a a a a see L d c c see in c c c fe	earn arts erb, rticle: uxilia ffirm: enten earn eterm onstru enten ompera ompr or ski	gran of s adje s (a ary ative ce stru gram niners, action ces ntive), rison, ehens ll deve	and acture mar e deg and ion elopm	basa (not) ve negars. ssential sente respess assert gree prace exercisent. skills ng vs.	sics: bun, tc.), he), rbs, tive ials: of ive, of tice ises	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences of Imperative, etc.) Degree of Comparison Comprehension Exe	eative Sentences on (Assertive,	Hour 5	L p v a a a a so so in c c c fo	earn arts erb, rticles uxilia ffirms enten earn onstruenten ompera ompra ompra or ski	gran of s adje s (a ary ative ce stru gram niners, uction ces ative), rrison, ehens ll deve	and acture mar e deg and ion elopm	basa (no , en , the negars. ssential sente prese prace exercisent. Skills ng vs. Factor:	sics: bun, tc.), he), trbs, tive ials: ence of tive, of tice isss	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences (Imperative, etc.) Degree of Comparison Comprehension Exe	eative Sentences On (Assertive, On recises	Hour 5	L p v a a a a a so so c c c c c fo	earn arts erb, rticles uxilia ffirms enten earn eterm onstrue ompar ompr or ski Develo nders earing	gran of s adjo s (a ary ative ce stru gram niners, uction ces ative), rison, ehens ll deve op list stand l g, pro ng it,	mmar peech ective, and acture mar e deg and ion elopmening istenii cess, fimpor	basa (not) ve negas. ssentia sente pres assert gree prace exercisent. skills ng vs. Cactor; tance	sics: bun, tc.), he), brbs, tive ials: ence of ive, of etice ises	2
I	Grammar Parts of Speech Articles Auxiliary Verbs Affirmative and Neg Grammar Determiners Sentence Construction Types of Sentences of Imperative, etc.) Degree of Comparison Comprehension Exe Listening Skills What is listening?	eative Sentences On (Assertive, On recises	5 7	L p v a a a a see see see see see see see see	earn arts erb, rticles uxilia ffirms enten earn onstruenten ompera ompra	gran of s adje s (a ary ative ce stru gram niners, uction ces ative), rrison, ehens ll deve	and acture mar e deg and ion elopmelopmistening istening import	basa (no part) to the large state of the large stat	sics: bun, tc.), he), brbs, tive ials: ence of ive, of etice ises	2

	Listening Difference between Listening and Hearing, Purpose and Importance of Effective Listening How to Improve Listening Process		listening abilities.	
V	Speaking Skills Introducing yourself Self-discovery Basics of Phonetics, pronunciation Extempore speech Video Recording for Self reflection Communication Skills Introduction to Communication, Importance of Communication Skills, Purpose of Communication, Types of Communication, Formal and informal communication Importance of Communication, Barriers to Communication, How to improve/ tips to improve Communication skills.	6	Enhance speaking skills: self-introduction, phonetics, pronunciation basics, extempore speaking, and self-reflection through video recording for improvement. Learn communication fundamentals: introduction, importance, types, formal vs. informal, barriers, tips for improvement, and effective responses in different contexts.	2
	Responding to different questions in various situations(formal/informal)			

T6: Chaturvedi, P.D., Chaturvedi Mukesh, "Business Communication: Concepts, Cases and Applications", Second edition, Pearson, Noida, 2011.

T7: Alex K., Chand, S, "Soft Skills: Know Yourself and Know the World", first edition, S. Chand and Company Ltd., New Delhi, 2009.

REFERENCE BOOKS:

R1:Quirk, Randolp, "A Comprehensive Grammar of the English Language", Randolph Quirk, Sidney Greenbaum, Pearson Education India, 2010..

R2:Marks, Jonathan, "IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score". Book + CD-ROM, Delta Publishing, 2017.

OTHER LEARNING RESOURCES:

O1: https://youtu.be/bEB8-SWMYhI

O2:https://youtu.be/-zZau_dttRY

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze and apply the rules of Parts of Speech in constructing grammatically correct sentences.	1, 2, 3, 4, 5, 10, 12
2	Evaluate sentence structures, employ varied sentence types, and demonstrate effective comprehension skills.	1, 2, 3, 4, 5, 10, 12
3	Assess listening skills, identify factors influencing listening, and implement strategies for improved listening.	1, 2, 3, 4, 5, 10, 12
4	Demonstrate effective speaking skills, including self-introduction, pronunciation, and extempore speech delivery.	1, 2, 3, 4, 5, 10, 12
5	Apply communication theories, recognize barriers, and enhance skills for diverse communication situations.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO	PO	РО	РО	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Introduct ory	CO 1	1	1	1	1	1					3		2
	English for Engineers	CO 2	1	1	1	1	1					3		2
22UBPD11 4R	Engineers	CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

	SF	EMESTER – I							
C TOTAL			4. 4.						
Course Title		Extra-Curricular A			D I	C 1	n (.,	
Course code		al credits: 1	L	T	P	\mathbf{S}	RC		C
	lota	al hours: 15S		Δ.	0	4	1		1
D : '4	NIII	<u> </u>	0	0	0		0 (,	1
Pre-requisite	NIL Parkalan of Tark	Co-requisite		0	T	Nil			
Programme	Bachelor of Tech	nology in Compute	er Scien	ce &	Engi	neerin	g		
Semester		1							
Course	To develop the social and soft sl	cills							
Objectives 2	To promote a holistic developm	ent of the learners							
(Minimum 3)		1	. '1			. , .			
CO1	Learn to a plan so that they can	-	contrib	utioi	is, mai	ntain	a cor	nmı	tment,
002	and manage their time and prior		laad. 1	:			4	4a 1	1
CO2	Transform passionate students	wno demonstrate I	ieadersh	ip a	na pur	sue ir	iteres	ts b	eyond
002	their academics.	• 1		1	1' '	.1		1	1
CO3	Learn to participate in vario	us co-curricular ac	ctivities	iea	aing t	o the	ır mı	ıltıI	aceted
004	personality development.	1 .1 1 .2	1 1		1 1	1			C .1 .
CO4	Express their ideas, views, In-	depth evaluation an	nd analy	SIS C	clearly	in the	e top	c o	f their
	interest.	20	.		1	•			
CO5	Demonstrate and practices dif		y Integ	ratın	g lear	nıng	exper	ienc	es by
	demonstrating transferable skills	S	~ .	. 1					
Unit-No.	Content		Conta Hour			earni	_		BL
			нли	•	(Outcor	ne		
	A 1/TY			•		т .	C ,		
I	AdtU encourages a range of		15	•	ADTI	_	foste	rs	
I	the regular curriculum int	ended to meet		-	ADTU	ic		rs	
I	the regular curriculum int learner's interest, These activi	ended to meet ties are aimed to			ADTI holist devel	ic opmer	ıt		
I	the regular curriculum int learner's interest, These activi develop the social and soft ski	ended to meet ties are aimed to lls and promote a		-	ADTU holist develo	ic opmer gh clu	ıt bs lik	te	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea	ended to meet ties are aimed to lls and promote a rners, Keeping in		•	ADTU holist develo throug Dance	ic opmer gh clu e,	it bs lik Musi	te	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning	ended to meet ties are aimed to lls and promote a rners, Keeping in methodology the			ADTU holist develo throug Dance Photo	ic opmer gh clu e, graph	it bs lik Musi y,	te c,	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning students are engaged in di	ended to meet ties are aimed to lls and promote a rners, Keeping in methodology the fferent activities			ADTU holist develor through Dance Photo Dram	opmer gh clu e, graph a,	it bs lik Musi	te c,	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning students are engaged in di headed under different clubs v	ended to meet ties are aimed to lls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music,			ADTU holist develor throug Dance Photo Dram Litera	opmer gh clu e, graph a, ture,	it bs lik Musi y, an	te c,	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning students are engaged in di headed under different clubs v photography, drama, literary e	ended to meet ties are aimed to Ils and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students			ADTU holist develor throug Dance Photo Dram Litera encou	opmer gh clu e, graph a, ture,	nt bs lik Musi y, an	te c, d	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning students are engaged in di headed under different clubs v photography, drama, literary e are encouraged to participate	ended to meet ties are aimed to lls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club			ADTO holist develor through Dance Photo Dram Literate encoupartic	opmer opmer gh clu e, graph a, ture, traging	at bs lik Musi y, an	n n	
I	the regular curriculum int learner's interest, These activi develop the social and soft ski holistic development of the lea mind the 360 degree learning students are engaged in di headed under different clubs v photography, drama, literary e are encouraged to participate activities, workshops, competi	ended to meet ties are aimed to Ils and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their			ADTO holist develor throug Dance Photo Dram Litera encour partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum int learner's interest, These activity develop the social and soft ski holistic development of the lear mind the 360 degree learning students are engaged in di headed under different clubs we photography, drama, literary of are encouraged to participate activities, workshops, competi- interest and hobbies, The stu-	ended to meet ties are aimed to ills and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of			ADTO holist develor through Dance Photo Dram Literate encoupartic	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum int learner's interest, These activity develop the social and soft ski holistic development of the learning students are engaged in di headed under different clubs v photography, drama, literary of are encouraged to participate activities, workshops, competi- interest and hobbies, The stu- the club are trained represent	ended to meet ties are aimed to lls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These actividevelop the social and soft ski holistic development of the learning to the social and soft ski holistic development of the learning students are engaged in disheaded under different clubs with photography, drama, literary eare encouraged to participate activities, workshops, competinterest and hobbies, The student club are trained represent inter University student and	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various a national level			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These actividevelop the social and soft skill holistic development of the learning students are engaged in disheaded under different clubs with photography, drama, literary eare encouraged to participate activities, workshops, competing interest and hobbies, The students are trained represent inter University student and competitions, Renewed person	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various d national level alities are invited			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These activities develop the social and soft ski holistic development of the learning to the activities are engaged in displayed to participate activities, workshops, competitinterest and hobbies, The stutte club are trained represent inter University student and competitions, Renewed person to conduct workshops that ber	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various d national level alities are invited aefit the members			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These actividevelop the social and soft skill holistic development of the learning students are engaged in disheaded under different clubs with photography, drama, literary eare encouraged to participate activities, workshops, competitionterest and hobbies, The students are trained represent inter University student and competitions, Renewed person to conduct workshops that bery and students by giving them	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various d national level alities are invited refit the members the platform to			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These activities develop the social and soft ski holistic development of the learning to the activities are engaged in displayed to participate activities, workshops, competitinterest and hobbies, The stutte club are trained represent inter University student and competitions, Renewed person to conduct workshops that ber	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various d national level alities are invited refit the members the platform to			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	
I	the regular curriculum intlearner's interest, These actividevelop the social and soft skill holistic development of the learning students are engaged in disheaded under different clubs with photography, drama, literary eare encouraged to participate activities, workshops, competitionterest and hobbies, The students are trained represent inter University student and competitions, Renewed person to conduct workshops that bery and students by giving them	ended to meet ties are aimed to alls and promote a rners, Keeping in methodology the fferent activities iz. Dance, music, etc., The students in regular club tions as per their dent members of AdtU in various d national level alities are invited refit the members the platform to			ADTO holist develo throug Dance Photo Dram Litera encou partic works	opmer gh clu e, graph a, ture, traging ipations	ot bs lik Musi- y, an g n i	n n	

REFERENCE BOOKS:

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1, 2, 3, 4, 5, 6, 10, 12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1, 2, 3, 4, 5, 6, 10, 12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1, 2, 3, 4, 5, 6, 10, 12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1, 2, 3, 4, 5, 6, 10, 12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1, 2, 3, 4, 5, 6, 10, 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Extra-	CO	2	2	2	1	2	2				2		2
	Curricul	1	2	2	2	1	2	2				2		2
	ar	CO	2	2	2	1	2	3				2		2
221 DE C1	Activitie	2	2	2	2	1	2	3				2		2
22UBEC1	S	CO	1	1	2	1	2	2				3		3
11		3	1	1		1						3		3
		CO	2	2	2	1	2	2				2		2
		4				1								
		CO	1	1	1	1	2	1				1		3
		5	1	1	1	1		1				1		3

		SEMESTE	R – II						
Course Title		Engineer	ing Mat	hema	tics II	[
Course code	22BTCS121R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours:	3	1	0	0	0	0	4
		45T+30P							
Pre-requisite	Mathematics	Co-requisite]	Nil		
Programme	Bache	elor of Technology i	n Comp	uter	Scienc	e & 1	Engin	eering	
Semester		Vinter/ II semester (
Course		ept of algebraic struc			g Boo	lean	algeb	ra and Bo	olean ring
Objectives		understanding compl	ex probl	lems.					
(Minimum 3)	Apply the concept	• 1							
	_	oply concepts of mu	ıltivarial	ble ca	ılculus	incl	uding	partial d	erivatives,
0.01		and vector calculus		-					
CO1		ordinary differential	_						
CO2		partial differentiation		on of	higher	orde	r.		
CO3	•	ex analysis and solut			11	•			
CO4		ncept of basic probab	•	^	. *	10n.			
CO5		ncept of basic and ap							1
Unit-No.	Cor	ntent	Conta		Lea	rnin	g Out	come	BL
			Hour						1.0.0
I	Sets, relations an				•	the		cept of	1,2,3
	_	on sets, Cartesian			elation	-		ncluding	
		union (sum), and			_			flexivity,	
	power sets. Di	• •			-	-		nsitivity,	
		compositions and						represent	
	inverses. Diffe	• •			elation		ising atrices	ordered	
		compositions and te partial ordering,			airs,		Need		
	•	aplete, distributive,			raphs. ifferer			d to between	
		plemented lattices.	5					ive, and	
	Boolean and	pseudo Boolean			ijectiv		-	nappings,	
	lattices.	pseudo Boolean			nderst		11	function	
	lattices.						and	inverses,	
					_			various	
								, such as	
					inear a				
II	Propositional Log	gic:			Constru			interpret	3,4
								luate the	,
	"	semantics, proof						lity, and	
	*	ability, validity,			autolog			ure of	
	_	leteness, deduction			roposi	_		and	
		cision problems of			_			een valid	
		ic. Introduction to				nvali		rguments	
	first order logic	and first order	7	tl	hrough	n dire	ct and	lindirect	
	1								50

	theory.		proofs, including proof by	
			contradiction.	
III	Algebraic Structures: Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).	6	Perform operations within these structures, verify axioms, and apply homomorphisms and isomorphisms to explore structural similarities. Additionally, students should comprehend the significance of substructures like subgroups, subrings, and subfields, and use theorems such as Lagrange's theorem and the Fundamental Theorem of Algebra to solve related problems. Developing proficiency in proving properties and relationships within algebraic structures, students will be equipped to apply these concepts to more advanced mathematical contexts and real-world scenarios.	3,4
IV	Introduction to Counting: Basic counting techniques — inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.	6	Solve problems involving counting without replacement, use the binomial theorem for expansion, and apply Pascal's triangle in combinatorial contexts. Additionally, students should grasp more advanced topics such as the inclusion-exclusion principle, Pigeonhole Principle, and solving problems involving partitions of sets.	4
V	Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.	6	Learn to represent graphs using adjacency matrices and lists, and apply fundamental algorithms for traversing graphs, Understand and apply	4 51

			concepts of graph coloring, planarity, and isomorphism, and solve problems involving Eulerian and Hamiltonian paths and circuits. Mastery of these concepts will enable students to apply graph theory to real-world problems in computer	
			science, network analysis, and other fields.	
	Practical Con	mponent		
Practical 1	Expert no 1	30	LO	1,2,3,4
Practical 2	Expert no 2			
•••••				
Practical 15				

T1: C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill,2000.

T2: K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, a.2007.

REFERENCE BOOKS:

R1: R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.

OTHER LEARNING RESOURCES:

O1: Coursera: Platforms like Coursera offer courses such as "Mathematics for Engineers" which cover topics ranging from calculus to differential equations and linear algebra.

O2: edX: Courses like "Engineering Mathematics" provide an in-depth study of mathematical techniques important in engineering disciplines

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply solutions of ordinary differential equations of various order.	1,2,3,4,5,10,12
2	Apply solutions of partial differentiation equation of higher order.	1,2,3,4,5,10,12
3	Analyse the complex analysis and solutions.	1,2,3,4,5,10,12
4	Understand the concept of basic probability and its application.	1,2,3,4,5,10,12
5	Understand the concept of basic and applied statistics.	1,2,3,4,5,10,12

Course	Course	CO	РО	РО	PO	РО	РО	РО	РО	РО	РО	PO1	PO1	PO1
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS12 1R		CO 1	3	2	3	3	3					3		2
	Engineeri ng	CO 2	2	2	2	2	2					3		2
	Mathema tics II	CO 3	2	2	2	2	2					3		2
		CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

		SEMESTER -	- II								
Course Title		Engineer	ing Che	mist	try						
Course code	22BTCS122R	Total credits: 4	L	T	P	S	R	O/F	C		
		Total hours:	2	1	2	0	0	0	4		
	3701	45T+30P									
Pre-requisite	Nil	Co-requisite	~				Nil				
Programme		or of Technology in (
Semester		inter/ II semester of t			r of th	e pro	ogran	<u>n</u>			
Course	•	asoning and quantitati	•								
Objectives		ontent, and pedagogy	for on	e of	existi	ng g	enera	l chemist	ry course		
(Minimum 3)	sequences				1						
		roduce the content of chemistry set in a current and relevant context for engineers. nalyse microscopic chemistry in terms of atomic and molecular orbitals and									
CO1	-	•	f atomic	and	molec	cular	orbita	ıls and			
804	intermolecular force							44.00			
CO2		es of the electromagne	-			for e	xcitin	g differen	t		
804		vels in various spectro	_		_						
CO3		perties and processes									
CO4	•	properties such as ion	ization	potei	ntial, e	electr	onega	itivity,			
~~-	oxidation states and										
CO5		ical reactions that are	1		-						
Unit-No.	Con	ntent	Conta		Lea	rnin	g Ou	tcome	\mathbf{BL}		
I		cular structure (12	Hou		Comp						
	Schrodinger equation solutions and the conjugated in an anoparticles. For atom wave function these functions to variations. Molecular multicentre orbitation atomic and molecular orbitals benzene and arom theory and the enfort ransition memagnetic properties solids and the role.	on. Particle in a box our applications for molecules and ms of the hydrogen ons and the plots of explore their spatial cular orbitals of s and plots of the als . Equations for malar orbitals. Energy	5		unders organi includ proton electro nucleu	stand zatio ing is, r ons s oution s, ' the ning a,	ing on of the ineutro with and as in They e p	atoms, roles of ns, and	1,2,3		
II	applications (8 lec Principles of	techniques and tures) spectroscopy and les. Electronic	7]	Comp unders princij used interac	stand ples to	ing and analy	of the methods yze the between	3,4		

	spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging. Surface characterization techniques. Diffraction and scattering.		matter and electromagnetic radiation across different wavelengths. They should be able to describe and apply techniques such as UV-Vis spectroscopy, infrared spectroscopy (IR), nuclear magnetic resonance spectroscopy (NMR), and mass spectrometry (MS) for qualitative and quantitative analysis of	
III	Intermolecular forces and potential energy surfaces Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces oh H ₃ H ₂ F and HCN and trajectories on these surfaces Use of free energy in chemical equilibria (6 lectures) Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energies and emf. Cell potentials, the Nernst equations and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham Diagrams	6	grasp the fundamental interactions between molecules and their implications in physical properties and chemical behavior. Intermolecular forces, including van der Waals forces, hydrogen bonding, and dipoledipole interactions, dictate the stability of molecular aggregates and influence phenomena such as boiling points, solubility, and viscosity. Understanding the concept of free energy in chemical equilibria is essential for students to comprehend the spontaneity and directionality of chemical reactions. Free energy (G) represents the energy available to do work under constant temperature and pressure conditions	3,4
IV	Periodic Properties (4 lectures)	6	Grasp the underlying principles governing	4

	Effective nuclear charge. Penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes. Ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries		these trends, such as effective nuclear charge and shielding effects, and how these influence the reactivity, chemical bonding, and physical properties of elements. Additionally, students should be able to predict and interpret periodic trends using periodic tables, understand the factors that affect these trends, and apply this knowledge to explain phenomena such as the formation of ions, trends in chemical reactivity, and the periodic classification of elements according to their properties.	
V	Representations of 3 dimensional structures, structural isomers and stereo isomers. Configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds. Organic reactions and synthesis of a drug molecule (4 lectures) Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule	6	understand the fundamental concepts of chirality, stereoisomerism, and geometric isomerism, and be able to distinguish between different types of stereoisomers such as enantiomers and diastereomers. They should comprehend how stereochemistry influences molecular interactions, including biological recognition processes and drug efficacy. Moreover, students should apply stereochemical principles to predict the outcomes of reactions, particularly in organic chemistry, and recognize the importance of spatial arrangement in shaping the physical and	4

			molecules. Mastery of	
			stereochemistry enables	
			students to understand	
			complex molecular	
			structures and their	
			behaviors, essential for	
			fields such as	
			pharmaceuticals,	
			materials science, and	
			biochemistry.	
	Practical Comp	onont	oroenemistry.	
	-	onent		
Practical 1	QualitativeOrganicAnalysis(Minimum5		Learn to identify	1,2,3
	numberofsamples)		unknown organic	
			compounds using a	
			systematic approach	
			involving several key	
			techniques. They should	
			be able to perform tests	
			such as solubility tests,	
		5	functional group tests	
			(e.g., bromine water test	
			for alkenes, silver nitrate	
			test for halides), and	
			spectroscopic methods	
			including infrared (IR)	
			and nuclear magnetic	
			resonance (NMR)	
			spectroscopy.	
Practical 2	Estimationof	5	Estimating iron using a	3,4
	IronUsingstandardKMnO ₄ solution		standard potassium	
			permanganate (KMnO4)	
			solution involves a	
			titration method that	
			students should master	
			for analytical chemistry.	
			Initially, students	
			prepare an acidic	
			solution containing iron	
			ions, then titrate it with	
			KMnO4 solution until a	
			color change occurs,	
			typically from purple to	
			colorless.	
Practical 3	DeterminationofTotalHardnessof	5	Determining the total	3,4
	waterandEstimationofCa		hardness of water and	- , .
			estimating the calcium	
			ion concentration	
			involves titration	
			mvorves utration	

			techniques essential in	
			environmental and	
		_	analytical chemistry.	
Practical 4	Determinationofsurface	5	Determining the surface	4
	tensionofgivenliquid		tension of a liquid	
			involves several	
			experimental methods	
			that students should	
			master in physical	
			chemistry and fluid	
			mechanics. One	
			common method is the	
			capillary rise method,	
			* *	
			where students measure	
			the height to which the	
			liquid rises in a capillary	
			tube due to capillary	
			action.	
Practical 5	Determinationofviscosityof givenliquid	5	Determining the	4
			viscosity of a liquid	
			involves several	
			experimental techniques	
			that are fundamental in	
			fluid mechanics and	
			physical chemistry. One	
			common method is the	
			capillary viscometer	
			technique, where	
			students measure the	
			time it takes for a liquid	
			to flow through a narrow	
			capillary tube under	
			gravity.	
Practical 6	Synthesisof apolymer/drug	5	Synthesizing a polymer	
			or drug involves a series	
			of chemical reactions	
			and processes aimed at	
			creating a specific	
			molecular structure with	
			desired properties. For	
			polymers, students	4
			typically learn methods	
			such as polymerization	
			reactions (e.g.,	
			condensation	
			polymerization, addition	
			polymerization) to link	
			monomers into long	
			chains.	
		<u> </u>	Chamb.	

T1: University chemistry, by B. H. Mahan

T2: University chemistry, by B. H. Mahan

T3: Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

T4: Fundamentals of Molecular Spectroscopy, by C. N. Banwell

T5: Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

REFERENCE BOOKS:

R1: Physical Chemistry, by P. W. Atkins

R2: Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

OTHER LEARNING RESOURCES:

O1:Coursera: Offers courses on engineering chemistry topics such as materials science, environmental chemistry, and chemical engineering principles.

O2: edX: Provides courses from universities worldwide covering topics like nanotechnology, renewable energy, and chemical process design.

O3: MIT Open Course Ware: Offers free lecture notes, exams, and videos from actual MIT courses in chemistry and chemical engineering.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.	1,2,3,4,5,10,12
2	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques	1,2,3,4,5,10,12
3	Understand bulk properties and processes using thermodynamic considerations	1,2,3,4,5,10,12
4	Understand periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity	1,2,3,4,5,10,12
5	Analyse major chemical reactions that are used in the synthesis of molecules.	1,2,3,4,5,10,12

Course	Course	CO	PO	РО	РО	РО	РО	РО	РО	PO	PO	PO1	PO1	PO1
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS12		CO 1	3	2	1	3	1					1		3
	Engineeri ng	CO 2	3	2	2	2	2					2		2
2R	Chemistr CC y 3	CO 3	3	2	1	3	1					1		3
		CO 4	3	2	2	2	2					2		2
		CO 5	3	2	2	2	2					2		2

		SEMESTE	R – II								
Course Title		Programmii	ng for Pi	roble	m Solv	ving					
Course code	22BTCS123R	Total credits: 4	L	Т	P	S	R	O/F	C		
		Total hours:	3	0	2	0	0	0	4		
		45T+30P									
Pre-requisite	Nil	Co-requisite			~ .		Nil				
Programme		lor of Technology i									
Semester		/inter/ II semester						m			
Course	_	e algorithms for arit			•						
Objectives		To test and execute the programs and correct syntax and logical errors. Understanding algorithms, data structures, and computational thinking, enabling them to									
(Minimum 3)				•				_	g them to		
CO1		nalyze problems logically and develop systematic solutions through coding Inderstand computer system elements and a foundational comprehension of algorithms									
COI	and programming.	ici system cicinents	and a n	Junua	uionai	com	prener	181011 01 a	igoriumis		
CO2		and looping staten	nents to	addı	ress d	ecisio	n-ma	king prog	ramming		
	problems.	and rooping staten		aaa	. 200 U	1010		5 Prog	,		
CO3	1	is derived data types	s, hetero	gener	ous dat	a tvn	es, str	ings, and	functions		
	effectively for prog		,	٠ د ن		-JP	.,	<i>6-,</i>			
CO4		rstanding of point	ters and	app	lying	their	cone	cepts skil	lfully in		
	programming scena			• •	•			•	·		
CO5	Apply file handlin	g concepts in C pr	ogramm	ing v	vith co	mpet	ence,	ensuring	effective		
	data management a	nd storage solutions									
Unit-No.	Cor	itent	Conta	ct	Lea	rnin	g Out	come	BL		
			Hour	•							
I	Introduction to		8		Jnders		-	of	1,2,3		
	Introduction to	-		_	rograi		_	concepts,			
	computer system	· ·				_		es, data			
	processor, where				-			tructures			
	stored and exe			`	such	as	loop				
	system, compiler	•			onditi			unctions,			
	Algorithm: steps	•						tructures			
	and numeric	*				•		sts. They			
	Representation Flowchart/Pseudo	of Algorithm: code with						proficient			
	examples. From					-		ng, and using a			
	programs; source	-				_		language			
	(with data types				-		-	Java, or			
	memory location				C++.	3 1 y	111011,	Java, Oi			
	Logical Errors in	•		`	J 1 1 •						
		F									
	object and executa	ıble code									
II		pressions and	12		Jnders			ow to	3,4		
	precedence	Conditional			onstru		and	evaluate			
	Branching and L	oops:			rithme		-	pressions			
	Writing and	evaluation of			vith	corre	ect	operator			
		nd consequent		r	recede	ence		and			
	John Milliand	tombequent	<u> </u>						61		

	branching, Iteration and loops		associativity rules to	
	Arrays: Arrays (1-D, 2-D),		ensure accurate	
	Character arrays and Strings Basic		calculations. They should	
	Algorithms: Searching, Basic		master using conditional	
	Sorting Algorithms (Bubble,		branching (if, else-if, else	
	Insertion and Selection), Finding		statements) to direct	
	roots of equations, notion of order		program flow based on	
	_		Boolean conditions,	
	of complexity through example		,	
	programs (no formaldefinition		enabling the execution of different code blocks	
	required)			
	roquiros)		based on varying input	
		_	scenarios.	
III	Function: Functions (including	8	Understand the concepts	3,4
	using built in libraries), Parameter		of parameters, return	
	passing in functions, call by value,		values, and scope,	
	passing arrays to functions: idea of		ensuring proper data flow	
	call by reference Recursion:		and variable accessibility	
	Recursion, as a different way of		within and outside	
	solving problems. Example		functions.	
	programs, such as Finding Factorial,			
	Fibonacci series, Ackerman function			
	etc. Quick sort or Mergesort.			
IV	Structure: Structures, Defining	6	Understand how to define	4
	structures and Array of Structures		and use structures to create	
			complex data types that	
	Pointers: Idea of pointers, Defining		group different variables	
	pointers, Use of Pointers in self-		under a single name,	
	referential structures, notion of		enhancing data	
	linked list (no implementation)		organization and	
			manipulation. They should	
			learn how to declare and	
			access structure members,	
			and understand memory	
			layout and alignment.	
X 7	File handling (only if time is		•	4
V	File handling (only if time is		Learn how to open, read,	4
	available, otherwise should be done		write, and close files using	
	as part of the lab)		programming languages	
	The Prince of the case,		such as Python, Java, or	
		5	C++. They should	
			understand the importance	
			of file modes (e.g., read,	
			write, append) and be able	
			to handle different file	
			types, such as text and	
			binary files.	
	Practical Con	mponent		
Practical 1	Write a C program to find sum and		These programs cover	1,2
T Tactical I	average of three numbers.	2	basic arithmetic	1,4
	average of unce numbers.		basic aritimetic	

	Waite Comment of Control		1::14	1
Practical 2	Write a C program to find the sum of individual digits of a given positive Write a C program to generate the first n terms of the Fibonacci sequence Write a C program to generate prime	2	operations, digit manipulation, and sequence generation in C, demonstrating fundamental programming concepts such as loops, conditionals, and input/output operations These programs	1,2
	numbers between 1 to n. Write a C program to Check whether given number is Armstrong Number or Not.		demonstrate how to generate prime numbers within a specified range and how to check if a given number is an Armstrong number, illustrating fundamental concepts such as loops, conditionals, and basic mathematical operations in C.	
Practical 3	Write a C program to evaluate algebraic expression (ax)/ (ax-b). Write a C program to check whether given number is perfect number or Not Write a C program to check whether given number is strong number or not.	3	These programs illustrate the evaluation of an algebraic expression, checking for perfect numbers, and identifying strong numbers, employing concepts such as mathematical operations, loops, conditionals, and functions in C.	1,2
Practical 4	a) Write a C program to find the roots of a quadratic equation.b) Write a C program perform arithmetic operations using switch statement.	2	These programs illustrate how to find the roots of a quadratic equation using mathematical formulas and handle various cases based on the discriminant, and how to perform basic arithmetic operations using a switch statement to select the operation based on user input, employing control structures, and mathematical operations in C.	1,2
Practical 5	Write a C program to find factorial of a given integer using non-recursive Function. Write a C program to find factorial	2	These programs demonstrate how to calculate the factorial of a given integer using both	1,2

	of a given integer using recursive		non-recursive and	
	function.		recursive approaches. The non-recursive approach employs a simple loop to multiply the integers up to the given number, while the recursive approach calls the function itself with a decremented value until it reaches the base case, illustrating fundamental concepts of iteration and recursion in C.	
Practical 6	Write C program to find GCD of two integers by using recursive function. Write C program to find GCD of two integers using non-recursive function.	2	These programs illustrate how to find the Greatest Common Divisor (GCD) of two integers using both recursive and non-recursive approaches. The recursive approach uses Euclid's algorithm, calling the function with the remainder until the base case of zero is reached. The non-recursive approach implements the same algorithm using a loop, demonstrating fundamental concepts of recursion and iteration in C.	1,2
Practical 7	Write a C program to find both the largest and smallest number in a list of Integers Write a C Program to Sort the Array in an Ascending Order. Write a C Program to find whether given matrix is symmetric or not.	2	These programs demonstrate how to find the largest and smallest numbers in a list of integers, sort an array in ascending order using the bubble sort algorithm, and check whether a given matrix is symmetric by comparing elements across the main diagonal, illustrating fundamental concepts of arrays, sorting, and matrix operations in C	3,4
Practical 8	Write a C program to perform addition of two matrices. Write a C program that uses functions to perform Multiplication	2	These programs demonstrate matrix operations in C. The first program performs the	3,4

	of Two Matrices		addition of two matrices	
Practical 9	Write a C program to use function to insert a sub-string in to given main	2	addition of two matrices by iterating through each element and summing corresponding elements. The second program defines a function to multiply two matrices, adhering to matrix multiplication rules, and then uses this function to compute the product, illustrating modular programming and array manipulation in C These programs demonstrate string	3,4
	string from a given position. Write a C program that uses functions to delete n Characters from a give position in a given string.		manipulation in C. The first program inserts a substring into a main string at a specified position using a function, while the second program deletes a specified number of characters from a given position in a string using a function. These tasks illustrate the handling of character arrays, string operations, and function use in C	
Practical 10	Write a C program using user defined functions to determine whether the given string is palindrome or not. Write a C program that displays the position or index in the main string S where the sub string T begins, or -1 if S doesn't contain T	3	These programs illustrate string operations in C using user-defined functions. The first program checks if a given string is a palindrome by comparing characters from both ends toward the center. The second program finds the starting index of a sub-string within a main string or returns -1 if the sub-string is not found, demonstrating the implementation of string search algorithms.	3,4
Practical 11	Write C program to count the number of lines, words and characters in a given text.	2	These programs demonstrate string and	3,4

	Write a C program to find the length		character manipulation in	
	of the string using Pointer.		C. The first program	
	of the string using 1 officer.		counts the number of	
			lines, words, and	
			characters in a given text	
			by iterating through the	
			characters and detecting	
			spaces, tabs, and newline	
			characters to determine	
			word boundaries and lines.	
			The second program	
			calculates the length of a	
			string using a pointer,	
			iterating through the	
			characters until it reaches	
			the null terminator,	
			showcasing the use of	
			pointers in C for string	
			operations. These tasks	
			highlight foundational	
			concepts in C	
			programming related to	
			strings, pointers, and	
			character handling.	
			<i>S</i> .	
Practical 12	Write a C program to Display array	2	These programs	3,4
	elements usingcalloc () function		demonstrate practical uses	
	Write a C Program to Calculate		of calloc() for dynamic	
	Total and Percentage marks of a		memory allocation and	
	student using structure.		structures for organizing	
			data related to students'	
			academic information,	
			academic information, showcasing core concepts	
			showcasing core concepts	
			showcasing core concepts in C programming such as	
Practical 13	Write a C program that uses	2	showcasing core concepts in C programming such as memory management and	3,4
Practical 13	Write a C program that uses functions and structures to perform	2	showcasing core concepts in C programming such as memory management and structured data handling.	3,4
Practical 13		2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate	3,4
Practical 13	functions and structures to perform	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of	3,4
Practical 13	functions and structures to perform the following operations:	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file	3,4
Practical 13	functions and structures to perform the following operations: Reading a complex number Writing a complex number	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex	3,4
Practical 13	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing	3,4
Practical 13	functions and structures to perform the following operations: Reading a complex number Writing a complex number	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in	3,4
Practical 13	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in programming and data	3,4
Practical 13	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers Write a C program to display the	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in	3,4
	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers Write a C program to display the contents of a file		showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in programming and data handling.	ŕ
Practical 13 Practical 14	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers Write a C program to display the contents of a file Write a C program to copy the	2	showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in programming and data handling. These programs illustrate	3,4
	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers Write a C program to display the contents of a file Write a C program to copy the contents of one file to another.		showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in programming and data handling. These programs illustrate file handling operations in	ŕ
	functions and structures to perform the following operations: Reading a complex number Writing a complex number Addition of two complex numbers Multiplication of two complex numbers Write a C program to display the contents of a file Write a C program to copy the		showcasing core concepts in C programming such as memory management and structured data handling. These programs illustrate practical applications of structures, functions, file handling, and basic operations with complex numbers in C, showcasing fundamental concepts in programming and data handling. These programs illustrate	ŕ

Write a C program to reverse the	file contents based on user		
first n characters in a file		input, showcasing	
		fundamental concepts in	
		file handling and C	
		programming.	

T1:E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill.

T2: Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHallof India.

REFERENCE BOOKS:

R1:Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

OTHER LEARNING RESOURCES:

O1:Coursera: Courses such as "Programming for Everybody (Getting Started with C).

O2: edX: Introduction to C Programming" by Dartmouth College.

O3:Udemy: Various courses on C programming, including "C Programming For Beginners - Master the C Language".

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand computer system elements and a foundational comprehension of algorithms and programming.	1,2,3,5,11,12
2	Utilize branching and looping statements to address decision-making programming problems.	1,2,3,4,5,9,11,12
3	Apply homogeneous derived data types, heterogeneous data types, strings, and functions effectively for programming tasks.	1,2,3,4,5,9,11,12
4	Demonstrate understanding of pointers and applying their concepts skillfully in programming scenarios.	1,2,3,4,5,11,12
5	Apply file handling concepts in C programming with competence, ensuring effective data management and storage solutions.	1,2,3,4,5,9,11,12

Course	Course	CO	РО	РО	PO	PO	PO	РО	РО	РО	РО	PO1	PO1	PO1
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS1 23R		CO 1	3	3	3	2	2	1				2		3
	Programm ing for	CO 2	3	2	2	2	2	1				2		2
	Problem Solving	CO 3	3	2	2	2	2	1				2		2
		CO 4	3	3	3	2	2	1				2		3
		CO 5	3	3	3	2	2	1				2		3

		Semeste	r II									
Course Title		Engineering	g Graphi	ics an	d Des	ign						
Course code	22BTCS124R	Total credits: 3	L	T	P	S	R	O/F	C			
		Total hours:	1	0	4	0	0	0	3			
		45T+30P	1	U	7	U	U	U				
Pre-requisite	Nil	Co-requisite					Nil					
Programme	Bachelor of Technology in Computer Science & Engineering											
Semester		Winter/ II semester of the first year of the program										
Course	To enable the students with various concepts like dimensioning, conventions and											
Objectives	standards related to Engineering Drawing											
(Minimum 3)	_	ge on the projection	_			_						
	_	ualization skills for l			_	_	-					
	_	aginative skills of the	e student	s req	uirea 1	to un	aersta	na Section	n of solids			
	and Developments		arrina na		ion of	1	نا داد:	aat in Iaa	matria and			
	Perspective project	nts understand the vi	ewing pe	псері	1011 01	a soi	iu obj	ect III Iso	menic and			
CO1	1 1	ng principles accu	rately fo	or co	nic c	ectio	ne c	veloid e	nicycloid			
COI	hypocycloid, and in		ratery it	л сс	ine s	cciio	115, C	ycioid, c	picycioid,			
CO2		raphic projections, a	uxiliary	views	s. anno	otatio	ns. dii	mensions.	and floor			
	_	s, doors, and fixtures			,		,	,,				
CO3	<u>^</u>	principles and conv		s, sh	owing	und	erstan	ding of	scale and			
	conventions.	•						C				
CO4	Utilize computer	graphics in CAD	drawing,	dem	onstra	ating	know	ledge of	software			
	theory, customizing	g settings, applying	ISO and	ANS]	I stanc	dards,	and p	producing	drawings			
	using different coor	rdinate input method	ls for line	es and	l circle	es.						
CO5	Apply computer-ai	ded geometric design	n.									
Unit-No.	Con	ntent	Contac	et	Lea	rnin	g Out	come	BL			
			Hour									
I		to Engineering			earn	the		damental	1,2,3			
	<u> </u>	curves: Drawing			_			chniques				
		accessories, BIS –						ving and				
	_	ne scales, Diagonal			rafting ecome	_	They profici					
	_	sentative Fraction. and application of				•		erpreting				
		es, Construction of			arious	_	type					
		Curves, Involutes			nginee		• •	lrawings,				
	1	g with normal and	5		ncludi	_		ographic				
								isometric				
				_	iews,			sectional				
					iews.		dents	should				
				u	nderst	tand	the	use of				
				Si	tandar	ď		drawing				
				iı	nstrum	nents	and c	omputer-				
				a	ided	des	sign	(CAD)				
				S	oftwai	re for	preci	sion and				
				e	fficier	ncy.						

II	Projections of Points and Lines: Introduction to principal planes of projections, Projections of the points located in same quadrant and different quadrants, Projections of line with its inclination to one reference plane and with two reference planes. True length and inclination with the reference planes Projections of Planes: Projections of planes (polygons, circle and ellipse) with its inclination to one reference	7	Understand the principles of orthographic projection, including the projection of points and lines onto various planes. They should learn to accurately depict the position of points in different quadrants and the true length and inclination of lines relative to the projection planes.	3,4
	plane and with two reference planes, Concept of auxiliary plane method for projections of the plane			
III	Projections of Solids and Section of Solids: Classification of solids. Projections of solids (Cylinder, Cone, Pyramid and Prism) along with frustum with its inclination to one reference plane and with two reference planes. Section of such solids and the true shape of the section	6	Learn to accurately draw various solids such as prisms, cylinders, pyramids, and cones in different orientations and positions relative to the projection planes. Additionally, students should understand how to create sectional views by cutting through solids to reveal internal features, using cutting planes and identifying sectional shapes.	3,4
IV	Orthographic Projections: Fundamental of projection along with classification, Projections from the pictorial - 35% view of the object on the principal planes for view from front, top and sides using first angle projection method and third angle projection method, full sectional view	6	Understand how to create multiple views (front, top, side) of objects using orthographic projection methods, ensuring accurate depiction of object dimensions, shapes, and spatial relationships. Students should master the conventions of first-angle and third-angle projection systems, apply projection rules to generate orthogonal views from isometric or perspective drawings, and interpret engineering drawings to extract geometric	4

			information for	
			manufacturing and	
T 7	T 4: D:4:		construction purposes.	4
V	Isometric Projections and		Understand the principles	4
	Isometric View or Drawing:		of isometric projection,	
	Isometric Scale, Conversion of		which involves projecting	
	orthographic views into isometric		object edges onto three	
	projection, isometric view or		mutually perpendicular	
	drawing		axes at equal angles of 120	
			degrees. Students learn to	
		6	create isometric views that	
			accurately depict the	
			shape, size, and	
			orientation of objects,	
			providing a realistic and	
			intuitive representation	
			useful in fields such as	
			engineering, architecture,	
			and design.	
	Practical Co	mponent		
Practical 1	Introduction to Engineering		Learn the fundamental	1,2
	Drawing , Principles of Engineering		principles and techniques	
	Graphics and their significance,		essential for creating	
	usage of Drawing instruments,		precise and standardized	
	lettering, Conic sections including		technical drawings used in	
	the Rectangular Hyperbola (General		engineering disciplines.	
	method only); Cycloid, Epicycloid,		They acquire skills in	
	Hypocycloid and Involute; Scales –	6	producing orthographic	
	Plain, Diagonal and Vernier Scales.		projections, isometric	
	Principles of Orthographic		views, and sectional views	
	Projections-Conventions -		of objects, ensuring	
	Projections of Points and lines		accurate representation of	
	inclined to both planes; Projections		dimensions, shapes, and	
	of planes inclined Planes - Auxiliary		relationships in two-	
	Planes;		dimensional formats	
Practical 2	Projections of Regular Solids	6	Grasp how to create	1,2
1 I actical 2	Covering those inclined to both the	U	sectional views to reveal	1,4
	Planes- Auxiliary Views; Draw		internal structures of	
	simple annotation, dimensioning			
			regular solids, employing	
	and scale. Floor plans that include:		cutting planes to illustrate	
	windows, doors, and fixtures such		cross-sections and	
	as WC, bath, sink, shower, etc.		understand spatial	
	Sections and Sectional Views of		relationships within the	
			objects. Mastery of these	
	Right Angular Solids Covering		skills in engineering	
	Prism, Cylinder, Pyramid, Cone—		drawing and technical	
	Auxiliary Views; Development of		illustration allows students	
	surfaces of Right Regular Solids -		to communicate design	

	Prism, Pyramid, Cylinder and		concepts effectively,	
	Cone; Draw the sectional		aiding in manufacturing,	
	orthographic views of geometrical		architectural planning, and	
	solids, objects. From industry and		spatial analysis in various	
	dwellings (foundation to slab only)		engineering disciplines.	
Practical 3	Isometric Projections Covering,	6	Learn how to create	1,2,3
1 ractical 5	Principles of Isometric projection –		accurate and visually	1,2,0
	Isometric Scale, Isometric Views,		appealing representations	
	Conventions; Isometric Views of		of objects by projecting	
	lines, Planes, Simple and compound		their edges onto three	
	Solids; Conversion of Isometric		mutually perpendicular	
	Views to Orthographic Views and		axes at equal angles of 120	
	Vice-versa, Conventions		degrees. This technique	
	vice-versa, Conventions		allows for the	
			visualization of objects	
			from different	
			perspectives, enhancing	
			spatial understanding and	
			design communication in	
			fields such as engineering,	
			architecture, and product	
			design.	
Practical 4	Overview of Computer Graphics	6	Learn about the basic	3,4
	Covering listing the computer		principles of rasterization,	
	technologies that impact on		vector graphics, and	
	graphical communication,		rendering techniques such	
	Demonstrating knowledge of the		as ray tracing and	
	theory of CAD software,		rasterization. They explore	
			topics like geometric	
			transformations, 3D	
			modeling, shading, and	
			texture mapping, essential	
			for creating realistic and	
			interactive virtual	
			environments in fields like	
			gaming, animation,	
			simulation, and virtual	
			reality.	
Practical 5	Customization & CAD Drawing	6	Learn to customize	3,4
	consisting of set up of the drawing		designs by manipulating	
	page and the printer, including scale		geometric shapes,	
	settings, Setting up of units and		dimensions, and materials	
	drawing limits; ISO and ANSI		to meet specific project	
	standards for coordinate		requirements. Students	
	dimensioning and to learning;		gain proficiency in CAD	
	Orthographic constraints, Snap to		tools to draft 2D and 3D	
	objects manually and automatically;		models, apply engineering	
	Producing drawings by using		principles, and simulate	
	various coordinate input entry		real-world conditions for	
	methods to		design validation.	
ı	l .	ı	ı	72

Draw straight lines, Applying		
various ways of drawing circles		

T1: Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House **T2:** Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

REFERENCE BOOKS:

R1: Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

R2: Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

R3: Corresponding set of) CAD Software Theory and User Manuals

OTHER LEARNING RESOURCES:

O1:https://nptel.ac.in

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing	1,2,3,4,5,6,10,12
2	To impart knowledge on the projection of points, lines and plane surfaces	1,2,3,4,5,6,10,12
3	To improve the visualization skills for better understanding of projection of solids	1,2,3,4,5,6,10,12
4	To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces	1,2,3,4,5,6,10,12
5	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections	1,2,3,4,5,6,10,12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
	Engineeri	CO												
22BTCS12	ng	1	3	3	3	2	2.	1				2		3
4R	Graphics		5	5	5	_		1				_		J
410	and													
	Design	CO	3	2	2	2	2	1				2		2
		2		_	_	_	_	1				_		_

CO 3	3	2	2	2	2	1		2	2
CO 4	3	3	3	2	2	1		2	3
CO 5	3	3	3	2	2	1		2	3

		SEMESTE	R – II												
Course Title		Techno 1	Professio	nal S	Skills	Ι									
Course code	22BTCS125R	Total credits: 1	L	T	P	S	R	O/F	C						
		Total hours: 30P	0	0	2	0	0	0	1						
Pre-requisite	Nil	Co-requisite					Nil								
Programme		or of Technology i	_				_	_							
Semester		inter/ II semester (
Course	To become confide		natics, lo	gic, 1	easor	ing a	nd co	ding to a	ınalyze and						
Objectives	solve problems in re		_												
(Minimum 3)	To acquire elementa		-	-		-									
	Problem-solving sk		-	tical	think	ing ar	nd pra	ctical ap	plication o						
201	technical knowledg														
CO1		evelop highly skilled and knowledgeable management professional who can deal wit rious areas and aspects of businesses.													
602		*				C	. ,	. 1	1						
CO2	Develop analytical		y as mar	ager	nent j	protes	sional	wno ca	n be more						
CO2	efficient and innova	*	ommont o	0000	nta an	d tha	th a am	ion of do	valammant						
CO3	Gather knowledge	idout various devel	opment c	once	pis an	ia the	meon	ies of de	veropment.						
CO4	Encourage the stude	ente towarde Non-tre	aditional	think	ring										
CO5	Effectively commu					dae i	n a nı	ofession	al manner						
COS	Lifectively commu	meate scientific and	a teemine	ai Ki	10 W IC	uge 1	n a pi	.010331011	ai maimei.						
Unit-No.	Con	tent	Contac	t	Le	arnin	g Out	come	BL						
			Hour												
I	C Programming	constructs:	6	J	Jnder	standi	ng	0	f 1,2,3						
	Types of Progran	ming Languages,		p	rogra	mmin	g	concepts	,						
	Evolution of 'C' La					-		les, data							
	of a 'C' Program				-	cont	rol s	structures	3						
	Debugging a 'C' F	•		1	such	as	loo	•							
	'C' Tokens,	Keywords and													
	•	ators, Constants,													
		ypes, Precedence				•		sts. They							
	of Operators, Scop						_	proficien							
	Variables, Arithm	•				_		ing, and							
	Evaluation of Exp	essions.			-			using a	1						
	G t 1G:							guage.							
II	Control Statemer		6			stand		ow to	- , -						
	Decision Making	-			onstr		and	evaluate							
	Types of ifelse l				rithm			pressions							
	Block, GOTO stat	anent.			vith reced	corr	cci	operator							
	Looping:			_	reced	ence ativity	, 441	anc iles to							
	Concept of Loop,	For loop, While				•	Ιl								
	loop, Do- while	-			nsure		The	accurate y should							
	Loop, break and c	ontinue statement,						y snouic onditiona							
	Introduction to A	rays, Strings and					-	e-if, else							
	Functions.			tatem	_	to	direc								
				8	tatCIII	ciits)	.0	unec							

			program flow based on	
			Boolean conditions,	
			enabling the execution of	
			different code blocks	
			based.	
III	Amoras	6	Grasp the importance of	3,4
111	Arrays: One Dimensional Arrays, Two-	U	array operations including	3,4
	dimensional Arrays, Two-		sorting, searching, and	
	Multidimensional Arrays, Dynamic		iterating through elements,	
			which are fundamental for	
	Arrays.			
			implementing algorithms	
			and solving computational	
			problems. Mastery of	
			arrays enables students to	
			manage large datasets,	
			optimize memory usage,	
			and enhance the	
			performance of software	
			applications across diverse	
			domains such as data	
			analysis, image	
			processing, and simulation	
			modeling.	
IV	Strings:	6	Learn how to declare,	4
	Implementing String Variables,		initialize, and access	
	String handling Functions.		individual characters or	
			substrings within strings	
			using indexing and slicing	
			techniques. Students also	
			explore various operations	
			and functions available for	
			manipulating strings,	
			including concatenation,	
			comparison, and	
			modification.	
V	Functions:	6	Understand the concepts	4
	Concept of Functions, user-defined		of parameters, return	
	Functions, System-defined		values, and scope,	
	Functions, passing in Functions.		ensuring proper data flow	
			and variable accessibility	
			within and outside	
			functions.	
	Practical Con	mponent		
Practical 1				
Practical 5				
1 Tactical 3				

T1: E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill.

REFERENCE BOOKS:

R1: Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

R2: Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

R3: Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.

R4: Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education.

ISBN: 978-93-325-3800-9.

R5: Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing

House. ISBN-978-93-5299-361-1

OTHER LEARNING RESOURCES:

O1:https://nptel.ac.in

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10,12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,10,12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,10,12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10,12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10,12

Course	Course	CO'	РО	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2

	Techno	CO 1	2	1	1	1	1			3	2
22BTCS12	Professio nal Skills	CO 2	2	1	3	1	1			3	2
5R	I	CO 3	2	3	1	1	1			3	2
		CO 4	2	2	2	2	2			3	2
		CO 5	2	2	2	2	2			3	2

		SEMESTE	R – II												
Course Title		EFFECTIVE EN	IGLISH :	FOR	R ENC	SINE	ERS								
Course code	22UBPD124R	Total credits: 2	L	T	P	S	R	O/F	C						
		Total hours: 30P	0	0	4	0	0	0	2						
Pre-requisite	Nil	Co-requisite					Nil								
Programme		vil Engineering/B.													
	_	e and Engineering			-			_	_						
		chanical Engineeri	_				_	_)/ B.Tech						
		in Computer Scien Technology a		_		_									
Semester	Fall/I	or Winter/II Semes						amme							
Course		his course will enable the students to acquire the important knowledge on grammar like													
Objectives		ne formation of sentences.													
(Minimum 3)	To enable the stude	o enable the students to use vocabulary meaningfully for a successful conversation.													
	To establish Reputation and Rapport, a dress code session is much needed														
	The 3 P's (Plannin	g, Prioritizing, and I	Performin	g) of	Time	e Mar	nagem	ent will b	e taught to						
	the students.														
CO1		entify common error	s in Engli	sh w	riting	•									
CO2	• •	equire skill of report writing.													
CO3		evelop the ability as critical readers and writers.													
CO4	Improve speaking	mprove speaking ability in English both in terms of fluency and comprehensibility.													
CO5		rect usage of English					_								
Unit-No.	Con	ntent	Contac Hour	t	Lea	arnin	g Out	come	BL						
I	Interchange of Int Assertive Sentence Interchange of Ex Assertive Sentence Analysis of Sentence	es clamatory and es	6	a till a pp SS c c s nn s till ff a a	and strang hrase studer compouch norph eman hese com n	former fo	res that mation to f we all exploses of as learning the congful so	ords and anguage. re the grammar syntax, and ng how mbine to sentences	1,2,3						
П	Vocabulary Synonyms Antonyms Homonyms		6	u n c la	angua on	tandings, ts of ge. S	usag words Studer Inding by	within a ts focus	3,4						

			expressions, and	
			specialized terminology	
			relevant to their fields of	
			study or interests. They	
			develop skills in	
			recognizing word forms,	
			meanings, and	
			relationships through	
			activities such as reading,	
			listening, and practice	
			exercises.	
***				2.4
III	Reading Skills	6	Learn to apply strategies	3,4
	reading Dams		such as skimming and	
	Techniques of Effective Reading		scanning to locate specific	
	Gathering ideas and information		information quickly, while	
	from a text		also improving their	
			ability to infer meaning	
	The SQ3RTechnique		from context and draw	
	Interpret the text		conclusions. Mastery of	
			reading skills enhances	
			students' capacity to	
			synthesize information,	
			evaluate arguments, and	
			critically assess sources	
			· · · · · · · · · · · · · · · · · · ·	
			across various disciplines	
***			and genres.	4
IV	Dress Code Ethics	6	Learn the importance of	4
	Dress Code Delines		presenting themselves	
	Introduction to Dress Code Ethics,		professionally and	
			respectfully through their	
	Purpose and Importance.			
	Purpose and Importance, How to Make FIRSTIMPRESSION		clothing choices. They	
	How to Make FIRSTIMPRESSION		clothing choices. They understand the impact of	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or			
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or		understand the impact of attire on first impressions,	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing	
	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male		understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and	
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions.	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male &	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male &	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break tasks into manageable	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male & Time-Management Skills Introduction To Time Management,	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break tasks into manageable steps, and create schedules	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male & Time-Management Skills Introduction To Time Management, Purpose And Importance of Time	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break tasks into manageable steps, and create schedules or timelines to organize	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male & Time-Management Skills Introduction To Time Management, Purpose And Importance of Time Management,	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break tasks into manageable steps, and create schedules or timelines to organize their workload. They	4
V	How to Make FIRSTIMPRESSION What to Wear During Interviews or Any Other Formal Meetings – Male & Time-Management Skills Introduction To Time Management, Purpose And Importance of Time	6	understand the impact of attire on first impressions, professionalism, and cultural sensitivity. By adhering to dress code policies, students demonstrate their understanding of workplace norms and expectations, preparing them for future careers and professional interactions. Learn to identify and set realistic objectives, break tasks into manageable steps, and create schedules or timelines to organize	4

			setting priorities, avoiding procrastination, and using tools like calendars or task management apps to optimize productivity.							
	Practical Component									
Practical 1										
Practical 5										

T1: Wren,P.C and Martin,H. 1995. High School English Grammar and Composition, S Chand Publishing. **T1:** Barrett,Grant.2016.PerfectEnglishGrammar:TheIndispensibleGuidetoExcellent Writing and Speaking, ZephyrosPress

REFERENCE BOOKS:

R1: Carthy. (2008) English Vocabulary in Use Upper - Intermediate with CD-ROM, Cambridge University Press

R1: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

OTHER LEARNING RESOURCES:

O1: https://youtu.be/rl85jxktfms

O2:https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10,12							
2	Develop analytical and research ability as management professional who can be more efficient and innovative in	1,2,3,4,5,10,12							

	practice.				
3	Gather knowledge about various development concepts and	1,2,3,4,5,10,12			
	the theories of development.				
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10,12			
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10,12			

Course	Course	CO'	PO	РО	РО	PO	PO	РО	РО	РО	PO	PO1	PO1	PO1
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	1	1	1	1	1					3		2
	EFFECTIV													
22UBPD12	E ENGLISH	CO 2	1	1	1	1	1					3		2
4R	FOR ENGINEE RS	CO 3	1	1	1	1	1					3		2
	KS	CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

	SEMESTER – II										
Course Title		MOOCS I: I	Enhanci	ng Stı	ıdy S	kills					
Course code	22MOSY124R	Total credits: 2	L	T	P	S	R	O/F	C		
		Total hours:	0	0	0	0	0	0	1		
		45T+30P									
Pre-requisite	Nil	Co-requisite]	Nil				
Programme		B.Tech in Comp	outer Sc	ience	Engi	neeri	ng				
Semester	W	/inter/II Semester o	f First Y	Year (of the	Prog	ramn	ne			
Course	Develop critical th	inking and problem-	solving	abiliti	es to	appro	oach a	cademic o	challenges		
Objectives	systematically. To	enable the students	to use	vocab	ulary	mear	ningfu	lly for a	successful		
(Minimum 3)	conversation.										
	_	ement skills to help	p studer	nts pr	ioritiz	e tas	ks, se	et goals, a	and create		
	_	fective study schedules.									
	_	nhance reading comprehension and note-taking techniques for better information									
	retention and under	- C							_		
	_	strategies, including	g prepara	ation,	anxie	ty ma	nager	nent, and	answering		
201	techniques					1.		1 1			
CO1		n to analyze your	Ū	•			stic g	oals, and	create a		
CO2		that maximizes you		• •				11_11_1_1	Ľ 1		
CO2		management techr	-	_		zatioi	ı, tas	k scheau	ling, and		
CO3		ercoming procrastina				a l a a	1	ماسم مه	41- a aia		
COS	~ ~ ~	n literacy skills to various sources, incl		•					•		
	scholarly articles.	arrous sources, men	uding ac	auem	ic dai	avase	s, cie	dible web	sites, and		
CO4	· · · · · · · · · · · · · · · · · · ·	gies for analyzing	comple	v inf	ormat	ion	idanti	fying ma	in ideas		
C04	•	its, and drawing insi	-					•			
CO5		ore various test-ta						~			
		ng test anxiety, and		_			_	_	_		
	confidence and per		r	8	_F -			5	J		
Unit-No.		ntent	Contac	ct	Lea	rnin	g Out	come	BL		
			Hour			•	5				
I	Introduction: De	efining effective	8	L	earn	to	asses	ss their	1,2,3		
	studying and its	importance for		ir	ndivid	ual l	earnin	g styles,			
	academic success.			st	rengt	hs, a	ınd a	reas for			
	Learning Styles:	Identifying your		ir	nprov	emen	t to	create an			
	preferred learning	g style (visual,		e	ffectiv	/e	and	tailored			
	auditory, kinesthe	etic) and tailoring		a	pproa	ch to	their	studies.			
	your study strateg	ies accordingly.			•			nderstand			
	Goal Setting:	Setting SMART		h	ow to	o set	reali	istic and			
	goals (Specific				chieva			academic			
	*	elevant, Time-				_		asks, and			
	bound) for your st						_	ate time			
		ersonalized Study				each	sub	ject or			
		a schedule that		a	ctivity	7.					
	incorporates cla	•									
	sessions, breaks	, and personal									

aammitmanta			
commitments. Self-Assessment Tools: Introduction to self-assessment exercises to evaluate your current study habits and identify areas for improvement.			
Time Management Techniques: Exploring various time management strategies like the Eisenhower Matrix, the Pomodoro Technique, and time tracking tools. Prioritization: Learning to prioritize tasks based on urgency and importance and allocate study time accordingly. Identifying Time Wasters: Recognizing and eliminating distractions like social media, multitasking, and disorganized study areas. Combating Procrastination: Understanding the root causes of procrastination and developing strategies to overcome it (e.g., breaking down tasks, reward systems).	12	Learn to effectively organize their tasks and responsibilities to maximize productivity and achieve their goals. They should understand and apply strategies such as prioritizing tasks using methods like the Eisenhower Matrix, setting SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound), and breaking down larger projects into manageable steps.	3,4
Creating a Sustainable Study Routine: Establishing a consistent study schedule that integrates well with your overall lifestyle			
Research Strategies: Developing effective research techniques including using library resources, academic databases, and credible online sources. Evaluating Information: Learning to assess the credibility of sources, identify biases, and distinguish between fact and opinion. Citation Styles: Understanding different citation styles (APA, MLA, Chicago) and practicing proper citation methods. Note-taking Techniques: Exploring various note-taking methods (e.g., outlining, mind mapping) and choosing a method that suits your learning style.	8	Learn to systematically gather, analyze, and interpret information to address specific questions or problems effectively. They should understand how to define a clear research question or hypothesis, conduct comprehensive literature reviews, and utilize various sources, including academic journals, books, and credible online resources. Students should become proficient in employing different research methodologies, such	3,4
	to self-assessment exercises to evaluate your current study habits and identify areas for improvement. Time Management Techniques: Exploring various time management strategies like the Eisenhower Matrix, the Pomodoro Technique, and time tracking tools. Prioritization: Learning to prioritize tasks based on urgency and importance and allocate study time accordingly. Identifying Time Wasters: Recognizing and eliminating distractions like social media, multitasking, and disorganized study areas. Combating Procrastination: Understanding the root causes of procrastination and developing strategies to overcome it (e.g., breaking down tasks, reward systems). Creating a Sustainable Study Routine: Establishing a consistent study schedule that integrates well with your overall lifestyle Research Strategies: Developing effective research techniques including using library resources, academic databases, and credible online sources. Evaluating Information: Learning to assess the credibility of sources, identify biases, and distinguish between fact and opinion. Citation Styles: Understanding different citation styles (APA, MLA, Chicago) and practicing proper citation methods. Note-taking Techniques: Exploring various note-taking methods (e.g., outlining, mind mapping) and choosing a method that suits your	Self-Assessment Tools: Introduction to self-assessment exercises to evaluate your current study habits and identify areas for improvement. Time Management Techniques: Exploring various time management strategies like the Eisenhower Matrix, the Pomodoro Technique, and time tracking tools. Prioritization: Learning to prioritize tasks based on urgency and importance and allocate study time accordingly. Identifying Time Wasters: Recognizing and eliminating distractions like social media, multitasking, and disorganized study areas. Combating Procrastination: Understanding the root causes of procrastination and developing strategies to overcome it (e.g., breaking down tasks, reward systems). Creating a Sustainable Study Routine: Establishing a consistent study schedule that integrates well with your overall lifestyle Research Strategies: Developing effective research techniques including using library resources, academic databases, and credible online sources. Evaluating Information: Learning to assess the credibility of sources, identify biases, and distinguish between fact and opinion. Citation Styles: Understanding different citation styles (APA, MLA, Chicago) and practicing proper citation methods. Note-taking Techniques: Exploring various note-taking methods (e.g., outlining, mind mapping) and choosing a method that suits your learning style.	Self-Assessment Tools: Introduction to self-assessment exercises to evaluate your current study habits and identify areas for improvement. Time Management Techniques: Exploring various time management strategies like the Eisenhower Matrix, the Pomodoro Technique, and time tracking tools. Prioritization: Learning to prioritize tasks based on urgency and importance and allocate study time accordingly. Identifying Time Wasters: Recognizing and eliminating distractions like social media, multitasking, and disorganized study areas. Combating Procrastination: Understanding the root causes of procrastination and developing strategies to overcome it (e.g., breaking down tasks, reward systems). Creating a Sustainable Study Routine: Establishing a consistent study schedule that integrates well with your overall lifestyle Research Strategies: Developing effective research techniques including using library resources, academic databases, and credible online sources. Evaluating Information: Learning to assess the credibility of sources, identify biases, and distinguish between fact and opinion. Citation Styles: Understanding different citation styles (APA, MLA, Chicago) and practicing proper citation methods. Note-taking Techniques: Exploring various note-taking methods (e.g., outlining, mind mapping) and choosing a method that suits your learning style.

	Developing strategies for organizing		quantitative, or mixed	
	research findings, including using		methods, and in using	
			· · · · · · · · · · · · · · · · · · ·	
	reference management tools		tools for data collection	
			and analysis.	_
IV	Active Reading Strategies: Learning	6	Learn techniques to	4
	to read actively by highlighting key		enhance their	
	points, annotating text, and		comprehension, retention,	
	summarizing information in your		and critical engagement	
	own words.		with texts. They should	
	Critical Analysis: Developing skills		understand how to set	
	to analyze arguments, identify		reading goals and preview	
	assumptions and biases, and		materials to identify key	
	evaluate evidence presented in		themes and structure.	
	reading materials.		Students should practice	
	Comprehension Strategies: Building		annotating texts by	
	comprehension skills through		highlighting important	
	techniques like SQ3R (Survey,		points, making notes in the	
	Question, Read, Recite, Review)		margins, and summarizing	
	and identifying main ideas and		sections in their own	
	supporting details.		words. They should also	
	Information Synthesis: Learning to		develop the ability to ask	
	synthesize information from		critical questions, make	
	different sources, identify		inferences, and connect	
	· · · · · · · · · · · · · · · · · · ·			
	•		new information to prior	
	supported conclusions.		knowledge.	
	Critical Thinking Exercises:			
	Practicing critical thinking skills			
	through analyzing case studies,			
	engaging in debates, and			
	formulating persuasive arguments	_		_
V	Test Preparation Techniques:	5	Learn strategies to	4
	Creating a study plan specifically		enhance their	
	for exams, including reviewing class		understanding and recall	
	materials, practicing with past		of material, reduce	
	exams, and forming study groups.		anxiety, and perform	
	Test Anxiety Management:		effectively during exams.	
	Understanding and combating test		They should understand	
	anxiety through relaxation		how to create a study	
	techniques, positive self-talk, and		schedule that allocates	
	visualization exercises.		sufficient time for	
	Test-Taking Strategies: Learning		reviewing each subject,	
	different test-taking approaches for		utilizing techniques such	
	various question formats (multiple		as spaced repetition and	
	choice, essay, short answer) and		active recall. Students	
	maximizing your exam		should practice	
	performance.		summarizing notes,	
	Time Management During Exams:		creating mind maps, and	
	Developing strategies for allocating		using flashcards for key	
	time effectively during exams and		concepts. They should also	
	prioritizing responses.		engage in self-testing	
	<u> </u>	I .		

	Self-Evaluation and Reflection:		through practice exams						
	Learning from exam experiences by		and quizzes to identify						
	reviewing results, identifying areas		areas needing						
	for improvement, and setting goals		improvement.						
	for future exams								
Practical Component									
Practical 1									

T1: Brown, Peter C., Henry L. Roediger III, and Mark A. McDaniel. Make it stick: The science of successful learning. Harvard University Press, 2014..

REFERENCE BOOKS:

R1: Newport, Cal. How to become a straight-A student: The unconventional strategies real college students use to score high while studying less. Crown, 2006.

OTHER LEARNING RESOURCES:

O1: https://youtu.be/rl85jxktfms

O2:https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students will learn to analyze your learning style, set realistic goals, and create a structured schedule that maximizes your learning potential.	1,2,3,4,5,10,12
2	To discover time management techniques like prioritization, task scheduling, and identifying and overcoming procrastination tendencies.	1,2,3,4,5,10,12
3	Apply information literacy skills to effectively research, evaluate, and synthesize information from various sources, including academic databases, credible websites, and scholarly articles.	1,2,3,4,5,10,12
4	To develop strategies for analyzing complex information, identifying main ideas, evaluating arguments, and drawing insightful conclusions from reading materials.	1,2,3,4,5,10,12
5	To explore Explore various test-taking approaches, including exam preparation techniques, managing test anxiety, and developing test-specific strategies that boost your confidence and performance.	1,2,3,4,5,10,12

Course	Course	CO'	PO	РО	PO	PO1	PO1	PO1						
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1												
	MOOCS		2	2	2	2	3					2		2
	I:	CO												
22MOSY12	Enhanci	2	2	3	3	2	3					2		2
4R	ng Study	CO												
	Skills	3	2	2	2	2	3					2		2
		CO												
		4	2	2	2	3	3					2		2
		CO												
		5	3	3	3	3	3					2		2

Course Title Course code	1									
Course ands		U <mark>niversal Human V</mark>	⁷ alues an	d Pr	ofessio	nal l	Ethics	8		
Course code	22UUHV101R	Total credits: 2	L	T	P	S	R	O/F	C	
		Total hours: 30P	1	0	2	0	0	0	2	
Pre-requisite	Nil	Co-requisite			1]	Nil	l		
Programme		B.Tech in Comp	outer Sci	ence	Engin	eerii	ng			
Semester	W	/inter/II Semester o						ne		
Course	Γο help students d	listinguish between	values ar	nd sk	ills, aı	nd ur	derst	and the no	ed, basic	
Objectives g	guidelines, content	and process of value	e educatio	on.						
(Minimum 3)	Γo help students in	itiate a process of d	ialog wit	hin tl	nemsel	ves t	o kno	w what th	ey 'really	
v	want to be' in their	life and profession								
l h	Γo help students ur	nderstand the meaning	g of happ	oines	s and p	rosp	erity f	or a huma	n being.	
	_	dents to understand			_	_			_	
a	accordingly.		·					_		
l h	To facilitate the students in applying the understanding of harmony in existence in their									
l r	profession and lead	an ethical life								
CO1	Evaluate the impo	ortance and process	s of Val	ue E	ducati	on,	aligni	ng it witl	n human	
a	aspirations.									
CO2	Analyze the conce	pt of harmony withi	n oneself	, emp	hasizi	ng th	ne con	nection be	etween 'I'	
a	and the body.									
CO3	Assess and apply	foundational values	in family	y and	socie	ty fo	r con	prehensiv	e human	
٤	goals.									
CO4	Examine the inter	connectedness and	mutual	fulfil	lment	in r	ature	, emphasi	zing co-	
e	existence principles	S.								
CO5	Demonstrate comp	etence in profession	nal ethics	, inc	orpora	ting	a hol	istic unde	rstanding	
f	for eco-friendly pro	oduction systems.								
Unit-No.	Cor	ntent	Contac	t	Lea	rning	g Out	come	BL	
			Hour							
I	Course Introduc	tion - Need, Basic		U	Inderst	and	the 1	need for	1,2,3	
	Guidelines, Con	tent and Process		v	alue	ed	ucatio	on in		
	for Value	Education		fe	osterin	g et	thical,	moral,		
	Understanding	the need, basic		a	nd so	ciall	y res	sponsible		
	guidelines, conten	nt and process for		b	ehavio	r.	The	basic		
	Value Education,	Self-Exploration-		g	uidelir	ies		include		
		ontent and process;		p	romoti	ng	core	values		
		ceptance' and		S	uch as	integ	grity, e	empathy,		
	•	lidation- as the			_		_	nsibility.		
	mechanism for	self-exploration,	3	T	he cou	ırse	conte	nt covers		
		Happiness and		v	arious	di	mensi	ons of		
		k at basic Human			uman		lues,	ethical		
		ht understanding,			neories		and	real-life		
	_	Physical Facilities-						personal		
		equirements for			_			contexts.		
		pirations of every				proce		involves		
		ith their correct			nteract			teaching		
1	priority, Underst	anding Happiness			nethod	-		ncluding		
	= -									
		orrectly- A critical current scenario,			iscussi eflectiv			studies,		

	Method to fulfill the above human		community service	
	aspirations: understanding and living in harmony at various levels.		activities, to engage students in deep thinking and practical application	
II			of values. Learn to identify and align	3,4
	Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya	3	their thoughts, emotions, and actions through self-awareness and self-regulation techniques. The course emphasizes the integration of the body, mind, and spirit, promoting practices such as mindfulness, meditation, and reflective journaling to achieve internal balance. Students are encouraged to recognize their intrinsic values and aspirations, fostering a sense of purpose and contentment.	
III	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious	3	Learn about the importance of empathy, effective communication, mutual respect, and cooperation in fostering strong and positive human connections. The course emphasizes the roles and responsibilities of individuals in contributing to the well-being of their families and communities, encouraging practices that promote trust, understanding, and support. Students are taught conflict resolution strategies and the value of compassion and ethical behavior in interpersonal interactions.	3,4

IV	order in societyUndivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha)- from family to world family!. Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.	3	Learn to recognize the intrinsic balance and mutual dependence that sustain ecosystems and the broader environment. The course emphasizes the concept of co-existence, where harmony arises from understanding and respecting the natural world's interdependent relationships. Students are encouraged to adopt sustainable practices and an ethical attitude towards nature, recognizing their role in maintaining	4
V	Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.	3	ecological balance. It fosters values such as integrity, empathy, and sustainability, guiding professionals to consider the broader impact of their decisions and actions. Professionals are encouraged to cultivate a balanced approach that respects diverse perspectives, promotes collaboration, and prioritizes ethical conduct in business practices. This holistic perspective also emphasizes accountability and responsibility towards stakeholders, communities, and the environment, encouraging ethical leadership and long-term sustainability in organizational strategies and operations.	4

Practical Component							
Practical 1							
Practical 5							

T1: Business Ethics: Ethical Decision Making & Cases by O.C. Ferrell and John Fraedrich.

T2: Professional Ethics and Human Values by Jayakumar.

REFERENCE BOOKS:

R1: The Oxford Companion to Philosophy edited by Ted Honderich.

R2: The Cambridge Encyclopedia of Language edited by David Crystal.

OTHER LEARNING RESOURCES:

O1: https://youtu.be/rl85jxktfms

O2: https://www.betterteam.com/dress-code-

 $\underline{policy\#:\sim:} text=\underline{Everyone\%20 is\%20 expected\%20 to\%20 be,} \underline{religion\%20 or\%20 ethnicity\%20 are\%20 exempt}$

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Evaluate the importance and process of Value Education, aligning it with human aspirations.	1,2,3,4,6,7,10,12						
2	Analyze the concept of harmony within oneself, emphasizing the connection between 'I' and the body.	1,2,3,4,6,7,10,12						
3	Assess and apply foundational values in family and society for comprehensive human goals.	1,2,3,4,6,7,10,12						
4	Examine the interconnectedness and mutual fulfillment in nature, emphasizing co-existence principles.	1,2,3,4,6,7,10,12						
5	Demonstrate competence in professional ethics, incorporating a holistic understanding for eco-friendly production systems.	1,2,3,4,6,7,10,12						

Course	Course	CO'	PO	PO	PO	РО	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		СО												
		1												
	Universal		1	1	1	2		2	2			1		2
22UUHV10	Human Values	CO 2	1	2	1	2		3	3			1		2
1R	and Professio nal Ethics	CO 3	1	1	1	2		2	3			1		2
	nai Etines	CO 4	1	2	1	2		3	3			1		2
		CO 5	1	1	1	2		3	3			1		2

	SEMESTER – II	[
Course Title	COMPUTATIONAL SYSTEMS AND DIGITAL WORLD 22UCDL103R Total credits: 1 L T PS R O/ C								
Course code	22UCDL103R	Total credits: 1	L	Т	P	S		O/	C
		Total hours: 30P						F	
			0	0	2			0	1
Pre-requisite	Nil BachelorofArtsinPerformingArts	Co-requisite				N	Vil		
S S									
(All Degree /	BachelorofScienceinActuarialScience								
Diploma	BachelorofScienceinForensicScience								
programme of Engineering,	BachelorofBusinessAdministration								
Computer	BachelorofHotelManagement andCateringT	Technology							
Technology,	Bachelor ofBusinessAdministration								
Management, Humanities,	BachelorofSocialWork								
Science, and	BachelorofArtsinSociology								
Agricultural Sciences)	BachelorofArtsinPsychology								
Sciences)	BachelorofScienceinBiotechnology								
	B.Sc.(Hons)Agriculture								
	BachelorofScienceinMicrobiology								
	BachelorofScienceinFoodNutritionandDiete	etics							
	BachelorofComputer Application								
	B.TechinCivilEngineering								
	B.TechinMechanicalEngineering								
	B.TechinComputerScienceandEngineering								
	B.TechinComputerScienceandEngineering								
	MasterofBusinessAdministration								
	MasterofBusiness AdministrationinHealthca	areManagement							
	MasterofSocialWork								
	MasterofArtsinAppliedPsychology								
	MasterofScienceinClinicalPsychology								
	MasterofArtsinSociology MasterofScienceinBiotechnology								
	MasterofScienceinMicrobiology								
	MasterofScienceinFoodNutritionandDietetic	cs							
	Master of Science in Botany								

	Master of Science in Zoology									
	MasterofComputerTechnology									
Semester		Winter/II Semester of First Year of the Programme								
Course	Students will be able to understand the fundamentals of computer systems and Internet									
Objectives	search along with advanced features of MS-Office.									
(Minimum 3)	Students will be able to understand about the introduction to Social Media and E-									
	Commerce and utility software									
	Students will develop a solid foundation in computational thinking, which includes									
	problem- solving, algorithmic design, and logical re-	easoning.								
CO1	FundamentalsofComputerSystems,OfficeAutomationandInternetSearch.									
CO2										
	KnowmoreabouttheInternet&CyberWorld									
CO3	Know Social Media, E-Commerce, and apply the sa									
CO4	Knowtousethedigitalpaymentsanddigitaltransaction			1						
Unit-No.	Content	Contac	Learning	BL						
		t Hour	Outcome							
I	Fundamentals of Computer Systems, Office		Learn about	1,2,						
	Automation and Internet Search		computer	3						
			hardware							
			components,							
			operating							
			systems, and software							
		7	applications that							
		,	facilitate office							
			automation							
			tasks such as							
			word							
			processing,							
			spreadsheets,							
			and							
			presentations.							
			Additionally,							
			students delve							
			into internet							
			search							
			strategies,							
			mastering							
			techniques to efficiently							
			locate and evaluate							
			information							
			using search							
			engines,							
			databases, and							
			online							
			resources.							

II	Internet&CyberWorld		Encompasses	3,4
"	internette y bei 11 tilu		exploring the	J, T
			interconnected	
			global network	
			of computers	
			and digital	
			systems that	
			facilitate	
			communication,	
			information	
			sharing, and	
			collaboration on	
			a massive scale.	
			Students delve	
			into the	
			technical	
			infrastructure of	
			the internet,	
			including	
		8	protocols,	
			servers, and data	
			transmission	
			methods, as well	
			as the evolution	
			and impact of	
			cyberspace on	
			society. They	
			learn about	
			cybersecurity	
			principles and	
			practices to	
			safeguard data,	
			systems, and	
			personal	
			information	
			from cyber	
			threats such as	
			hacking,	
			phishing, and	
			malware.	
III	SocialMedia,E-		Understanding	3,4
	Commerce, and digital branding		their	
			interconnected	
			roles in modern	
		7	digital	
			marketing and	
			communication	
			strategies.	
			Students explore	
			how social	
			-	95

			madia =1a4f	
			media platforms	
			such as	
			Facebook,	
			Instagram, and	
			Twitter are	
			utilized for	
			brand	
			promotion,	
			customer	
			engagement,	
			and community	
			building. They	
			learn about e-	
			commerce	
			principles,	
			including online	
			retail strategies,	
			payment	
			systems, and	
			logistics	
			management,	
			essential for	
			conducting	
			business in the	
			digital age.	
IV	Digitalpaymentsanddigitaltransactions, ando		Learn about	4
IV	Digitalpaymentsanddigitaltransactions,ando ther utilitysoftware			4
IV	Digitalpaymentsanddigitaltransactions,ando ther utilitysoftware		Learn about digital payment methods such as	4
IV			digital payment	4
IV			digital payment methods such as mobile wallets,	4
IV			digital payment methods such as mobile wallets, online banking,	4
IV			digital payment methods such as mobile wallets, online banking, and	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols,	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols, transaction	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols, transaction processes, and	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management,	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management, scheduling, and	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management,	4

ı			productivity in	
			•	
			personal and	
			professional	
			environments.	
	Practical Component			
Practical 1	Experiment 1 : Disassemble and reassemble a		Familiarize	1,2,
	desktop computer, identifying and explaining		students with	3
	the function of each component. Discuss the		computer	
	importance of hardware compatibility.		hardware	
	Experiment 2 : Install an operating system (e.g.,		components.	
	Windows or Linux) on a virtual machine.			
	Configure essential settings, such as user			
	accounts, network connections, and system			
	updates.			
	Experiment 3: Use office software (e.g.,			
	Microsoft Office or Google Workspace) to			
	create documents, spreadsheets, and			
	presentations. Teach formatting, inserting			
	images, and collaboration features.			
	Experiment 4: Instruct students on effective	8		
	internet searching, including the use of search			
	engines, keywords, and advanced search			
	operators.			
	Experiment 5: Set up email accounts, compose			
	and send emails, attach files, and organize			
	emails into folders. Discuss email			
	etiquette and best practices.			
	Experiment 6: Use cloud storage services (e.g.,			
	Google Drive or Dropbox) to store and			
	1			
	synchronize files. Create a backup of important data and discuss data			
	_			
	recovery options.			
Practical 2	Experiment 1: Set up a small local network	7	Introduce	2 4
Fracucai 2	Experiment 1: Set up a small local network with routers and computers. Configure network	,	students to the	3,4
			fundamentals of	
	settings, assign IP addresses, and establish			
	connectivity. Explore basic network diagnostics.		the internet and	
	Experiment 2 : Guide students in creating a		network	
	simple website using HTML and CSS. They		configuration.	
	should design webpages, add text and images,			
	and format their content using CSS. Discuss web			
	hosting and domain registration.			
	Experiment 3 : Use email clients that support			
	encryption (e.g., Thunderbird) to send and			
	receive encrypted emails. Practice creating and			
	verifying digital signatures for email			
	authenticity.			
Practical 3	Experiment 1: Instruct students to create	8	Familiarize	3,4

	accounts on nonvious social modic plotforms		students with	1
	accounts on popular social media platforms		students with	
	(e.g., Facebook, Twitter, Instagram). Guide them		social media	
	through profile setup, privacy settings, and		platforms and	
	content posting.		digital branding	
	Experiment 2: Have students create a content			
	calendar for a fictional business or brand. Plan			
	posts, including text, images, and hashtags, and			
	use social media management tools to schedule			
	posts.			
	Experiment 3: Guide students in building a			
	basic e-commerce website using platforms like			
	Shopify or WooCommerce. They should add			
	products, set up payment gateways, and			
	configure the online store.			
	Experiment 4: Set up a payment gateway for			
	the e-commerce website created in Experiment			
	3. Test payment transactions and discuss			
	security protocols such as SSL encryption.			
	Experiment 5 : Create and manage paid			
	social media advertising campaigns using			
	platforms like Facebook Ads or Google Ads.			
	Monitor campaign performance and adjust			
	ad targeting.			
	Experiment 6: Simulate an influencer			
	marketing campaign. Students should identify			
	potential influencers, negotiate partnerships, and			
	track the impact of influencer promotions.			
	Experiment 7: Analyze online reviews and			
	social media mentions related to a fictional			
	brand. Develop strategies to manage and			
	improve the brand's online reputation.			
Practical 4	Experiment 1: Instruct students to create	7	Familiarize	4
	accounts on popular digital payment platforms		students with	
	(e.g., PayPal, Venmo, or a mobile payment app).		digital payment	
	Guide them through account verification, linking		methods and	
	bank accounts or cards, and adding funds.		their setup.	
	Experiment 2 : Provide a list of online shopping			
	websites. Students should select products, add			
	them to the cart, and complete transactions using			
	the digital payment methods they set up in			
	Experiment 1.			
	Experiment 3: Make digital purchases and			
	collect digital receipts. Discuss the			
	advantages of digital receipts, such as			
	organization and ease of tracking expenses.			
	Experiment 4: Provide a list of utility software			
	applications (e.g., antivirus, system optimization			
	tools). Have students select one, download it,			
	and install it on their computers.			
			•	

T1: Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems Applications. 3rd ed. New Delhi: BPB Publications.

T2: Goel, A, 2010. Computer Fundamentals, Pearson India.

REFERENCE BOOKS:

R1: Balaguruswamy, E. 2009 Fundamentals of Computers, Tata McGraw-Hill Education.

R2: Balaguruswamy, 2014. E. Fund Of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-Hill Education.

R3: Lawson, C. 2022. Introduction to Social Media, Oklahoma State University.

OTHER LEARNING RESOURCES:

O1:https://www.w3schools.com

O2: https://edu.gcfglobal.org

O3: https://www.tutorialspoint.com

O4: https://www.javatpoint.com/

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Fundamentals of Computer Systems, Of fice Automation and Internet Search.	1,2,3,4,5,10,12						
2	Know more about the Internet & Cyber World	1,2,3,4,5,10,12						
3	Know Social Media, E-Commerce, and apply the same for digital branding	1,2,3,4,5,10,12						
4	Know to use the digital payments and digital transactions, and other utility software	1,2,3,4,5,10,12						

Course	Course Name	CO	РО	РО	РО	PO	РО	РО	РО	РО	РО	PO	PO	PO
code		's	1	2	3	4	5	6	7	8	9	10	11	12
		CO												
		1												
	COMPUTATI													
22HCDI 1	ONAL		3	3	3	2	3					2		3
22UCDL1	SYSTEMS	CO												
03R	AND DIGITAL	2	3	3	1	3	3					2		3
	WORLD	CO												
		3	2	3	1	2	3					2		3
		CO												
		4	2	3	1	3	3					2		3

Evaluation Criteria:

SlNo	Evaluation Type	Total Marks
1	In-Semester Examination	70
2	End Semester Examination	30
Т	Cotal	100

a. In-Semester Examination Details(70)

SlNo	Components	Count	Individual Components Marks	Total Marks	Remarks
1	Skill Test	2	20	40	
2	Quizzes	2	10	20	
3	Lab Experiments (Eachexperiments16inno'swi llcarry20marks,later reducedtooverall20)		20	20	The student's score out of 100willbe
4	Home Assignments (Eachassignments5inno'swill carry20marks,later reducedtooverall10)		10	10	Converted to a eoutof70.
5	Participation in Class		10	10	
	Grand Total			100	

b. End Semester Examination Details (30)

SlNo	Components	al Components Marks	Total Marks	Remarks
1	Theory(MCQ based)	20	20	
2	Practical Experiments	60		The student's scoreoutof100 will be Converted to a
3	Viva	20	20	e out of 30.
	Grand Total	100		

		SEMESTER -	- II								
Course Title		CO CURRIC	ULAR	AC.	ΓΙVΙΊ	TES					
Course code	22UBCC121	Total credits: 1	L	T	P	S	R	O/F	C		
		Total hours: 15S	0	0	0	4	0	0	1		
Pre-requisite	Nil	Co-requisite					Nil				
Programmes	All UG Programme	es									
Semester	Winter/II Semester of First Year of the Programme										
Course	It is to develop the social and soft skills and to promote a holistic development of the										
Objectives	learners										
(Minimum 3)											
CO1	The students will	be engaged in diff	ferent a	ctivi	ities h	eade	d unc	ler differ	ent clubs		
	namely dance, mus	ic, photography, dra	ma, lite	racy	, etc.						
CO2											
	The students will p	articipate in regular	club ac	tivit	ies lik	e woı	kshoj	ps, compe	titions as		
	per their interest an	d hobbies									
CO3	The students will be	be trained to represe	nt ADT	'U in	ı vario	ous in	iter u	niversity,	state and		
	national level comp										
CO4		be given a platform	to earn	fron	n invit	ed ex	perts	in their r	espective		
	fields.										
CO5		et an exposure of 36	•	e lea	rning	meth	odolo	gy consid	lering the		
	_	ng with the academic									
Unit-No.	Con	tent	Contac		Lea	rnin	g Out	tcome	BL		
т	A 1/TT	C	Hour		A D.T.I.	T C		1 1' 4'			
I	AdtU encourage activities outsice	_	10					holistic			
		le the regular anded to meet			develo	•		through tion in			
		These activities			worksl	_	пстра	and			
	·	elop the social and				•	s Th				
		romote a holistic	-								
	_	the learners,					•	ment of			
	*	the 360 degree			the lea						
		ology the students									
	~	different activities									
		fferent clubs viz.									
	Dance, music, ph	otography, drama,									
	literary etc., T	he students are									
	encouraged to par	rticipate in regular									
	club activitie	s, workshops,									
	•	per their interest									
		student members									
		trained represent									
	AdtU in various inter University										
	student and	national level									
	competitions,	Renewed									
	personalities are	invited to conduct									

	workshops that benefit the members							
	and students by giving them the							
	platform to learn from experts in the							
	respective fields.							
Practical Component								
Practical 1								
Practical 2								
Practical 3								
Practical 4								

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T1:

REFERENCE BOOKS:

R1:

OTHER LEARNING RESOURCES:

01:

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	The students will be engaged in different activities headed under different clubs namely dance, music, photography, drama, literacy, etc.	1,2,3,4,5,6,10,12					
2	The students will participate in regular club activities like workshops, competitions as per their interest and hobbies	1,2,3,4,5,6,10,12					
3	The students will be trained to represent ADTU in various inter university, state and national level competitions	1,2,3,4,5,6,10,12					
4	The students will be given a platform to earn from invited experts in their respective fields.	1,2,3,4,5,6,10,12					
5	The students will get an exposure of 360 degree learning methodology considering the overall growth along with the academics.	1,2,3,4,5,6,10,12					

Course	Course	CO'	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1	PO1 2
code	Name	S	1	2	3	4	3	0	,	0	9	U	1	2
	СО	CO 1	2	2	2	1	2	2				2		2
22UBCC1 21	CURRICUL AR	CO 2	2	2	2	1	2	3				2		2
	ACTIVITIES	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTER -	- II									
Course Title		EXTRA CURRI	CULAR	R ACTIV	TTIE	S						
Course code	22UBEC121	Total credits: 1	L	T P	S	R	O/F	C				
		Total hours: 15S	0	0 0	4	0	0	1				
Pre-requisite	Nil	Co-requisite				Nil						
Programmes	All UG Programme	es										
Semester		Winter/II Semester of First Year of the Programme										
Course	It is to develop the social and soft skills and to promote a holistic development of the											
Objectives	learners	•										
(Minimum 3)												
CO1	Learn to a plan	Learn to a plan so that they can make meaningful contributions, maintain a										
	commitment, and n	nanage their time and	l prioritie	es.								
CO2												
	Transform passion	ate students who	demonst	rate lead	lershi	p and	l pursue	interests				
	beyond their acade	mics.										
CO3	Learn to participat	e in various co-curr	ricular a	ctivities	leadiı	ng to	their mul	ltifaceted				
	personality develop	oment.										
CO4	Express their ideas,	, views, In-depth eval	luation a	nd analy	sis cle	early i	n the topi	c of their				
	interest.											
CO5	Demonstrate and p	ractices different act	ivities, b	y Integra	ating	learni	ng experi	ences by				
	demonstrating trans	sferable skills.										
Unit-No.	Con	tent	Contact	Lea	arnin	g Out	come	BL				
			Hour									
I	AdtU encourage	es a range of	10	ADTU	J fo	sters	holistic					
	activities outsid	le the regular		develo	_		through					
	curriculum inte	nded to meet		clubs	like l	Dance	, Music,					
	learner's interest,	These activities		Photo	graph	y,	Drama,					
		lop the social and		and			terature,					
	soft skills and p	romote a holistic		encou	ragin	g						
	development of			partic	ipatio	n	in					
		I the 360 degree		works	_		and					
	~	logy the students		compe	etition	ıs.						
		lifferent activities										
		fferent clubs viz.										
	_	otography, drama,										
	literary etc., T											
		ticipate in regular										
	club activities	-										
	-	per their interest										
		student members										
		trained represent										
		inter University										
	student and	national level										
	competitions,	Renewed										
	_	nvited to conduct										
	_	enefit the members										
1	and students by	giving them the										

	platform to learn from experts in							
	the respective fields.							
Practical Component								
Practical 1								
Practical 2								
Practical 3								
Practical 4								

TEXT	BO	OKS:

T1:

REFERENCE BOOKS:

R1:

OTHER LEARNING RESOURCES:

01:

CO PO Mapping		
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course	Course	CO'	РО	РО	РО	РО	PO	РО	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	EXTRA	CO 1	2	2	2	1	2	2				2		2
22UBEC1	CURRICUL	CO 2	2	2	2	1	2	3				2		2
21	AR ACTIVITIE S	CO 3	1	1	2	1	2	2				3		3
	CC 4	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – III								
Course Title		Analog 1	Electron	nic C	ircuit	S					
Course code	22BTCS211R	Total credits: 4	L	Т	P	S	R	O/F	С		
		Total hours: 45T+30P	3	0	2	0	0	0	4		
Pre-requisite	Nil	Co-requisite			<u> </u>		Nil				
Programme	Bachel	Bachelor of Technology in Computer Science & Engineering									
Semester	3rd se	emester of the secon	nd year	of th	e pro	gram	1				
Course	Design and analy	Design and analysis of CE, CB, CC amplifiers using small signal h-model and pi-									
Objectives	model and deriva	model and derivation of voltage gain, current gain, input impedance and output									
(Minimum 3)	impedance. Design and analysis of common source FET amplifier. Behaviour of operational amplifier.										
CO1	To understand the	To understand the characteristics of transistor									
CO2	Design and analys	e various rectifier c	rircuits								
CO3	Design and analys	e various amplifier	circuits								
CO4	Design sinusoidal	and non-sinusoidal	oscillato	ors							
CO5	Understand the fu	nction an op amp ar	nd design	op a	amp b	ased	circui	ts			
Unit-No.	Con	ntent	Contac Hour		Lea	arnin	g Outo	come	KL		
I	of half-wave	f a diode; review and full-wave diodes, clamping	7		operation or conver liodes egular	ion; AC rsion; ftion; ing/cl	to appl for lipping	y Zener voltage design	1,2,3		

II	Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits	10	Understand BJT structure, I-V characteristics; use as switch, amplifier (small-signal model, biasing circuits); analyze common-emitter, common-base, common-collector configurations; grasp small-signal and high-frequency equivalent circuits.	3
III	MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits- gain, input and output impedances, trans-conductance, high frequency equivalent circuit.	10	Understand MOSFET structure, I-V characteristics; utilize as switch, amplifier (small-signal model, biasing circuits); analyze common-source, common-gate, commondrain configurations; grasp small-signal parameters, high-frequency behavior.	3,4
IV	Differential amplifier; power amplifier; direct coupled multistage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product	8	Understand differential amplifier operation; design power amplifiers and direct-coupled multistage amplifiers; analyze operational amplifier internals, ideal behavior, and non-idealities (offsets, bias currents, slew rate, gain-bandwidth product).	3,4

	<u>, </u>		,	
V	Idealized analysis of op-amp		Analyze op-amp circuits:	
	circuits. Inverting and non-		inverting/non-inverting	
	inverting amplifier, differential		amplifiers, differential	
	amplifier, instrumentation		amp, integrator, active	
	amplifier, integrator, active filter,		filters, controllers,	
	P, PI and PID controllers and		oscillators, analog-to-	
	lead/lag compensator using an op-		digital conversion,	
	amp, voltage regulator, oscillators	10	comparators, detectors,	3,4
	(Wein bridge and phase shift).		generators, rectifiers, and	
	Analog to Digital Conversion.)		monostable	
	Hysteretic Comparator, Zero		multivibrators.	
	Crossing Detector, Square-wave			
	and triangular-wave generators.			
	Precision rectifier, peak detector.			
	Monoshot.			
	PRACTICAL CO	MPONE	NT	
1	To Study the V-I characteristics of		Students will be able to	
	Forward Biased		describe the V-I	
			characteristics of a	
			forward-biased diode,	
		2	and analyze and interpret	2,3
			the experimental data to	
			explain the behavior of	
			the diode under different	
			voltage conditions.	
2	To Study the Reverse		Understand and explain	
	characteristics of Zener diode.		the reverse characteristics	
	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		of a Zener diode,	
			identifying key concepts	
			such as breakdown	
			voltage and reverse	
		2	current.	2,4
			Analyze and interpret the	
			behavior of Zener diodes	
			in reverse bias conditions	
1			through experimental	
			data.	

3	To Study the working of a diode as half wave rectifier with and without filter.	3	Explain the basic operation of a diode in a half-wave rectifier circuit, both with and without a filter.Compare the performance and output characteristics of a half-wave rectifier circuit with and without a filter using practical observations.	2,4
4	To study the input and output characteristic of BJT in CE configuration.	3	Students will be able to analyze and interpret the input and output characteristics of a BJT in CE configuration. Students will be able to evaluate performance parameters of a BJT based on its characteristic curves.	4,5
5	To design an Inverting Amplifier for the given specifications using Op-Amp IC 741.	3	Upon completing this task, students will be able to design an inverting amplifier circuit using the Op-Amp IC 741 to meet specified requirements and they will analyze the circuit's performance to ensure it meets the given specifications.	3,4
6	To design and setup a non-inverting amplifier circuit with OPAMP 741 for a fixed gain, plot the waveforms, observe the phase reversal.	3	By the end of this task, students will be able to design and set up a non-inverting amplifier circuit using OPAMP 741 for a fixed gain and plot and analyze the resulting waveforms to observe phase reversal.	3,4

7	To study a low pass and a high pass filter with a given cut off frequency.	3	Describe the functioning and applications of low pass and high pass filters, including their cut off frequencies. Students will be able to design and implement low pass and high pass filters with specified cut off frequencies in practical circuits. (Bloom's Level 3: Applying)	2,3
8	To study a low pass and a high pass filter with a given cut off frequency.	3	Understand the fundamental principles and applications of low pass and high pass filters with given cut off frequencies. Apply their knowledge to analyze and design	2,3
			basic low pass and high pass filter circuits.	
9	To design a differentiator and integrator using OPAMP IC741.	3	Design both a differentiator and an integrator circuit using the OPAMP IC741 and analyzetheir performance in various applications.	6,4
10	To design and setup a summing amplifier circuit with OPAMP 741 for a fixed gain and verify the output.		Understand and apply the principles of summing amplifier circuits using OPAMP 741 to achieve a fixed gain.	
		3	Analyze and verify the output of the designed summing amplifier circuit to ensure it meets the specified requirements.	3,4

T1:Micro Electronics by Millman And Grabel , McGRAW HILL

T2: Integrated Electronics by Millman & Halkias , McGRAW HILL

T3: Electronic Devices and Circuits by Boylstead&Nashelsky, Pearson

REFERENCE BOOKS:

- R1: Micro electronics circuit by Sedra and Smith, Oxford University;
- R2: Microelectronics circuit analysis and design, by Rashid, PWS publication house;
- R3: Electronic devices and integrated circuit- BP Singh and Rekha Singh, Pearson.
- R4: Electronic Prith Ed. by Albert Malvino

OTHER LEARNING RESOURCES:

- 1. Analog Devices Op-Amp Circuits
- 2. All About Circuits Operational Amplifier Circuits

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	To understand the characteristics of transistor.	1,2,3,5,10 and 12
2	Design and analyse various rectifier circuits	1,2,3,5,9,10 and 12
3	Design and analyse various amplifier circuits	1,2,3,4,5,6,10 and 12
4	Design sinusoidal and non-sinusoidal oscillators	1,2,3,4,5,6,10 and 12
5	Understand the function an op amp and design op amp based circuits	1,2,3,4,5,6,10 and 12

Course code	Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO1	3	3	2		2					2		2
		CO2	3	3	2		2				2	2		3
		СОЗ	3	2	1	2	2	2				2		2
	Analog	CO4	2	3	2	2	2	2				2		2
22BTCS211R	Electronic Circuits	CO5	3	3	3	3	3	3				2		3

		SEMESTE	R – III								
Course Title	Digital Electron	ic Circuits									
Course code	22BTCS212R	Total credits: 4	L	Т	P	S	R	O/F	С		
		Total hours: 45T+30P	2	0	2	0	0	0	3		
Pre-requisite	Nil	Co-requisite					Nil				
Programme	Bac	helor of Technology	in Comp	uter	Scien	ce &	Engin	eering			
Semester	3rd s	emester of the secon	d year of	the	progr	am					
Course	To familiarize with the different number systems, logic gates, and combinational and										
Objectives		sequential circuits utilized in the different digital circuits and systems.									
	The course will help in design and analysis of the digital circuit and system.										
(Minimum 3)	Apply skills in digital system integration and troubleshooting										
CO1	Apply Boolean a	llgebra and analyze d	igital log	ic fai	nilies	, dem	onstra	ting profi	ciency in		
	~ ~ ~	nderstanding characte							J		
CO2		plify logic functions sing expertise in MS	•	•		•			_		
CO3	-	sign sequential circuit			•		•	n applica	tions and		
CO4		lesign digital-to-anal rious A/D converter ty	_	erter	s, un	dersta	anding	g of qua	ntization,		
CO5	•	nductor memories a ne operation, classifi PLDs.				_			•		
Unit-No.	C	ontent	Contac Hour	t	Le	arning	g Outo	come	KL		

I	Fundamentals of Digital Systems and logic families: Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.	7	Understanding digital signals, circuits, logic operations, Boolean algebra, IC gates, binary number systems, arithmetic, error codes, digital IC characteristics, TTL, Schottky TTL, CMOS logic, and interfacing techniques including tri-state logic.	1,2,3
II	Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.	10	Understanding combinational digital circuits: logic function representation, K-map simplification, multiplexers, demultiplexers, adders, subtractors, ALU design, MSI chips, comparators, encoders, decoders, display drivers, and function realization methods like Q-M method.	3,4
III	Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.	10	Understanding sequential circuits: 1-bit memory, bistable latch properties, clocked SR flip-flop, JK, T, D flip-flops, applications, shift registers, converters, counters, special ICs, and their applications in digital memory, timing, and sequence control systems.	3,4

IV	A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D	8	Understanding A/D and D/A converters: types (weighted resistor, R-2R ladder), specifications, IC examples, sample-and-hold circuits, A/D conversion techniques (parallel comparator, successive approximation, counting, dual slope), and their applications in digital systems.	4
V	Semiconductor memories and Programmable logic devices: Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).	10	Understanding semiconductor memories: organization, expanding size, types (ROM, RAM, CAM, CCD), characteristics, commonly used chips, ROM as PLD, programmable logic devices (PLAs, PALs, CPLDs, FPGAs), and their roles in digital systems.	4
	PRACTICAL CO	MPONEN'	Т	
1	To study and verify the truth table of logic gates.	3	Understand and explain the functionality and truth tables of basic logic gates. Apply knowledge to construct and verify the truth tables of various logic gates through experimentation	2,3

2	To design and implementation using NAND gate & NOR gate as Universal Gate.	3	1. Understand and apply the concept of using NAND and NOR gates as universal gates in digital circuit design 2. Construct and evaluate various digital logic circuits using only NAND and NOR gates to demonstrate their universality.	3,5
3	To study about Ex-OR gates and verify their Truth Table.	3	Understand the fundamental operation and logic of Ex-OR gates. Apply knowledge to verify the truth table of Ex-OR gates through practical experimentation	2,3
4	To study about adder circuits, half adder circuits and verify their truth table.	3	Understand the concepts and functionality of adder and half-adder circuits. Analyze and verify the truth tables of adder and half-adder circuits to ensure their correct operation.	2,4
5	To study about adder circuits, full adder circuits and verify their truth table.	3	Comprehend the concepts and functionality of adder and full adder circuits. Apply knowledge to verify the truth tables of adder and full adder circuits through practical implementation	2,3
6	To study half subtractor using basic gates.	3	Understandthe functionality and design of a half subtractor using basic logic gates. Construct and verify the operation of a half subtractor circuit to demonstrate its subtraction capability	2,3

7	To study full subtractor using basic gates.	3	Understand the operation and logic of a full subtractor circuit using basic gates. Implement and analyze a full subtractor circuit to verify its functionality	2,4
8	To design and set up a 4:1 and 2:1 Multiplexer.	3	Design and construct 4:1 and 2:1 multiplexer circuits, demonstrating an understanding of their functional principles. Evaluate and test the performance of the constructed multiplexer circuits to ensure accurate operation	3,4
9	To design and set up a 1:4 Demultiplexer (DE-MUX).	3	Understand the functional principles of a 1:4 Demultiplexer and apply this knowledge to design and set up the circuit. Evaluate the performance of the 1:4 Demultiplexer to ensure correct signal distribution and functionality	3,5
10	Implementation and verification of decoder and encoder using logic gates.	3	Apply knowledge of digital logic to design and implement encoder and decoder circuits using logic gates. Evaluate the functionality of the encoder and decoder circuits through systematic verification	3,5

T1:Dr. Sanjay Sharma "Digital Electronics and logic Design", Katson Books, fourth edition 2015

REFERENCE BOOKS:

R1: R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009

R2: Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.,

OTHER LEARNING RESOURCES:

www.nptel.ac.in

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply Boolean algebra and analyze digital logic families, demonstrating proficiency in interfacing and understanding characteristics of digital ICs.	1,2,3,10 and 12
2	Design and simplify logic functions using K-maps, implement combinatorial digital circuits, showcasing expertise in MSI chips and function realization using the Q-M method.	1,2,3,4,5,10 and 12
3	Analyze and design sequential circuits, demonstrating proficiency in applications and design considerations of various types of flip-flops and counters.	1,2,3,4,5,10 and 12
4	Evaluate and design digital-to-analog converters, understanding of quantization, encoding, and various A/D converter types.	1,2,3,4,5,10 and 12
5	Analyze semiconductor memories and programmable logic devices, demonstrating proficiency in the operation, classification, and characteristics of different memory technologies and PLDs.	1,2,3,4,5,10 and 12

Course code	Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO1	2	2	1							1		1
		CO2	3	3	2	2	1					1		2
	Digital	СОЗ	3	3	3	1	1					1		2
22BTCS212R	Electronic Circuits	CO4	3	3	2	2	1					1		2

	CO5										
		3	3	2	2	1			1	2	ı

		SEMESTE	R – III											
Course Title		Data Stru	ucture&	Algo	rithm	ıs								
Course code	22BTCS213R	Total credits: 4	L	T	P	S	R	O/F	С					
		Total hours:	3	0	2	0	0	0	4					
		45T+30P												
Pre-requisite	Fundamentals of	Co-requisite					Nil							
	programming													
	logic													
Programme	Bache	or of Technology is	n Comp	uter S	Scienc	ce &]	Engin	eering						
Semester			3											
Course	To impart the basic concepts of data structures and algorithms.													
Objectives	To understand basic concepts about stacks, queues, lists, trees and graphs.													
(Minimum 3)	To understand concepts about searching and sorting techniques													
CO1	Analyze algorithms using asymptotic notations, demonstrating proficiency in searching													
	techniques like linear search and binary search, and making informed time-space trade-offs.													
CO2	Design and analyze algorithms for stack and queue operations, including expression conversion and evaluation, demonstrating mastery in implementing and evaluating various types of queues.													
CO3	_	nalyze operations of						ations, sh	owcasing					
CO4	^	ologies and operation				•		s with a	focus on					
004		s and practical appli		initore	iii ty	pes o	1 1100	3, WILII U	rocus on					
CO5		pare various sorting		ms ar	nd has	shing	techn	iaues: de	monstrate					
		ph terminologies,	_			_		•						
	traversal with comp		1		,		,							
Unit-No.	-	itent	Contac	ct	Lea	arnin	g Out	come	BL					
			Hour				0							
I	Introduction: Ba	sic Terminologies:	8		y	lear	ning	these	1,2,3					
	Elementary Dat	a Organizations,		C	oncep	ts,	studer	nts will						
	Data Structure Op	erations: insertion,			nders			data						
	deletion, traversal	etc.; Analysis of		0:	rganiz	zation	, perf	orm key						
	an Algorithm	n, Asymptotic			perati		on							
	Notations, Time-S	pace trade off.		st	ructu	res,		analyze						
	Searching: Line	_		al	lgoritl	hms		using						
	Binary Search Te	chniques and their	asymptotic notations, and											
	complexity analys	is.	evaluate search techniques											
				fo	or		ef	ficiency,						
				u	nders	tandiı	ng the	eir time-						
				SJ	pace t	rade-	offs.							
II	Stacks and Queu	es: ADT Stack	8	U	Inders	stand	stac	ck and	3,4					
	and its operations:	Algorithms and		q	ueue	ADT	s, perf	form and						
	their complexity a	nalysis,		a	nalyz	e sta	ck op	erations,						

			1	
	Applications of Stacks: Expression		apply stacks in expression	
	Conversion and evaluation –		conversion and evaluation,	
	corresponding		and explore various queue	
	algorithms and complexity analysis.		types with their operations	
	ADT queue, Types of Queue:		and complexities.	
	Simple Queue, Circular Queue,			
	Priority Queue; Operations on each			
	types of Queues: Algorithms and			
	their analysis.			
III	Linked Lists: Singly linked lists:	10	Comprehend singly,	3,4
	Representation in memory,		doubly, and circular linked	,
	Algorithms of several operations:		lists, perform operations	
	Traversing, Searching, Insertion		like traversal, insertion,	
	into, Deletion from linked list;		deletion, and implement	
	Linked representation of Stack and		linked representations of	
	Queue, Header nodes, Doubly		stack and queue. They will	
	linked list: operations on it and		analyze algorithms and	
	algorithmic analysis; Circular		complexities associated	
	Linked Lists: all operations their		with these data structures	
			with these data structures	
	algorithms and the complexity			
	analysis.	40	**	
IV	Trees: Basic Tree Terminologies,	10	Understand binary trees,	4
	Different types of Trees: Binary		BSTs, AVL trees, B trees,	
	Tree, Threaded Binary Tree, Binary		and B+ trees. They'll	
	Search Tree, AVL Tree; Tree		perform operations,	
	operations on each of the trees and		analyze algorithms, and	
	their algorithms with complexity		explore applications,	
	analysis. Applications of Binary		enhancing skills in data	
	Trees. B Tree, B+ Tree:		organization and	
	definitions, algorithms and analysis.		algorithmic analysis.	
V	Sorting and Hashing: Objective	9	Understand hashing	4
	and properties of different sorting		techniques. In graph	
	algorithms: Selection Sort, Bubble		theory, they'll grasp basic	
	Sort, Insertion Sort, Quick Sort,		terms, representations,	
	Merge Sort, Heap Sort; Performance		search algorithms, and	
	and Comparison among all the		analyze complexities,	
	methods, Hashing.		enhancing problem-	
	Graph: Basic Terminologies and		solving skills in data	
	Representations, Graph search and		manipulation.	
	traversal algorithms and			
	complexity analysis.			
Practical Con				
Tructical Coll				
Practical 1	Array Operations		Gain proficiency in	
			implementing and	
	Program to perform basic array		analyzing basic array	
	operations (insertion, deletion,	3	operations in	4
	search, update).		programming. Understand	
			their implications and	

			efficiency in problem-	
Practical 2	Linked List Operations Program to implement singly linked list operations (insertion, deletion, traversal). Program to implement doubly linked list operations (insertion, deletion, traversal). Circular Linked List Program to implement circular linked list operations (insertion, deletion, traversal).	3	solving contexts. Implemented singly, doubly, and circular linked list operations (insertion, deletion, traversal) in Python, fostering understanding, implementation skills, and analytical comparison of dynamic data structures in programming.	5
Practical 3	Stacks and Queues Stack Using Array Program to implement stack operations using arrays (push, pop, peek). Stack Using Linked List Program to implement stack operations using linked lists. Infix to Postfix Conversion Program to convert infix expression to postfix expression using stack.	3	Implement stack operations (push, pop, peek) using arrays in Python, emphasizing stack properties and array-based implementation efficiency.	4
Practical 4	Queue Using Array Program to implement queue operations using arrays (enqueue, dequeue, front, rear). Queue Using Linked List Program to implement queue operations using linked lists. Circular Queue Program to implement circular queue using arrays.	3	Implement queue operations (enqueue, dequeue, front, rear) using linked lists in Python, emphasizing dynamic memory management and efficient queue operations.	4
Practical 5	Trees	3	Create a binary tree in Python and perform preorder, inorder, and	5

	Binary Tree Creation Program to create a binary tree and perform preorder, inorder, and postorder traversals. Binary Search Tree (BST) Operations Program to implement BST operations (insertion, deletion, search).		postorder traversals, illustrating tree structure and traversal algorithms.	
Practical 6	AVL Tree Implementation Program to implement AVL tree operations (insertion with rotations). Heap Implementation Program to implement a max-heap or min-heap and perform heap operations (insert, delete, heapify).	3	Implement AVL tree operations (insertion with rotations) in Python, ensuring balance and efficient search, insertion, and deletion operations in self-balancing trees.	4
Practical 7	Sorting Programs Merge Sort Implementation: Write a C program to implement the merge sort algorithm to sort an array of integers. Quick Sort Implementation: Implement the quick sort algorithm in C to sort an array of integers. Heap Sort Implementation: Write a C program to implement the heap sort algorithm to sort an array of integers.	3	Implement merge sort in C for array sorting, emphasizing divide-and-conquer principles and efficient sorting of large datasets. Implement quick sort in C for array sorting, focusing on partitioning and recursion for efficient average-case sorting of arrays. Implement heap sort in C for array sorting, showcasing heap properties and efficient inplace sorting using a maxheap or min-heap structure.	5
Practical 8	Hash Table with Chaining: Implement a hash table using chaining for collision resolution in C. Include functions to insert, search, and display elements.	3	Implement hash table with chaining in C, handling collisions with linked lists for efficient insert, search, and display operations in hash-based data storage.	5
Practical 9	Hash Table with Linear Probing: Write a C program to implement a	3	Implement hash table with linear probing in C, resolving collisions by	4

	hash table using open addressing with linear probing for collision resolution. Include functions to insert, search, and display elements.		linearly searching for open slots, ensuring efficient key-value storage and retrieval.	
Practical 10	Hash Table with Quadratic Probing: Implement a hash table using open addressing with quadratic probing for collision resolution in C. Include functions to insert, search, and display elements	3	Implement hash table with quadratic probing in C, resolving collisions using quadratic increments for open slots, ensuring efficient key-value storage and retrieval.	5

T8: "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

REFERENCE BOOKS:

- **R3:** Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
- **R4:** "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

OTHER LEARNING RESOURCES:

- 1. https://books.google.co.in/books/about/Data_Structures_and_Algorithms.html?id=11CHYj5eV-EC&redir_esc=y
- 2. https://techdevguide.withgoogle.com/paths/data-structures-and-algorithms/

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze algorithms using asymptotic notations, demonstrating proficiency in searching techniques like linear search and binary search, and making informed time-space trade-offs.	1,2,3,10 and 12
2	Design and analyze algorithms for stack and queue operations, including expression conversion and evaluation, demonstrating mastery in implementing and evaluating various types of queues.	1,2,3,4,5,10 and 12
3	Implement and analyze operations on linked lists and its variations, showcasing competence in memory representation and algorithmic complexities.	1,2,3,4,5,10 and 12
4	Apply tree terminologies and operations on different types of trees, with a focus on algorithmic analysis and practical applications.	1,2,3,4,5,10 and 12

5	Evaluate and compare various sorting algorithms and hashing	1,2,3,4,5,10 and 12
	techniques; demonstrate proficiency in graph terminologies,	
	representations, and algorithms for search and traversal with	
	complexity analysis.	

Course	Course	C	PO											
code	Name	Os	1	2	3	4	5	6	7	8	9	10	11	12
		CO												
		1	2	2	1							1		1
	Data	CO												
•••	Structur	2	3	3	2	2	1					1		2
22BTCS2	e&	CO												
13R	Algorith	3	3	3	3	1	1					1		2
	ms	CO												
		4	3	3	2	2	1					1		2
		CO												
		5	3	3	2	2	1					1		2

		SEMESTE	R – III										
Course Title		Biolog	gy For E	ngine	eers								
Course code	22BTCS214R	Total credits: 4	L	T	P	S	R	O/F	С				
		Total hours:	2	0	0	0	0	0	2				
		45T+30P											
Pre-requisite	Nil	Co-requisite					ramn						
Programme	Bache	elor of Technology i	n Compi	uter (Scienc	ce & 1	Engin	eering					
Semester			3										
Course	To introduce the st	udents about the bio	logical co	oncep	ts fro	m an	engin	eering per	spective.				
Objectives	To enable the stude	ents to have a strong	knowled	ge of	funct	ionin	g of a	n ecosyste	em and				
(Minimum 3)	identification of or	ganisms.											
	To introduce with	To introduce with the concepts of genetics and mechanisms related to it.											
		To describe about the genetic code and its applicability.											
	To explain the stud	lents about different	physiolog	gical	pheno	meno	on occ	curring in	human				
	body.												
CO1	Analyze and dif	ferentiate between	the fu	ndam	ental	prin	ciples	of bio	logy and				
	engineering, emph	asizing the significar	nce of bio	ologic	al obs	servat	ions.						
CO2						_							
	_	tance of classification				-			S				
	cellularity, ultrastr	ucture, energy utiliza	ition, and	mol	ecular	taxoı	nomy.						
CO3	Implement and a	nalyze operations	on linke	d lie	te an	d its	vari	ations sl	nowcasing				
03	_	nory representation a						ations, si	loweasing				
CO4	-	cular basis of info				_		understa	nding the				
004	-	structure, the univers				-			_				
CO5	·	damental principle											
	•	ecological aspects of			•	•		1115 1001	time direction,				
Unit-No.		ntent	Contac					come	BL				
			Hour										
I	Introduction		8	1.	Under	stand		the	1,2,3				
		cope of Biology as						scope of					
	an important scien				_			ches, and					
	Branches of biolo	-			liffere	-		from					
	Fundamental diff	~			ngine			They'll					
	science and engin				ompa	_		oiological					
	Comparison betw				_			ision and					
	_	e and camera, Bird			light	wit		nan-made					
	flying and aircraf				echno			grasp					
	Biological observ				istorio	-		oiological					
	century that lead				bserv			scientific					
	discoveries in the	•			esearc		steps						
	Steps in scientific				Brown		- Po	motion's					
	_	on in biological			ignific			3.232.0					
	sciences.												
II	Classification &	Ecology	8	(Classify organisms based 3,4								
		—			n	J 8		phology,					
	Classification of	organisms, Basis of				mistr		ecology,					
	classification: Mo	orphological,				-		llular vs.					
				ľ		unu	amee	iiuiui Võ.					

	biochemical or ecological, level of		multicellular, prokaryotic	
	organization, symmetry, germ layer		vs. eukaryotic organisms,	
	organization, segmentation,		habitats, and adaptations.	
	notochord.		They'll grasp ecosystem	
	Concept of unicellular and		structure, energy flow,	
	multicellular organisms; prokaryotes		types of excretion, and	
	and eukaryotes; Habitat &		characteristics of major	
	Adaptations.		animal phyla.	
	Concept of Ecosystem: Structure &			
	Function.			
	Energy flow in an ecosystem:			
	Lindemann ten percent law.			
	Types of excretion: Ammonotelism,			
	Ureotelism and Uricotelism.			
	Animal Kingdom: Characters of			
	phylum with examples.			
	Model organisms for the study of			
	biology come from different groups.			
	E. coli, S.cerevisiae, D.			
	Melanogaster, C. elegance, A.			
	Thaliana, M. musculus.			
III	Genetics & Biomolecules	10	Understand allele	3,4
	Concept of Allala, Daminana		concepts, dominance,	
	Concept of Allele; Dominance		inheritance patterns,	
	&Recessive Monohybrid, Dihybrid		mitosis, meiosis,	
	& Trihybrid cross; Mitosis &		Mendelian laws, co-	
	Meiosis.		dominance, incomplete	
	Mendel's laws, Concept of		dominance, sex	
	Segregation and Independent		determination, genetic	
	assortment.		disorders, DNA/RNA	
	Concept of co-dominance and		roles, enzyme	
	incomplete dominance with illustrations.		classification, and	
			mechanisms, enhancing	
	Sex determination in human.		understanding of genetic	
	Genetic disorders in human beings.		principles and	
	DNA & RNA as genetic material.		biomolecules.	
	Enzymes: Classification;			
TX 7	Mechanism of enzyme action.	10	aroon proportion of the	1
IV	Information Transfer &	10	grasp properties of the	4
	Metabolism		genetic code, DNA	
	Genetic code: Properties		structure, recombination,	
	Structure of DNA		protein structures, the	
	Concept of recombination and		central dogma, ATP's role	
	crossing over		in cellular energy, and	
	Proteins: Primary secondary, tertiary		protein-ligand interactions,	
	and quaternary structure.		enhancing understanding of information transfer and	
	Concept of Central dogma			
	ATP as an energy currency of cell.		metabolism in biological	
	Concept of docking: Protein Ligand		systems.	
	5. 1. 1. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2.		I	

	interaction			
V	Physiology Human Circulatory System: Heart and its working mechanism; Blood groups; Erythroblastosisfetalis. Neuroendocrine system of human: Endocrine glands and their functions. Human Excretory system: Structure of Kidney and Nephron Nervous system of human: Structure of neuron; Resting Membrane Potential; Origin and conduction of nerve impulse. Human Respiratory System: Structure of lungs and exchange of gases. Human digestive enzymes: Components and enzymes. Mechanism of muscle contraction.	9	understand the functioning of the human circulatory, neuroendocrine, excretory, respiratory systems, nervous system, and muscle contraction mechanism. They'll grasp blood groups, erythroblastosis, kidney structure, neuron function, digestive enzymes, and gas exchange, enhancing physiological knowledge.	4

- T1: Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S.
- A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- T2: Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- T3: Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

REFERENCE BOOKS:

R1: Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

R2: Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

OTHER LEARNING RESOURCES:

- 1. **IEEE Transactions on Biomedical Engineering**: Research articles and reviews on biomedical engineering topics.
- 2. Nature Biotechnology: Leading journal in biotechnology and biological engineering.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Analyze and differentiate between the fundamental principles of biology and engineering, emphasizing the significance of biological observations.	2,3,4,6,8,9,10 and 12							

2	Evaluate the importance of classification in biology, considering criteria such as cellularity, ultrastructure, energy utilization, and molecular taxonomy.	2,3,4,6,8,9,10 and 12
3	Implement and analyze operations on linked lists and its variations, showcasing competence in memory representation and algorithmic complexities.	2,3,4,6,8,9,10 and 12
4	Explore the molecular basis of information transfer in genetics, understanding the hierarchy of DNA structure, the universality of the genetic code, and defining genes.	2,3,4,6,8,9,10 and 12
5	Explore the fundamental principles of microbiology, including identification, classification, and ecological aspects of single-celled organisms.	2,3,4,6,8,9,10 and 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
	Biology 1			2	2	3		1		3	1	1		2
				3	2	3		1		2	1	1		2
22BTCS21 4R		CO 3		3	2	2		1		2	1	1		2
	CIS	CO 4		2	3	2		1		2	1	1		2
		CO 5		2	3	3		1		3	1	1		2

		SEMESTEI	R – III								
Course Title		Mathematics I	II (Diffe	renti	al Cal	culus	s)				
Course code	22BTCS215R	Total credits: 4	L	T	P	S	R	O/F	С		
		Total hours:	2	0	0	0	0	0	2		
		45T+30P									
Pre-requisite	NIL	Co-requisite				N	NIL				
Programme	Bache	elor of Technology in	n Comp	uter S	Scienc	e & 1	Engin	eering			
Semester			3								
Course	Gather, analyze,	evaluate, and synt	thesize	infor	matio	n rel	evan	t to a qu	estion or		
Objectives	issue.										
(Minimum 3)	Manipulate and a	nalyze numerical d	ata and	arriv	e at a	n info	orme	d conclus	ion.		
	Understand appli	ications of derivati	ves in	optin	nizati	on, r	elated	l rates, a	and curve		
	sketching.			_							
CO1	Understand the ski	lls of partial derivativ	ves with	their	applic	ation	s.				
CO2		Inderstand the skills of vector calculus									
CO3	Analyse the applic	ation of integral calc	ulus								
CO4		ncept of line integral,		integ	ral and	l volu	ıme in	tegral.			
CO5		ncept of applications		_				-			
Unit-No.	Cor	ntent	Contac	ct	Lea	rnin	g Out	come	BL		
			Hour			•	5				
I	Sequences, Serie	s and Mean value	8	C	Conver	gence	e	and	1,2,3		
	theorems			d	iverge	ence	tes	ts for			
				S	equen	ces	and	series,			
	Sequences	and Series:		iı	ncludi	ng		ratio,			
	~	nd divergence -		c	ompai	rison,		integral,			
		omparison tests –		C	Cauchy	's	root	, and			
	•	uchy's root test -			lterna	-	serie	s tests.			
		- Leibnitz's rule.			hey'll		dersta				
		heorems (without		a	pply	R					
	proofs): Rolle				agran	-		n value			
	Lagrange's mean	value theorem.			neorer		in	solving			
					nathen		ıl j	problems			
**	D.66 1. 1	4° 0 0° /	•		ffectiv		.:11 1		2.4		
II	-	uations of first	8		tuden				3,4		
	order and first d	egree			olve Bernou		order- and	•			
	Linear differe	ntial equations-				-		exact ons, and			
		quations –Exact					_	eal-world			
		uations reducible to			ppry cenari		suc				
		ications: Newton's						cooling,			
		- Law of natural						ay laws,			
	growth and de				lectric		circui	•			
	trajectories–Elect				rthogo			jectories,			
	_	, D. Melanogaster,			nhanc			problem-			
<u> </u>	,	,				0			131		

	C. elegance, A. Thaliana, M.		solving skills in	
	musculus.			
	musculus.		differential equations.	
III	Linear differential equations of	10	Students will master	3,4
	higher order		solving linear differential	
			equations of higher order	
	Homogeneous and Non-		with constant coefficients,	
	homogeneous differential equations		both homogeneous and	
	of higher order with constant		non-homogeneous, using	
	coefficients – with non-		methods such as variation	
	homogeneous term of the type eax,		of parameters and Cauchy-	
	sin ax, cos ax, polynomials in xn,		Legendre equations.	
	eaxV(x) and $xnV(x)$ – Method of		They'll apply these	
	Variation of parameters, Cauchy and		techniques to diverse	
	Legendre's linear equations.		mathematical and	
			scientific contexts.	
IV		10	Understand partial	4
- ,	Partial differentiation		differentiation, including	-
			homogeneous functions,	
	Introduction – Homogeneous		Euler's theorem, total	
	function – Euler's theorem– Total		derivative, chain rule,	
	derivative— Chain rule— Jacobian —		Jacobian, and	
	Functional dependence –Taylor's		Taylor/MacLaurin series	
	and MacLaurin's series expansion of		for functions of two	
	functions of two variables.			
			variables. They'll apply	
	Applications: Maxima and Minima of functions of two variables		these concepts to find	
			extrema using Lagrange's	
	without constraints and		method, enhancing	
	Lagrange'smethod.		problem-solving abilities	
			in multivariable calculus.	
V	Multiple integrals	9	Students will learn double	4
			and triple integrals, change	
	Double and Triple integrals –		of integration order in	
	Change of order of integration in		double integrals, and	
	double integrals - Change of		transformations to polar,	
	variables topolar, cylindrical and		cylindrical, and spherical	
	spherical coordinates		coordinates. They'll apply	
			these techniques to	
			compute volumes and	
			solve practical problems in	
			diverse fields.	
	Practical Con	mponent		
T	I	T		
Practical 1				

T1: Introduction to Integral Calculus: Systematic Studies with Engineering Applications for Beginners, Ulrich L. Rohde, 2011.

REFERENCE BOOKS:

R5: Calculus. Gilbert Strang, 1991.

OTHER LEARNING RESOURCES:

- 1. **Wolfram Alpha** Computational tool for exploring differential calculus concepts, performing calculations, and visualizing functions.
- 2. **Mathematical Association of America (MAA)** Offers resources, journals, and articles related to calculus and mathematics education.
- **3. MathWorld** Online mathematics encyclopedia that provides detailed explanations and definitions related to differential calculus concepts.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Understand the skills of partial derivatives with their applications.	1,2,3,4,5,10 and 12			
2	Understand the skills of vector calculus	1,2,3,4,5,10 and 12			
3	Analyse the application of integral calculus	1,2,3,4,5,10 and 12			
4	Understand the concept of line integral, surface integral and volume integral.	1,2,3,4,5,10 and 12			
5	Understand the concept of applications of multivariable calculus (Integration).	1,2,3,4,5,10 and 12			

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
	Mathema tics III (Different ial Calculus)	CO 1	3	2	3	3	3					3		2
		CO 2	2	2	2	2	2					3		2
22BTCS21 5R		CO 3	2	2	2	2	2					3		2
		CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

		SEMESTE	R – III									
Course Title		Techno I	Profession	nal S	kills	II						
Course code	22BTCS216R	Total credits: 4	L	T	P	S	R	O/F	C			
		Total hours: 45T+30P	0	0	2	0	0	0	1			
Pre-requisite	NIL	Co-requisite				ľ	NIL	•				
Programme	Bachelor of Techi	nology in Computer	Science	& E	ngine	ering						
Semester	3											
Course	To become confide	ent in using mathema	atics, logi	c, rea	asonin	g and	codii	ng to analy	yze and			
Objectives	solve problems in	solve problems in real-life situations										
(Minimum 3)	To acquire advance	ed practical knowled	ge of pro	gram	ming	code	style.					
	Gain advanced pra	ctical knowledge and	d expertis	e in j	progra	ammii	ng coo	de style,				
	emphasizing clarity	y, efficiency, and ma	intainabi	lity i	n soft	ware o	develo	opment.				
CO1												
		lled and knowledgea		agem	ent pr	ofess	ional	who can d	eal with			
	various areas and a	spects of businesses	•									
CO2												
CO2	Develop analytical	and research ability	as manag	geme	nt pro	fessio	onal w	ho can be	more			
	efficient and innov				•							
		1										
CO3									_			
	Gather knowledge	about various develo	opment co	oncep	ots and	d the	theori	es of deve	lopment.			
CO4												
C04	Encourage the stud	lents towards Non-tr	aditional	think	ing.							
CO5	F-66 (* 1						c					
	Effectively commu	nicate scientific and	technica	I Kno	wieag	ge in a	ı profe	essional m	anner.			
Unit-No.	Con	ntent	Contac	et	Lea	arnin	g Out	come	BL			
			Hour				O					
I	C Programming	constructs:	8	J	Inder	stand		the	1,2,3			
		nming Languages,		f	undan	nental	ls	of C				
		Language,Structure		р	rogra	mmin	g,	including				
		m, Executing and		_	angua		_	evolution,				
	Debugging a 'C'I	rogram,		р	rogra	m		structure,				
	'C' Tokens,	Keywords and			xecut			bugging,				
	· ·	rators, Constants,		te	okens	•		eywords,				
	_	Types, Precedence						tors, data				
		pe and Lifetime of					_	cope and				
	•	etic Expressions,			ifetim			rithmetic				
	Evaluation of Exp	•			xpres	-		and				
					xpres			valuation,				
					nhanc			coding				
						_		problem-				
					olving			1				
II	Control Stateme	nts:	8					tatements	3,4			
		using if statement,						itch-case,				
		block,Switch case		,	ото Ото			decision-				
	- J P = 5 1 11 0150		1			, 1	~-		1			

	Block, GOTO statement.		making, and looping	
	Looping:		structures (for, while, do-	
	Concept of Loop, For loop, While		while) with break,	
	loop,Do- while loop, jumpingin		continue, and jump	
	Loop, break and continue statement,		statements. They'll	
	Introduction to Arrays, Strings and		understand arrays, strings,	
	Functions.		and functions, enhancing	
			their ability to design	
			structured and efficient C	
			programs.	
III	Arrays:	10	Students will proficiently	3,4
	One Dimensional Arrays, Two-		handle one-dimensional,	-,-
	dimensional		two-dimensional, and	
	Arrays, Multidimensional Arrays,		multidimensional arrays,	
	Dynamic Arrays.		including dynamic arrays.	
	Strings:		They will implement	
	Implementing String Variables,		string variables, utilize	
	String handling Functions.		string handling functions	
	Functions:		effectively, and grasp the	
	Concept of Functions, user-defined		concepts of user-defined	
	Functions, System-		and system-defined	
	definedFunctions, passing in		functions, enhancing their	
	Functions.		ability to develop robust	
			and modular C programs.	
IV		10	Understand pointers in C,	4
			including declaration,	
			initialization, and	
	Pointers in C:		accessing variables	
	Pointers: Introduction, Declaring		through pointers. They	
	Pointer Variables, Initialization of		will manipulate pointer	
	Pointer		expressions, perform	
	variables, accessing a Variable		increments, and	
	through its Pointer, Pointer		comprehend scale factors,	
	Expressions,		enhancing their ability to	
	Pointer Increments and Scale Factor.		manage memory	
			efficiently and solve	
			complex programming	
			tasks.	

V	Structures:	9	Students will grasp	4		
	Introduction, Defining a structure,		structures in C: defining,			
	declaring structure variables,					
	accessing structure members,		members, initializing, and			
	structure initialization, array of		using arrays of structures.			
	structures.		They'll understand unions,			
	Unions:		differentiate them from			
	Defining a Union, using a Union,		structures, and manage file			
	Difference between Structure and		operations, including			
	Union.		defining, opening, closing			
	File Management in C:		files, and handling			
	Introduction, Defining and opening		input/output and errors			
	a file, closing a file, Input/output		effectively.			
	and Error Handling on Files.					
	_					
	Practical Con	mponent				
Practical 1						
Practical 2						
I inclicui B						
Practical 10						

T1: "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

REFERENCE BOOKS:

R1: PradipDey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

R2: Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

R3: Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.

OTHER LEARNING RESOURCES:

- 1. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
- 2. Dr. GuruprasadNagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1

	CO PO Ma	apping
SN	Course Outcome (CO)	Mapped Program Outcome

1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10 and 12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,10 and 12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,10 and 12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10 and 12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10 and 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS21 6R	Techno Professio nal Skills II	CO 1	2	1	1	1	1					3		2
		CO 2	2	1	3	1	1					3		2
		CO 3	2	3	1	1	1					3		2
		CO 4	2	2	2	2	2					3		2
		CO 5	2	2	2	2	2					3		2

Course Title BASIC LIFE SA													
	VING SKILLS												
Course code 22UULS212R	Total credits: 4	L	T	P	S	R	O/F	C					
	Total hours: 45T+30P	0 0 2				0	0	1					
Pre-requisite NIL	Co-requisite		•	•	1	NIL	•	•					
Programme Bach	elor of Technology in	Comp	uter S	Scien	ce &]	Engin	eering						
Semester		3											
Course Equip learners wit	h essential knowledge	and pra	actica	l skill	s for l	nandli	ng emerg	ency fire					
-	ng fire safety protocols	s, evacu	ation	proce	dures	, and	fire preve	ntion					
(Minimum 3) measures.													
	Teach learners to provide basic management and treatment for injuries resulting from fire												
	emergencies, focusing on immediate first aid techniques, injury assessment, and												
	stabilization.												
	Enhance learners' capability to respond effectively to fire-related injuries by emphasizing												
practical skills in	practical skills in first aid administration and emergency response protocols												
001													
CO1 Rasic Life Suppor	t (BLS) is the specific	ckille a	nd kn	owled	lae th	at ind	ividuale e	hould					
	nstrate after completing				-								
_	-	-		-									
_	essential for anyone who may encounter a medical emergency and need to provide												
ininediate ussista	immediate assistance before professional medical help arrives.												
CO2 Soft skills encomp	bass personal attribute	s and al	oilitie	s enal	oling	effecti	ve interp	ersonal					
interactions in po	ersonal and professio	nal set	tings.	They	y enh	ance	communi	ication,					
collaboration, and	d overall success in	divers	e asp	ects	of lif	fe, en	nphasizin	g their					
significant value i	n achieving personal a	nd prof	essior	nal go	als								
CO3													
	oing healthcare profess			_									
<u>^</u>	knowledge and skills	•		_				•					
	pes of traumatic injuri		_				_						
	nd appropriate care in e	emerger	icies,	enhai	ncing	overa	ll prepare	dness and					
response capabilit	ies.												
CO4													
	o educate on the princi	ples an	d pur	ose o	of the	Triage	system i	n					
healthcare, focusion	ng on prioritizing patie	nt care	based	l on u	rgenc	y. Lea	rners wil	explore					
	as immediate, delayed				_			_					
significance in all	ocating resources and	reatme	nt. Th	ey wi	ll ide	ntify r	nedical co	onditions					
_	ng immediate attentior												
accurate and time	y patient assessment d	uring tı	iage t	o opt	imize	outco	mes in en	nergency					
settings.													
G0.													
CO5	ntify and distinguish	aamma	n ma	dicc1	omer	ganar:	oonditie:	na auch ca					
	ntify and distinguish												
	tion (heart attack), s				_								
	anaphylaxis, respirat	-				-							
reactions or anaph	and non-epileptic),	ana an	cigic	react	10118 ((111CIU(mig seve	re aneigic					
	ylactic shock)												

Unit-No.	Content	Contact Hour	Learning Outcome	BL
I	Basic Life Support(BLS)	8	Basic Life Support (BLS) teaches lifesaving skills,	1,2,3
	Introduction of BLS		including the Chain of Survival, ABCs	
	Chain of survival		Assessment, CPR and ventilation techniques,	
	ABCs Assessment		AED usage, and choking management for adults and	
	CPR and Ventilation Technique		children.	
	AED			
	Choking for adult and children			
II	Soft skills	8	Soft skills training	3,4
	Introduction		enhances communication, situational awareness, and teamwork. Learning	
	Communications Skills		outcomes include improved communication	
	Situational Skills		skills, effective situational responses, and	
	Team Work		collaborative teamwork, along with other essential	
	Other Soft Skills		interpersonal skills.	
III	Trauma emergencies	10	Trauma emergency	3,4
	• Introduction		training covers initial pre-	·
	Priorities of Initial approach		hospital care priorities:	
	inpre-hospital care		scene safety, primary	
	a) Scene safety		assessment, bleeding	
	b) Primary assessment		control, helmet removal,	
	c) Bleeding control		amputated body part care,	
	d) Helmet removal		victim extrication, cervical	
	e) Care of amputated body partf) Extrication of victims and		spine stabilization, collar	
	f) Extrication of victims and safe transfer		application, and limb splinting.	
	g) Cervical spine stabilization		spining.	
	h) Cervical collar application			
	i) Splinting of broken Limbs			
IV	Triage system	10	Triage system training	4
	• Introduction		includes understanding the	
	• Flowchart approach of		triage flowchart, managing	
	Triage		multiple casualties in pre-	
	• Triage of Multiple		hospital settings, and	
	Casualties in Pre-Hospital setting		prioritizing single casualty	

	Triage of Single casualty		care, ensuring efficient and effective emergency								
V	Medical emergencies Introduction Victim centred approach in medical emergency Management of a)seizures b)heart attack c)asthma Diabetic emergencies d)emergency child birth e)stroke recovery position	9	response. Medical emergency training covers victim- centered care and management of seizures, heart attacks, asthma, diabetic emergencies, emergency childbirth, and stroke recovery positions, ensuring effective and compassionate emergency response.	4							
Practical Component Practical 1											

T1: Nancy Caroline'S Emergency Care in the streets Seventh edition by Jones and Bartlett First Aid book by LC Gupta

REFERENCE BOOKS:

R1: Advance Cardio vascular life support and Basic life support provider manual @ American Heart Association (AHA)

OTHER LEARNING RESOURCES:

- 1. **Red Cross First Aid App**: Provides step-by-step instructions for responding to emergencies and locating nearby AEDs.
- 2. **PulsePoint**: Alerts CPR-trained individuals to nearby cardiac arrests and AED locations.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Basic Life Support (BLS) is the specific skills and knowledge that individuals should acquire and demonstrate after completing a BLS training course. These outcomes are essential for anyone who may encounter a medical emergency and need to provide immediate assistance before professional medical help arrives	1,2,3,4,5,9,11 and 12
2	Soft skills encompass personal attributes and abilities enabling effective interpersonal interactions in personal and professional settings. They enhance communication, collaboration, and overall success in diverse aspects of life, emphasizing their significant value in achieving personal and professional goals.	1,2,3,4,5,9,11 and 12
3	Focuses on equipping healthcare professionals, first responders, and emergency care providers with the knowledge and skills to promptly recognize, assess, and effectively manage various types of traumatic injuries and emergencies. This training is critical for ensuring timely and appropriate care in emergencies, enhancing overall preparedness and response capabilities.	1,2,3,4,5,9,11 and 12
4	The course aims to educate on the principles and purpose of the Triage system in healthcare, focusing on prioritizing patient care based on urgency. Learners will explore triage levels such as immediate, delayed, minimal, and expectant, understanding their significance in allocating resources and treatment. They will identify medical conditions and injuries needing immediate attention versus those manageable later. Emphasis is on accurate and timely patient assessment during triage to optimize outcomes in emergency settings.	1,2,3,4,5,9,11 and 12
5	Learners will identify and distinguish common medical emergency conditions such as myocardial infarction (heart attack), stroke, diabetic emergencies (hypoglycemia and hyperglycemia), anaphylaxis, respiratory distress (including asthma exacerbation), seizures (epileptic and non-epileptic), and allergic reactions (including severe allergic reactions or anaphylactic shock)	1,2,3,4,5,9,11 and 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1	2	2	3	2	2				3		3	3
		СО												
	BASIC	2												
	LIFE		3	2	3	2	2				2		3	3
22UULS212	SAVIN	CO												
R	G	3			2	2							2	2
	SKILL		3	2	3	3	3				3		3	2
	S	CO												
		4	3	2	3	1	3				2		3	2
		CO												
		5												
			3	2	3	3	3				2		2	2

		SEMESTE	R – III						
Course Title		PERSONAL I	FINANC	IAL	PLAN	NIN	G		
Course code	22UUFL213R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours: 45T+30P	0	0	2	0	0	0	1
Pre-requisite	Introduction to Financial Budgeting And Planning	Co-requisite NIL							
Programme	Bache	lor of Technology i	n Comp	uter (Scien	ce & 1	Engin	eering	
Semester			3						
Course Objectives (Minimum 3)	money, borrowing, 2. Assess the perso methods of goal ac	d offer an inclusive lending, taxes and t nal financial plannir hievement. get, record-keeping	heir appl	ications, the	on to f	inanc ycle (ial pla of fina	nning. ncial plan	s, and
CO1	Develop a cash management strategy and a plan to facilitate the home or automobile buying process.								
CO2	Design a diversified investment portfolio that addresses several different investment objectives.								
CO3		een open and closed- al estate investment		ıal fu	nds, e	exchai	nge-tra	ded funds	s, and
CO4	Create a financial pand your estate.	olan that covers your	income	needs	s in re	tiremo	ent an	d helps pr	otect you
CO5	financial stability a								
Unit-No.	Con	ntent	Contac Hour		Lea	arnin	g Out	come	BL
I	i. Functions of mo	ning, causes, how it	8	Pu u ff a p v v s iii (Planning anders unction and could anning alue of the imple anteres (NPV)	ng contanding trol, ng proof more and contant trol, and contant trol, and I	vers ng mon aflation finance pocesses ney in compo	n causes cial s, time cluding und nt Value Value	1,2,3

II	compound interest; v.Net Present Value and Future value, vi. Power of Compounding; vii. Doubling period and Rule of 72. Income Tax Planning-	8	power, doubling periods, and the Rule of 72 for effective financial decision-making. Learning Outcome: Gain proficiency in	3,4
	 i. Meaning of Income, ii. Direct & Indirect Taxes, Taxable Income, various heads of Income for tax Calculation, iii. Non-taxable Income, iv. Tax evasion and tax avoidance, v.GST, Tax Planning Strategies. 		understanding income, taxes (direct, indirect), taxable and non-taxable income, tax evasion, avoidance, GST, and effective tax planning strategies.	
III	i. Meaning of Entrepreneurship, prerequisites for becoming an entrepreneur, ii. Entrepreneurship Support Systems in India, iii. Institutional support systems for entrepreneurs, iv. Financial support systems for entrepreneurs; v. Venture Capital, Business Angels, vi. Assistant of Government, vii. Commercial Bank Loans and Overdraft.	10	Understand entrepreneurship fundamentals, support systems in India, institutional and financial support mechanisms (venture capital, business angels, government assistance, commercial bank loans), enabling effective entrepreneurial planning and implementation.	3,4
IV	Planning for investing in securities market - i. Investment avenues offered by Securities Markets Primary Market and Secondary Market, ii . Stock market- meaning, features, functions of NSE, BSE DEMAT trading account,	10	Gain knowledge of investment avenues in securities markets, primary and secondary markets, stock market functions (NSE, BSE), DEMAT trading, security repositories, stock brokers, operational aspects (order placement, contract notes,	4

	iii. Security repository, stock brokers. Operational aspects of securities markets: placement of orders, contract note, pay-in and pay-out, trading and settlement cycle, iv. Various risks involved in investing in securities markets; Role of Financial Intermediaries; Stock indices. v. Mutual Funds- meaning concept, definition, types, importance and drawbacks of mutual funds, mutual funds in India, investing in mutual funds, vi. Systematic Investment Plan (SIP)		trading cycles), risks, financial intermediaries, stock indices, mutual funds (types, importance, drawbacks, investing in India), and advantages of Systematic Investment Plans (SIPs).	
V	and its advantages. Planning for debts and Retirement	9	Develop skills in	4
· ·	i. Consumer credit Introduction to consumer credit; choosing a source of credit, the cost of credit alternatives, ii. Consumer Legal Protection; iii. Housing Decision: Factors and Finance: Vehicle Decisions. iv. Retirement planning Meaning of cost of living; retirement need analysis; development of retirement plan, various retirement schemes. v. Estate Planning; Pension and Medicare Planning; Wills.		consumer credit management, including choosing credit sources and evaluating costs. Understand consumer legal protections and factors influencing housing and vehicle decisions. Master retirement planning, including cost-of-living considerations, retirement needs analysis, retirement scheme evaluation, estate planning, pension, Medicare planning, and wills.	*
Practical 1				
Practical 2 Practical 10				

T1: Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems & The Million-Dollar Financial Advisor: Powerful Lessons and Proven Strategies from Top Producers by David J. Mullen Jr

T2: Personal Finance and Planning by Dr. Rajni

T3: Peaceful Personal Finance: A Short Read on the Basics of Personal Finance and Planning Kindle Edition by Hema Singh

REFERENCE BOOKS:

R1: Be Your Own Financial Advisor: Financial Planning, Investment Options, Risk Management, Tax Management, Succession Planning Kindle Edition y Sushil Bali

R2: The Dumb Things Smart People Do with Their Money: Thirteen Ways to Right Your Financial Wrongs Kindle Edition y Jill Schlesinger

OTHER LEARNING RESOURCES:

- 1. **Financial Planning Association (FPA)**:Offers resources, workshops, and events for financial planners and individuals seeking financial advice.
- 2. **Local Community Resources**: Check local libraries, community centers, and universities for workshops or seminars on personal financial planning.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop a cash management strategy and a plan to facilitate the home or automobile buying process.	1,2,4,5,11 and 12
2	Design a diversified investment portfolio that addresses several different investment objectives.	1,2,4,5,11 and 12
3	Differentiate between open and closed-end mutual funds, exchange-traded funds, and direct or indirect real estate investments.	1,2,4,5,11 and 12
4	Create a financial plan that covers your income needs in retirement and helps protect you and your estate.	1,2,4,5,11 and 12
5	Apply financial knowledge and skills to make informed decisions, ensuring long-term financial stability and security.	1,2,4,5,11 and 12

Course	Course	Cos	PO	PO1	PO1	P								
code	Name		1	2	3	4	5	6	7	8	9	0	1	O 12
														12
		CO 1	1	2		3	3						3	3
	PERSONA L FINANCI AL PLANNIN	CO 2	1	2		3	3						3	3
22UUFL20 2R		CO 3	1	3		2	3						3	3
	G	CO 4	1	2		3	3						3	3
		CO 5												

Course code 22UBPD214R
Pre-requisite NIL Co-requisite NIL Co-requisite NIL Co-requisite NIL Co-requisite NIL Co-requisite NIL Programme Bachelor of Technology in Computer Science & Engineering
Pre-requisite NIL Co-requisite NIL NIL Programme Semester 3 To introduce the types of sentences and their significance. To strengthen the vocabulary of the students to enhance student' vocabulary to enhance their speaking and writing skills it the importance of dress codes in various organization: To overcome fear of Public Speaking To understand the process of Effective Reading techniques and Listening skills. CO1 Create effective written communication for professional scenarios, incorporating engineering terminology and conventions. CO2 Demonstrate proficient verbal communication skills, applying engineering vocabulary and technical language appropriately. CO3 Evaluate and apply effective teamwork strategies in engineering contexts, fostering collaboration and innovation. CO4 Develop and deliver professional presentations using appropriate engineering language and communication techniques. CO5 Analyze and adapt communication strategies for diverse engineering workplace scenario demonstrating cross-cultural competence. Unit-No. Content Contact Hour I Module 1: Reading Skills Reading Skills enhances 1,2,3
Pre-requisite NIL Co-requisite NIL
Programme Bachelor of Technology in Computer Science & Engineering
Semester 3 To introduce the types of sentences and their significance. To strengthen the vocabulary of the students to enhance student' vocabulary to enhance their speaking and writing skills it the importance of dress codes in various organization: To overcome fear of Public Speaking To understand the process of Effective Reading techniques and Listening skills. CO1
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Objectives (Minimum 3) To strengthen the vocabulary of the students to enhance student' vocabulary to enhance their speaking and writing skills it the importance of dress codes in various organization: To overcome fear of Public Speaking To understand the process of Effective Reading techniques and Listening skills. CO1 Create effective written communication for professional scenarios, incorporating engineering terminology and conventions. CO2 Demonstrate proficient verbal communication skills, applying engineering vocabulary and technical language appropriately. CO3 Evaluate and apply effective teamwork strategies in engineering contexts, fostering collaboration and innovation. CO4 Develop and deliver professional presentations using appropriate engineering language and communication techniques. CO5 Analyze and adapt communication strategies for diverse engineering workplace scenario demonstrating cross-cultural competence. Unit-No. Content Contact Hour Hour I Module 1: Reading Skills Reading Skills enhances 1,2,3
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Unit-No. Content Contact Hour BL I Module 1: Reading Skills 8 Reading Skills enhances 1,2,3
Hour I Module 1: Reading Skills 8 Reading Skills enhances 1,2,3
I Module 1: Reading Skills 8 Reading Skills enhances 1,2,3
Exercise 1: Interpreting different abilities to interpret
1
texts various texts, understand
Exercise 2: Importance and punctuation significance,
significance of Punctuation read stories and news, and Exercise 3: Story -reading comprehend different
Exercise 4: News-reading genres, fostering improved
Exercise 4. News-reading genres, rostering improved reading comprehension
different genres and analysis.
II Unit 2: Non-Verbal 8 Non-Verbal 3,4
Communication Communication teaches
i. Understanding Non-Verbal understanding and
Communication & Body Language interpreting body
Types of Body Language language, the importance
ii. Importance and Impact of Body and impact of non-verbal
Language &Introduction to Haptics, cues, and introduces
haptics, kinesics, and
proxemics for effective

	Kinesics and Proxemics		interpersonal communication.	
III	Unit 3: Grammar (Flipped Classroom) i. Types of Sentences (using Assertive, Imperative, exclamatory in respective contexts), ii. Degrees of Comparison	10	Grammar (Flipped Classroom) covers using assertive, imperative, and exclamatory sentences in context, and understanding degrees of comparison, enhancing grammatical accuracy and contextual sentence construction.	3,4
IV	Unit 4: Public Speaking Skills i. Introduction to public speaking Preparation for Public speaking (scripts, non-verbal cues) ii. Understanding and overcoming Fear of Public Speaking Tips Public Speaking	10	4	
V	Module 5: Listening Skills i. Process of listening ii. Understanding listening barriers iii. Difference between Listening and Hearing, iv. Importance of Effective Listening Practice Session: Listening to podcasts, Lectures, Audio Books etc.	9	presentations. Listening Skills explores the listening process, identifies barriers, distinguishes between listening and hearing, underscores the importance of effective listening, and includes practical sessions with podcasts, lectures, and audio books to enhance listening proficiency.	4

T1: Wren, P.C and Martin, H. 1995. High School English Grammar and Composition, S Chand Publishing.

T2: Barrett, Grant. 2016. Perfect English Grammar: The indispensable Guide to Excellent Writing and Speaking, Zephyros Press

REFERENCE BOOKS:

R1: Mccarthy. (2008) English Vocabulary in Use Upper - Intermediate with CD ROM, Cambridge University Press

R2: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

OTHER LEARNING RESOURCES:

- 1. https://www.youtube.com/watch?v=rl85jxktfms
- 2. https://www.slideshare.net/JavedIqbal15/presentation-on-vocabulary-building-14522369

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Create effective written communication for professional scenarios, incorporating engineering terminology and conventions.	1,2,3,4,5,10 and 12						
2	Demonstrate proficient verbal communication skills, applying engineering vocabulary and technical language appropriately.	1,2,3,4,5,10 and 12						
3	Evaluate and apply effective teamwork strategies in engineering contexts, fostering collaboration and innovation.	1,2,3,4,5,10 and 12						
4	Develop and deliver professional presentations using appropriate engineering language and communication techniques.	1,2,3,4,5,10 and 12						
5	Analyze and adapt communication strategies for diverse engineering workplace scenarios, demonstrating cross-cultural competence.	1,2,3,4,5,10 and 12						

Course	Course	Co	PO											
code	Name	S	1	2	3	4	5	6	7	8	9	10	11	12
		CO 1	1	1	1	1	1					3		2
22UDDD2	FOR 2 EMPLOYABI C LITY FOR 3 ENGINEERS C	CO 2	1	1	1	1	1					3		2
22UBPD2 14R		CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTER	R – III									
Course Title		MOC	OCS II:	HTM	IL							
Course code	2MOCECS217R	Total credits: 4	L	T	P	S	R	O/F	С			
		Total hours: 45T+30P	0	0	0	0	0	0	1			
Pre-requisite	NIL	Co-requisite	•			1	NIL	•	•			
Programme	Bachelor of Technology in Computer Science & Engineering											
Semester	3											
Course	Understand HTM	syntax and struct	ure.									
Objectives	Create semantical	y meaningful web	pages.									
(Minimum 3)	Incorporate multir	nedia (images, aud	lio, vide	eo).								
	_	r user data collection			cessil	oility	and re	esponsiver	ness best			
	_	ounded HTML desig		U		•		•				
CO1	Students will under			ructur	e of I	НТМІ						
CO2	To create well-struc	tured and semantica	lly mean	ningfu	ıl web	page	es usin	g HTML	tags.			
CO3	To explore how to incorporate multimedia elements such as images, audio, and video into web pages.											
CO4	They will learn to in	mplement forms and	input el	emen	ts to c	collec	t user	data.				
	design.	apply best practices			•							
Unit-No.	Con	tent	Contac Hour		Lea	arnin	g Out	come	BL			
I	Introduction to HT	ML: Overview of	8	U	Inders	standi	ng the	World	1,2,3			
	the World Wide	Web and HTML,		V	Vide V	Web a	nd H	ΓML,				
	basic structure	of an HTML				_	HTML					
		standing HTML					_	tags for				
		ments, creating						ohs, and				
	headings, paragr	-						ng text				
	breaks, working w	ith text formatting				_	nd sty	-				
	and styling					-	ndatio					
							conte	ent				
	TANKAT TO	1 4 15 .	•		reatio			•				
II	HTML Elements Semantic HTML level semantic understanding att usage, linking v anchor tags, inclu	elements, text- elements , ributes and their web pages with	8	el m en	emant lemen nasteri nhanc	ic a its ing ed	and t eff attribu func	ext-level fectively, ates for tionality, h anchor	3,4			
	multimedia conten	t		ir e	-	anc	l mu	rporating ltimedia, rehensive content				

			creation.	
III	Forms with HTML: Introduction to HTML forms and their importance, Form structure using <form> tag, Input types for text, email, password, etc., using radio buttons, checkboxes, and select lists, implementing form validation with HTML attributes</form>	10	Forms with HTML teaches the importance and structure of HTML forms, utilizing <form> tag for form creation, incorporating input types like text, email, password, radio buttons, checkboxes, and select lists, and implementing form validation through HTML attributes, ensuring proficient form development skills.</form>	3,4
IV	HTML5 Features and Advanced Techniques: Introduction to HTML5 and its new features ,semantic elements in HTML5 , incorporating geolocation and local storage, utilizing canvas for graphics and animations, working with responsive design and media queries	10	HTML5 Features and Advanced Techniques introduces HTML5's new features including semantic elements, geo location, local storage, canvas for graphics/animations, and responsive design with media queries, ensuring proficiency in modern web development practices and enhanced user experience.	4
V	Accessibility and Best Practices: Importance of web accessibility, semantic markup for improved accessibility, implementing ARIA roles and attributes, testing and validating HTML code, applying best practices for cross-browser compatibility and performance optimization	9	Accessibility and Best Practices module emphasizes the importance of web accessibility, using semantic markup for improved accessibility, implementing ARIA roles and attributes, testing and validating HTML code for compliance, and applying best practices for cross- browser compatibility and performance optimization, ensuring inclusive and efficient web development skills.	4
	Practical Con	nponent	DAIIIO.	
Practical 1			<u> </u>	

T1: "HTML and CSS: Design and Build Websites" by Jon Duckett:

• Beginner-friendly book with visual examples and clear explanations of HTML and CSS concepts.

T2: "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins:

Comprehensive guide covering HTML basics and beyond, suitable for beginners.

REFERENCE BOOKS:

R1: "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins

R2: "HTML5: Up and Running" by Mark Pilgrim

OTHER LEARNING RESOURCES:

1. YouTube Tutorials:

Channels like Traversy Media, The Net Ninja, and Academind offer video tutorials on HTML for visual learners.

2. HTML Cheat Sheets and Reference Cards:

Download and use cheat sheets for quick reference to HTML tags and attributes.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students will understand the basic syntax and structure of HTML	1,2,3,4,5,10 and 12
2	To create well-structured and semantically meaningful web pages using HTML tags.	1,2,3,4,5,10 and 12
3	To explore how to incorporate multimedia elements such as images, audio, and video into web pages.	1,2,3,4,5,10 and 12
4	They will learn to implement forms and input elements to	1,2,3,4,5,10 and 12

	collect user data.	
5		1,2,3,4,5,10 and 12
	They will be able to apply best practices for accessibility and	
	responsiveness in HTML design.	

Course code	Cours	Co	PO	PO1	PO1	PO1								
	e	S	1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO												
		1	2	2	2	2	3					2		2
		CO												
• • • • • • • • • • • • • • • • • • •	MOO	2	2	3	3	2	3					2		2
2MOCECS2	CS II:	CO												
17R	HTM	3	2	2	2	2	3					2		2
	L	CO												
		4	2	2	2	3	3					2		2
		CO												
		5	3	3	3	3	3					2		2

		SEMESTER – III											
Course Title		CO-CURRICULA	R ACT	IVI	FIES	5							
Course code	22UBCC211	Total credits: 4	L	T	P	S	R	O/F	C				
		Total hours: 45T+30P	0	0	0	4	0	0	1				
Pre-requisite	NIL	Co-requisite				I	NIL						
Programme	Bachelor	of Technology in Com	puter S	cien	ce &	Eng	ginee	ring					
Semester		3											
Course	Actively engage in d	iverse club activities (dance, ı	nus	ic, p	hoto	ograp	hy, dra	ma,				
Objectives	literacy) to foster per	sonal development.											
(Minimum 3)	Participate enthusiast	tically in workshops a	nd com	petit	tions	s, en	hanc	ing pra	ctical				
	skills and competitiv	e spirit.											
		to represent ADTU ef	fectivel	y in	inte	er-ur	niver	sity and	national				
		mpetitions, showcasing leadership and teamwork.											
	· ·	ain insights and skills from industry experts through workshops, enhancing											
		ofessional competence and career readiness.											
CO1	proressional compete	The and earlest reasons	-										
		ngage actively in diverse club activities such as dance, music, photography, drama, and teracy, fostering personal interests and skills development.											
CO2	•	articipate enthusiastically in workshops and competitions aligned with individual hobbies and interests, enhancing practical learning and competitive spirit.											
CO4	level competitions, der Benefit from worksho	epresent ADTU effective nonstrating leadership at the pse conducted by industrative fields of interpretations.	nd team	work	ζ.								
CO5	Experience a 360-degree	ee learning approach tha g well-rounded personal	nt integra				-		holistic				
Unit-No.	Con	tent	Contac Hour	t	Lea	rnin	g Ou	itcome	BL				
I	_	range of activities	10				at Ad		4,5				
		curriculum intended				•	ocial						
		rest, These activities					thro	_					
		p the social and soft						etivities					
	skills and	1					e, mu						
	_	ofthelearners, Keeping					ohy, a	ına					
	in mind the 36				lram Sartic		•						
		identsare engaged in eaded under different			oartic vork	_							
		music, photography,				•	ons, a	and					
	drama, literary etc.,				_			ions,					
	T	cipate inregular club			_		then						
		, competitions as per			_	_		y and					
	detivities, workshops	, competitions as per		1	11101-	uIII V	CISIL	y and					

their interest and hobbies, The student	national level events.	
members of the club are trained represent		
AdtU in various inter University student		
and national level competitions, Renewed		
personalities are invited to conduct		
workshops that benefit the members and		
students by giving them the platform to		
learn from experts in the respective fields.		

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Engage actively in diverse club activities such as dance, music, photography, drama, and literacy, fostering personal interests and skills development.	1,2,3,4,5,6,10 and 12
2	Participate enthusiastically in workshops and competitions aligned with individual hobbies and interests, enhancing practical learning and competitive spirit.	1,2,3,4,5,6,10 and 12
3	Gain proficiency to represent ADTU effectively in inter- university, state, and national level competitions, demonstrating leadership and teamwork.	1,2,3,4,5,6,10 and 12
4	Benefit from workshops conducted by industry experts, gaining valuable insights and skills applicable to their respective fields of interest.	1,2,3,4,5,6,10 and 12
5	Experience a 360-degree learning approach that integrates academic growth with holistic development, nurturing well-rounded personalities capable of thriving in various professional and social contexts.	1,2,3,4,5,6,10 and 12

Course code	Course Name	Co s	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	CO-	CO 1	2	2	2	1	2	2				2		2
22UBCC2	CURRICUL AR	CO 2	2	2	2	1	2	3				2		2
11	ACTIVITIE S	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2

	3
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		SEMESTEI	R – III											
Course Title		EXTRA CURI	RICULA	AR A	CTIV	ITIE	S							
Course code	22UBEC211	Total credits: 4	L	T	P	S	R	O/F	С					
		Total hours:	0	0	0	4	0	0	1					
		45T+30P												
Pre-requisite	NIL	Co-requisite					NIL							
Programme	Bache	lor of Technology in	n Comp	uter S	Scienc	e & 1	Engin	eering						
Semester			3											
Course	Develop effective	planning skills to	contribu	ite m	eanin	gfull	y, ma	intain						
Objectives	commitment, and	manage time and p	orioritie	s.										
(Minimum 3)	Cultivate leadersh	altivate leadership qualities and passion for diverse interests beyond academics.												
	Engage in co-curr	ricular activities for	holistic	e pers	sonali	ty de	velop	oment.						
	Demonstrate clear	monstrate clear expression, in-depth evaluation, and analytical skills in chosen topics,												
	integrating transfer	regrating transferable learning experiences.												
CO1														
	-	hat they can make m	eaningfu	ıl con	tributi	ions,	maint	aın a com	mıtment,					
	and manage their ti	me and priorities.												
CO2														
	Transform passion	ate students who de	monstrat	te lea	dershi	p and	d purs	ue interes	sts beyond					
	their academics.													
CO3									1.10					
		te in various co-cu	ırrıcular	activ	/ities	leadı	ng to	their m	ultifaceted					
GO 4	personality develop	oment.												
CO4	Express their ideas	s, views, In-depth ev	valuation	and	analve	sis cl	early :	in the ton	ic of their					
	interest.	s, views, in-depth ev	aruation	ana	anary	313 CI	carry	in the top	ic of their					
CO5	interest.													
	Demonstrate and p	ractices different acti	vities, b	y Inte	gratin	g lea	rning	experienc	es by					
	demonstrating tran	sferable skills.												
TI24 NI-	Con	-44	C4-	-4 T	T	•	- 04		DI					
Unit-No.	Col	ntent	Contac		Lea	ırnın	g Out	come	BL					
I	AdtU encourage	es a range of	Hour 10		AtI I f	ostor	s holis	tio	4,5					
1	AdtU encourage activities outside	C	10				t throi		4,5					
		ended to meet						ivities						
		, These activities					nusic,							
		elop the social and						more.						
		promote a holistic		_	_			n club						
	development to					•		ops, and						
	_	d the 360 degree						ancing						
		ology the students			_			earning						
	_	different activities					у ехр	_						
	headed under di	fferent clubs viz.		p	repari	eparing them for								
	Dance, music, ph	notography, drama,		n	ationa	ıl-leve	el							
	literary etc., T	The students are		C	ompet	titions	S							

encouraged to participate in regular	
club activities, workshops,	
competitions as per their interest and	
hobbies, The student members of the	
club are trained represent AdtU in	
various inter University student and	
national level competitions,	
Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	
Practical Con	mponent

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10 and 12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10 and 12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10 and 12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10 and 12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10 and 12

Course code	Course Name	Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O	PO1 1	PO1 2
												10		
		CO 1	2	2	2	1	2	2				2		2
2211015.02	EXTRA CURRICUL	CO 2	2	2	2	1	2	3				2		2
22UBEC2 11	AR ACTIVITIE	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – IV										
Course Title		Computer Org		n & A	Archi	tectui	æ						
Course code	22BTCS221R	Total credits: 3	L	T	P	S	R	O/F	С				
		Total hours: 42T	2	1	0	0	0	0	3				
		~											
Pre-requisite	Programming	Co-requisite		Nil									
	For Problem												
D	Solving	6 TC l ! !		-4	<u> </u>	1	T•-	.					
Programme		Bachelor of Technology in Computer science and Engineering Fall/ IV semester of the second year of the program											
Semester Course													
		1. Discuss the organization and architecture of computer systems and electronic computers.											
Objectives (Minimum 3)		e basic componer	ata of ac	mnu	or or	stom	hosi	dog the c	omputor				
(William 3)	arithmetic.	e basic componer	its of co	mpu	ei sy	Stems	s desi	des the C	omputer				
		input-output o	rganizat	ion	mei	mory	or	ganizatio	on and				
		nt, and pipelining	_	.011,	1110	шог у	OI	Samzan	, and				
CO1	Understand the in			ents	of a	comi	outer	system	with the				
	instruction set arch		-			•		5,500111	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
CO2	Analyse the various							ıter arithr	netic and				
	discuss the various a	_		-1	Port		P						
CO3	Analyse the control			men	norv	desig	n tecl	nnologies	and I/O				
	transfers.		,										
CO4	Demonstrate the co	ncepts of pipelinii	ng, paral	lel pr	ocess	ing a	nd co	ncurrent	access to				
	memory	1 11	C 1	•		U							
CO5	Summarize the co	oncepts of memo	ry orga	nizati	on w	ith r	nappi	ng funct	ions and				
	replacement algorith	ims.											
Unit-No.	Cont	tent	Contac	et	Lea	rning	g Out	come	BL				
			Hour										
I	Functional blocks	of a computer:	8										
	CPU, memory			U	nders	standii	ng t	he key					
	subsystems, contro							s of a					
	set architecture of a			computer, including CPU,									
	instruction execut	· · · · · · · · · · · · · · · · · · ·		memory, input/output 1,2,									
	*	of instructions,		I	evices	•	and	their					
	addressing modes					ations	ships	and					
	Case study – ins			O	perati	ons							
	some common CPU												
II	Data represen	•	8	I	nders			how					
	number represents	ation tivad and											
	number represents				•		•	ent data					
	floating point	representations,		u	sing b	oinary	, hexa	decimal,					
	floating point character represen	representations, tation. Computer		u ai	sing b	oinary SCII s	, hexa ystem	decimal, ns. Learn					
	floating point character represen arithmetic – integ	representations, tation. Computer ger addition and		u aı ce	sing b nd AS onver	oinary SCII s sion	, hexa ystem	decimal, ns. Learn methods	2 1				
	floating point character represen arithmetic – integ subtraction, ripple	representations, tation. Computer ger addition and carry adder, carry		u an	sing band AS onverse etwee	oinary SCII s sion on thes	, hexa ystem	decimal, as. Learn methods mats and	3, 4				
	floating point character represen arithmetic – integ subtraction, ripple look-ahead adder, o	representations, tation. Computer ger addition and carry adder, carry etc. multiplication		u an co	sing band AS onverse etwee ompre	oinary SCII s sion on thes ehend	, hexa ystem	decimal, ns. Learn methods mats and their	3, 4				
	floating point character represen arithmetic – integ subtraction, ripple look-ahead adder, o – shift-andadd, I	representations, tation. Computer ger addition and carry adder, carry etc. multiplication Booth multiplier,		u an co	sing band AS converse etwee compressions gnific	oinary, SCII s sion these thend cance	, hexa ystem	decimal, as. Learn methods mats and their computer	3, 4				
	floating point character represen arithmetic – integ subtraction, ripple look-ahead adder, o – shift-andadd, I carry save multipl	representations, tation. Computer ger addition and carry adder, carry etc. multiplication Booth multiplier, ier, etc. Division		u an co	sing band AS onversetwee ompre gnific peration	SCII sion these thend cance	hexa ystem se form in c	decimal, ns. Learn methods mats and their	3, 4				
	floating point character represen arithmetic – integ subtraction, ripple look-ahead adder, o – shift-andadd, I	representations, tation. Computer ger addition and carry adder, carry etc. multiplication Booth multiplier, ier, etc. Division non-restoring		u an co	sing band AS onversetwee ompre gnific peration	oinary, SCII s sion these thend cance	hexa ystem se form in c	decimal, as. Learn methods mats and their computer	3, 4				

	Introduction to x86 architecture			
III	CPU control unit design: hardwired and micro-programmed design approaches, Case study — design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers — program controlled, interrupt driven and DMA,	10	Understand the architecture and function of the CPU control unit, including instruction decoding, control signal generation, and execution sequencing. Learn to design control units using both hardwired and microprogrammed approaches, and comprehend their role in	3, 4
	privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB		overall CPU performance.	
IV	Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.	8	Understand the concept and implementation of pipelining in CPU architecture to improve instruction throughput. Learn about various stages of pipeline execution, potential hazards (data, control, structural), and techniques for hazard mitigation. Gain insight into the impact of pipelining on overall system performance and efficiency.	4
V	Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.	8	Understand the structure and organization of computer memory, including hierarchical levels (cache, primary, secondary storage), memory addressing, and data access methods. Learn about memory management techniques, such as paging and segmentation, and comprehend their impact	4

	on system performance
	and resource allocation.

T1:"Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

REFERENCE BOOKS:

R1: "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

R2: "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill.

R3: "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the interaction of the components of a computer system with the instruction set architecture of a CPU and addressing modes.	1, 2, 3, 10, 12
2	Analyse the various data representation techniques, perform computer arithmetic and discuss the various adders and multipliers.	1, 2, 3, 4, 5, 10, 12
3	Analyse the control unit design approaches, memory design technologies and I/O transfers.	1, 2, 3, 10, 12
4	Demonstrate the concepts of pipelining, parallel processing and concurrent access to memory.	1, 2, 3, 4, 10, 12
5	Summarize the concepts of memory organization with mapping functions and replacement algorithms.	1, 2, 3, 4, 5, 10, 12

Course code	Course Name	со	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	P O 9	PO1 0	P O 11	P O 12
		CO 1	2	3	1							1		3
22BTCS221	Computer Organizatio	CO 2	3	3	3	2	2					1		3
R	n & Architectur	CO 3	2	2	2							1		3
	e	CO 4	2	2	3	2						1		3
		CO 5	2	2	2	2	1					1		3

		SEMESTE	R – IV						
Course Title		Оре	erating S	Syste	ms				
Course code	22BTCS222R	Total credits: 3	L	T	P	S	R	O/F	С
		Total hours:	3	0	4	0	0	0	5
		42T+60P							
Pre-requisite		Co-requisite							
Programme		or of Technology i							
Semester		all/ IV semester of							
Course		ne mechanisms of			_				
Objectives		ation and the med	chanism	s inv	olve	d in 1	memo	ory mana	gement in
(Minimum 3)	contempor	•		1	1.	41.		راء ۽ الم ۽ ال	سوندو مداور
	_	nowledge on Mut			n aig	goritr	ims,	аеаагоск	detection
	•	and agreement pr			~~~~	4		4£	
		the components	and n	nana	geme	ent a	ispec	ts of co	ncurrency
CO1	manageme Analyze operatin		on type	20 0	arvio	96 0	nd a	tructuros	including
	UNIX and WIND		on, type	.s, si	CI VIC	co, a	110 81	uctul CS	meruunng
CO2	Analyze process c		ips, and	state	es. ex	amin	e thre	ead adva	ntages, and
	appraise CPU sched	•	•						
CO3	Evaluate IPC med		~				oblen	ns; assess	s deadlock
	conditions and use					•			
		•					•	-	
CO4	Evaluate memory	management cond	cepts, in	cludi	ing n	nappi	ng, a	allocation	strategies,
	paging, virtual men	nory principles, and	analyse	page	fault/	repla	ceme	nt algorith	ims.
CO5	Analyze I/O hardw			_	_				•
	storage structures,		-	s, fil	e ma	nage	ment	concepts	allocation
	methods, and direct								1
Unit-No.	Con	tent	Contac		Lea	ırnin	g Out	tcome	BL
I	Introduction.		Hour 7						
1	Introduction:	erating Systems,	/	T	Jnder	ctond		the	
	• •	perating systems,			undar			concepts	
		ing Systems, OS			ınd		ı olutio	_	
		Calls, Structure of			perat			systems,	
	an OS-Layere				liffere	_	OS	types,	
	1	erating Systems,			ervice		and	system	
	Concept of Virtua							structural	2
					nodel			operating	
					ystem				
					nonol		-		
								d grasp	
				t	he co	ncep	t and	benefits	
					of virt	_			
II	Processes:		8	J	Jnder	stand	p	rocesses,	
	Definition, Proce	ess Relationship,		t	heir r	elatio	nship	s, states,	
	Different states	of a Process,		s	tate t	ransi	tions,	and the	2, 4
	Process State tra	insitions, Process		F	roces	s C	ontro	l Block	
1	Control Block	(PCB), Context		(PCB)	I	_earn	about	

	switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling.		threads, their states, benefits, and types, including multithreading. Grasp process scheduling foundations, objectives, types of schedulers, scheduling criteria, and algorithms like FCFS, SJF, RR, including preemptive and non-preemptive methods, and multiprocessor scheduling.	
III	Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	8	Understand inter-process communication, focusing on critical sections, race conditions, and mutual exclusion, including hardware solutions. Learn about deadlocks, including their definition, necessary and sufficient conditions, prevention, avoidance using the Banker's algorithm, and methods for detection and recovery. Gain insight into ensuring robust and efficient process synchronization.	2, 4
IV	Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition— Internal and External fragmentation and Compaction; Paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	8	Understand memory management concepts, including logical and physical address mapping, contiguous memory allocation with fixed and variable partitions, internal and external fragmentation, and compaction. Learn about paging, virtual memory basics, control structures, locality of reference, demand paging, and page replacement algorithms like Optimal, FIFO, SC,	2, 4, 5

			NRU, and LRU for	
			1	
			utilization and	
			management.	
${f V}$	I/O Hardware:	8	Gain understanding of	
	I/O devices, Device controllers,		I/O hardware, including	
	Direct memory access Principles of		devices, controllers, and	
	I/O Software: Goals of Interrupt		principles of direct	
	handlers, Device drivers, Device		memory access (DMA).	
	independent I/O software,		Explore I/O software	
	Secondary-Storage Structure		goals, including interrupt	
	File Management:		handlers, device drivers,	
	Concept of File, Access methods,		and device-independent	
	File types, File operation, Directory		I/O software. Learn file	
	structure, File System structure,		management concepts,	
	1		1 1	
	Allocation methods (contiguous,		access methods, types,	2, 4, 5
	linked, indexed), Free-space		operations, directory and	
	management.		file system structures,	
	Disk Management:		allocation methods, and	
	Disk structure, Disk scheduling,		free-space management.	
	Disk reliability, Disk formatting,		Understand disk	
	Boot-block, Bad blocks.		management	
			encompassing structure,	
			scheduling, reliability,	
			formatting, boot-block,	
			and handling bad blocks	
			for efficient storage and	
			retrieval operations.	
Practical	1.Write Shell Script for followings		Upon completion of these	
	a. To find the global complete path		shell scripting tasks,	
	for any file.		learners will gain	
	b.To broadcast a message to a		proficiency in file path	
	specified user or a group of users		retrieval, user message	
	logged on any terminal.		broadcasting, selective	
	1			
	c. To copy the file system from two		file copying based on	
	directories to a new directory in		timestamp, file	
	such a way that only the latest file		comparison and copying,	
	is copied in case there are		zero-sized file deletion,	
	common files in both the	20	identifying files with	1,2,3,4
	directories.		multiple links, listing	, , ,
	d.To compare identically named		executable files,	
	files in two different directories		displaying formatted	
	and if they are same, copy one of		date/time with a greeting,	
	them in a third directory		and sorting directories by	
	e.To delete zero sized files from a		file size in descending	
	given directory (and all its sub-		order.	
	directories).			
	f. To display the name of those files			
	(in the given directory) which are			
	having multiple links.			
	6 I		1	

g.To display the name of all executable files in the given directory. h.Write a script to display the date, time and a welcome message (like Good Morning etc.). The time should be displayed with "a.m." or "p.m." and not in 24 hours notation. i. Write a script to display the directory in the descending order of the size of each file 2. Implementation of FCFS (First Come First Serve) CPU Scheduling. 3. Implementation of SJF (Shortest Job First) CPU Scheduling. 4. Implementation of Round Robin (RR) CPU Scheduling algorithms, learners will achieve proficiency in understanding and simulating these Scheduling. 5. Implementation of Priority CPU Scheduling Algorithm. 20 fundamental scheduling techniques, gaining insight into their respective advantages, limitations, and practical applications in optimizing CPU resource allocation and system performance. Through implementing FIFO, Optimal, and LRU page replacement algorithms as well as the producer-consumer problem using threads, learners will develop a deep understanding of memory management strategies, gaining practical experience in simulating and evaluating these techniques to optimize resource allocation, enhance system performance, and mitigate concurrency					
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optimize resource allocation, enhance system performance, and					
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mitigate concurrency				• •	
issues in computer				issues in computer	
systems.				systems.	

T1: Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

T2: Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

REFERENCE BOOKS:

- R1: Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing.
- R2: Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- R3: Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- R4: Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze operating system evolution, types, services, and structures including UNIX and WINDOWS	1, 2,3, 4, 5, 10, 12
2	Analyze process concepts, relationships, and states, examine thread advantages, and appraise CPU scheduling objectives, algorithms, and criteria.	1, 2,3, 4, 5, 10, 12
3	Evaluate IPC mechanisms and solutions for classical problems; assess deadlock conditions and use prevention, avoidance, detection, and recovery techniques.	1, 2,3, 4, 5, 10, 12
4	Evaluate memory management concepts, including mapping, allocation strategies, paging, virtual memory principles, and analyse page fault/replacement algorithms.	1, 2,3, 4, 5, 10, 12
5	Analyze I/O hardware, device controllers, DMA principles, and I/O software, secondary-storage structures, disk scheduling algorithms, file management concepts, allocation methods, and directory implementations.	1, 2,3, 4, 5, 10, 12

Course code	Course Name	C O	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
		CO 1	3	2	2	3	2					3		2
22BTCS2	Operati	CO 2	3	2	2	2	2					2		1
22BTCS2 22R	ng Systems	CO 3	3	3	3	3	2					3		1
		CO 4	2	2	3	2	3					2		2
		CO 5	2	2	2	3	2					3		1

		SEMES	TER – I	V							
Course Title		Design	& Anal	ysis of	Alg	gori	ithı	ms			
Course code	22BTCS223R	Total	L	T	P	S	R		O/F		С
		credits: 3	3	0	0	0	0		0		3
		Total hours:									
		45T									
Pre-requisite	Data	Co-requisite	C / C++	Progra	mm	ing					
	Structures										
Programme	Back	nelor of Techno	ology Cor	mputer	scie	ence	e ar	nd F	Engin	eer	ing
Semester]	Fall/ IV semest	er of the	second	yea	r of	f th	e p	rogra	am	
Course	1. Analyz	e the asymptot	tic perfo	rmance	of	alg	ori	thm	ıs.		
Objectives		strate a familia	-	-	_	_					
(Minimum 3)	3. Apply	important alg	gorithmi	c desig	gn	paı	rad	ign	ıs ar	nd	methods o
	analysi										
CO1	Analyze algo	rithms, apply	y asym _l	ptotic	not	tatio	ons	5,	solve	n	nathematica
	analyses, show	~ ~									
CO2	Apply sorting a		gorithms,	matrix	mul	tipl	ica	tion	, usin	g b	rute force and
	divide-and-conc										
CO3	Apply greedy			_	gra	mm	ing	t to	opt	imi	ze problems
	showcasing exp										
CO4	Apply strategie	-	blems lil	ke the	N-(Que	en,	kn	apsac	ck,	and travelin
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CO5	Evaluate decision		_	_						•	•
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	l n		1	
	Programming		algorithmic	
			strategies—Brute-	
			Force, Greedy, and	
			Dynamic	
			Programming—to	
			solve computational	
			problems efficiently	
			and optimally.	
III	Advanced Algorithmic	10	Upon completion,	
	Strategies: Branch and		learners will master	
	Bound and Backtracking		advanced algorithmic	
	methodologies for the design		strategies such as	
	of algorithms; Illustrations of		Branch and Bound,	
	these techniques for Problem-		Backtracking, and	
	Solving, Bin Packing, Knap		heuristics, applying	
	Sack TSP. Heuristics –		them to solve complex	
	characteristics and their		_	3, 4,
			computational problems like Bin	3,4,
	application domains.		*	
			Packing, Knapsack, and	
			Traveling Salesman	
			Problem (TSP),	
			enhancing problem-	
			solving skills across	
			diverse application	
			domains.	
IV	Graph and Tree	10	Upon mastering graph	
IV	Algorithms: Traversal	10	Upon mastering graph and tree algorithms	
IV	Algorithms: Traversal algorithms: Depth First	10	Upon mastering graph and tree algorithms including DFS, BFS,	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST,	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures,	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	7	Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion,	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable Problems: Computability of		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion, learners will understand	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable Problems: Computability of Algorithms, Computability		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion, learners will understand the fundamental	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard,		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion, learners will understand the fundamental concepts of	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard, Approximation algorithms,		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion, learners will understand the fundamental concepts of computability in	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm. Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard, Approximation algorithms,		Upon mastering graph and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains. Upon completion, learners will understand the fundamental concepts of computability in algorithms, distinguish	

NP-complete, NP-hard)
problems, comprehend
Cook's theorem,
identify standard NP-
complete problems, and
apply reduction
techniques to solve
complex computational
challenges effectively.

T1:Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

T2: Fundamentals of Algorithms – E. Horowitz et al.

REFERENCE BOOKS:

R1: Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

R2: Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.

R3: Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze algorithms, apply asymptotic notations, solve mathematical analyses, showing proficiency in problem-solving.	1, 2, 3, 4, 11, 12
2	Apply sorting and searching algorithms, matrix multiplication, using brute force and divide-and-conquer strategies.	1, 2, 3, 4, 11, 12
3	Apply greedy approaches and dynamic programming to optimize problems, showcasing expertise in algorithmic design.	1, 2, 3, 4, 9, 10, 11, 12
4	Apply strategies to solve problems like the N-Queen, knapsack, and traveling salesperson problems.	1, 2, 3, 4, 9, 10, 11, 12
5	Evaluate decision tree lower bounds, grasp P, NP, and NP-Complete complexity classes, showing understanding of lower bound theory's algorithmic implications.	1, 2, 3, 4, 5, 9, 10, 11, 12

Course code	Course Name	со	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	2	2							3	2
22BTCS22	Design &	CO 2	2	2	2	2							2	2
3R	Analysis of Algorith	CO 3	2	2	3	3					1	1	2	2
	ms	CO 4	2	3	2	2					1	1	2	2
		CO 5	1	2	1	2	2				1	1	1	2

		SEME	STER – I	V											
Course Title			iscrete M		ntics										
Course code	22BTCS224R	Total credits:	L	T	PS	R	O/F	С							
		4	3	1	0 0	0	0	4							
		Total hours:													
		52T													
Pre-requisite	Programmin	Co-requisite				Nil									
	g For														
		Problem Solving													
Programme		 helor of Technolo	av in Con	muton	goionag	and F	ngingoning								
Semester	Dac														
Course	Fall/ IV semester of the second year of the program 1. To provide students with an overview of discrete mathematics.														
Objectives	•	•													
(Minimum 3)	functio					0	r ,								
	3. Studen														
	Boolean algebra and other important discrete math concepts.														
CO1	Understand the concepts of relation, function and partially ordered set.														
CO2		Enable to solve logical problems using truth table.													
CO3		concept of algebra		es and it	's relev	ant the	orems.								
CO4		basic counting tech													
CO5	Understand the	concepts of graphs	and their	basic pr	opertie	es.									
Unit-No.	Co	ntent	Contact	t	Learn	ing Ou	tcome	BL							
			Hour												
I		and functions:	12												
	Basic operat	tions on sets,			Upon completion, learners										
	_	•		•		_									
	Cartesian pr	oducts, disjoint		will	uı	ndersta	nd and								
	Cartesian pr union (sum),	oducts, disjoint and power sets.		will man	uı ipulate	nderstar sets	nd and through								
	Cartesian pr union (sum), Different type	oducts, disjoint and power sets. es of relations,		will man basi	uı ipulate c c	ndersta	nd and through ons and								
	Cartesian pr union (sum), Different typ their compositi	oducts, disjoint and power sets. es of relations, ions and inverses.		will man basi Cart	ui ipulate c c esian	nderstar sets operatio	through ons and products,								
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	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive,	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and function	ipulate c cesian prehentions positio anactions positions	nderstand	through ons and products, us types of including d inverses, different th their	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and function Their conditions.	ipulate c cesian prehen tions positio ana ctions positio y will cepts o	nderstand	through ons and products, us types of including d inverses, different h their d inverses. grasp the elete partial	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and functions com order	ipulate c cesian prehentions positio ana etions positio y will cepts o ering,	nderstand	through ons and products, us types of including d inverses, different h their d inverses. grasp the dete partial es (chain,	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and function order com order com	ipulate c cesian prehen tions positio and ctions positio y will cepts o cring, plete,	onderstan	through ons and products, us types of including d inverses, different h their d inverses. grasp the elete partial es (chain, distributive,	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and functions order com mod	ipulate c cesian prehentions position ana ctions positio y will cepts o cring, plete, lular,	nderstand	through ons and products, us types of including d inverses, different h their d inverses. grasp the elete partial es (chain, distributive, blemented),	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean		will man basi Cart com relat com and functions order com mod Boo	ipulate c cesian prehen tions positio ana ctions positio y will cepts o cring, plete, lular, lean	onderstan	through ons and products, us types of including d inverses, different h their d inverses. grasp the elete partial es (chain, distributive,	1,2, 3							
	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented and pseudo Bo	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean olean lattices.	10	will man basi Cart com relat com and functions order com mod Boo Boo	ipulate c cesian prehen tions positio ana ctions positio y will cepts o cring, plete, lular, lean lean la	nderstand	through ons and products, us types of including dinverses, different th their dinverses. grasp the elete partial es (chain, distributive, blemented), pseudo-	1,2, 3							
II	Cartesian prunion (sum), Different type their compositi Different type their compositi Complete p chain, latti distributive, complemented and pseudo Bo	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean olean lattices.	10	will man basi Cart com relat com and function order com mod Boo Boo Upo	ipulate c cesian prehen tions positio ana etions positio y will cepts o ering, plete, lular, lean lean la	onderstan	through ons and products, us types of including dinverses, different th their dinverses. grasp the elete partial es (chain, distributive, blemented), pseudo- n, learners								
II	Cartesian prunion (sum), Different type their composite Different type their composite Complete p chain, latti distributive, complemented and pseudo Bo Propositional Syntax and	oducts, disjoint and power sets. es of relations, ions and inverses. es of functions, ions and inverses. artial ordering, ce, complete, modular and lattices. Boolean olean lattices.	10	will man basi Cart com relate com and functions order com mod Boo Boo Upo will	ipulate c cesian prehen tions position ana ctions positio y will cepts o cring, plete, lular, lean lean lan grasp	nderstand	through ons and products, us types of including dinverses, different th their dinverses. grasp the elete partial es (chain, distributive, blemented), pseudo-	2, 3, 4							

	soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.		logic, proficiency in proof systems, evaluation of satisfiability and validity, understanding of soundness and completeness, application of the deduction theorem, and introduction to first-order logic and its theory.	
III	Algebraic Structures: Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).	12	Upon completion, learners will understand algebraic structures like semigroups, monoids, groups, rings, integral domains, fields, and Boolean algebra, with applications in coding theory and quotient structures.	2, 3, 4
IV	Introduction to Counting: Basic counting techniques — inclusion and exclusion, pigeon- hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.	10	Upon completion, learners will proficiently apply basic counting techniques, including inclusion-exclusion, pigeonhole principle, permutation, combination, summations, and understand introductory concepts of recurrence relations and generating functions.	1, 2, 3
V	Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.	8	Upon completion, learners will understand fundamental graph theory concepts such as degrees, paths, cycles, subgraphs, isomorphism, Eulerian and Hamiltonian paths, and trees.	2, 3, 4

T1:C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.

T2:K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.

REFERENCE BOOKS:

R1: R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the concepts of relation, function and partially ordered set	1, 2, 3, 4, 12
2	Enable to solve logical problems using truth table.	1, 2, 3, 4, 12
3	Understand the concept of algebraic structures and it's relevant theorems.	1, 2, 3, 4, 12
4	Understand the basic counting techniques.	1, 2, 3, 4, 12
5	Understand the concepts of graphs and their basic properties.	1, 2, 3, 4, 12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	PO1 2
	Discrete Mathemati cs	CO 1	3	3	2	2								2
22BTCS22		CO 2	3	2	3	2								2
4R		CO 3	3	3	2	2								2
		CO 4	3	2	3	2								2
		CO 5	3	3	2	2								2

	SEMESTER – IV														
Course Title		Enviro	nmenta	l Scie	ence										
Course code	22BTCS226R	Total credits: 3	L	T	P	S	R	O/F	C						
		Total hours: 52T	2	0	0	0	0	0	2						
Pre-requisite		Co-requisite					Nil								
Programme		or of Technology in													
Semester		all/ IV semester of t					rogra	m							
Course		ding Ecological Sy													
Objectives		Environmental Iss													
(Minimum 3)		Environmental St						Practices.							
CO1		Understand the relationships between natural and man-made systems.													
CO2	_	evelop critical thinking for shaping strategies (scientific, social, economic,													
		ministrative, and legal) for environmental protection, conservation of biodiversity,													
002		vironmental equity, and sustainable development													
CO3		derstand the consequences of human actions on the web of life, global economy, and													
CO4	quality of human lif		(21 - 1-	-1 E				T	C 11						
CO4		Environment Pollution lern civilization on the				nent	issues	, Impact o	or Human						
CO5	•	pects of human popu				noot (of the	nonulatio	n growth						
COS	on the environment		uiauoii,	ana t	ne mi	paci	or the	рориганс	ni giowin						
Unit-No.		tent	Contac	· f	Lea	rnin	7 Out	come	BL						
Cint 140.			Hour		Dea		, Out	come							
I	Introduction to	Environment:	12	U	Jpon c	compl	etion,	learners							
	Definition and sco	pe, components of			/ill	_	erstan								
	environment,	atmosphere,		fı	undam	nental	con	cepts of							
	hydrosphere, 1	ithosphere and		tł	ne		envi	ronment,							
	biosphere, s	tructure and		e	ncom	assir	g its	s scope,							
	composition,			C	ompoi	nents	(atn	nosphere,							
	Life systems, pro	o and eukaryotic		h	ydrosj	phere	, litł	nosphere,							
	organizations, Me	tabolic principles;		b	iosphe	ere),	life	systems	122						
	types of plants and	animals.		(1	prokar	yotic		and	1,2, 3						
	Producers, co	onsumers and		e	ukaryo	otic),	r	netabolic							
	decomposers.			p	rincip	les,	plai	nt and							
				a	nimal	class	ificati	ions, and							
				e	cologi	cal	rol	es of							
				_				ners, and							
					ecomp		8	in							
				e	cosyst	ems.									
II	Ecology: Termino	••	10	•			_								
	approach, ecosyste				_	_		learners							
	ecosystems; struct				/ill	grasp		cological							
	mineral cycling, en				oncep			including	2 2 4						
	trophic chains. De	evelopment and			ermino			cosystem	2, 3, 4						
	evolution.			_	_			function,							
						-	_	energy							
						•		nins, and							
				u	nderst	and	e	cosystem							

		1	davalanment	
			development and	
			evolution, enabling them	
			to analyze and interpret	
			ecological systems and	
			their dynamics effectively.	
III	Environmental Pollution:	12	Upon completion, learners	
	Sources, causes, assessment, effect,		will comprehend the	
	prevention and control of water		sources, causes,	
	pollution, air pollution noise and		assessment, effects,	
	land pollution. Strategies of		prevention, and control of	
	management, concept of		water, air, noise, and land	
	sustainability. Energy, e n v i r o n		pollution. They will	
	m e n t, and their relationship with		understand management	2, 3, 4
	human activities. Water Resources		strategies, sustainability	
	and utilization, forest resources.		concepts, and the	
			interrelationship between	
			energy, environment, and	
			human activities,	
			including the utilization of	
			water and forest resources.	
IV	Global Environmental Problems:	10	Upon completion, learners	
1 V	Human health, settlements,	10		
	management of rivers, lakes, forests,			
	wild life and catchments. Role of		including human health	
	society, NGO and Govt. agencies.		impacts, sustainable	
	Concept of urbanization and green		settlement management,	
	cities Global Warming, greenhouse		conservation of rivers,	
	causes and effects, carbon		lakes, forests, and wildlife.	
	Sequestration.		They will grasp the roles	12, 3,
			of society, NGOs, and	4
			government agencies in	-
			environmental	
			stewardship, and	
			comprehend concepts	
			related to urbanization,	
			green cities, global	
			warming, greenhouse gas	
			causes and effects, and	
			carbon sequestration.	
V	International agreements and	8	Upon completion, learners	
	protocols , National forest policy		will grasp international	
	and Environmental laws and acts.		agreements and protocols	
	EIA.		concerning environmental	
			conservation, understand	
			national forest policies,	2, 3, 4
			environmental laws, and	, ,
			acts governing sustainable	
			practices. They will also	
			comprehend	
			Environmental Impact	
			Ziiviioiiiieitai iiipact	177

	Assessment	(EIA)	
	processes,	enabling them	
	to contribut	e effectively to	
	environmen	tal	
	managemen	at and policy	
	implementa	tion.	

T11. Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the relationships between natural and man-made systems.	1,2,3,4,7,12
2	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development	1,2,3,4,7,12
3	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	2,7,12
4	Understand about Environment Pollution, Global Environment issues, Impact of Human Population and modern civilization on the Environment .	2,3,7
5	Analyse various aspects of human population, and the impact of the population growth on the environment.	1,2,3,4,7,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P O 1 1	PO1 2
		CO 1	1	2	2	2			3					3
22BTCS22	E	CO 2	2	2	2	2			3					3
6R	Environmental Science	CO 3		3					3					3
		CO 4		1	2				3					
		CO 5	1	2	2	2			3					3

		SEM	ESTER -	- IV						
Course Title		Tec	chno Prof	essiona	ıl Ski	ills II	I			
Course code	22BTCS225R	Total credits:	L	T	P	S	R	O/F	C	
		1	0	0	2	0	0	0	1	
		Total hours:								
		30P								
Pre-requisite		Co-requisite								
Programme	Bac	helor of Techno								
Semester		Fall/ IV semester of the second year of the program 1. Develop advanced technical skills and knowledge relevant to the specific								
Course				ills and	l kno	wlec	lge rel	evant to the	e specific	
Objectives	_	ional field or in	•		cc	. •			1 1	
(Minimum 3)		e communicat							•	
	_	ues, and stal	kenolders	ın t	ootn	tecr	ınıcaı	and non	-technical	
	context	s. students for suc	vaassful a	store inte	o ond	Lodve	naama	nt within th	air abasan	
	_	on through prac		-						
	_	on unough prac -making.	circai exp	orience,	prot	J1C111-	301 1111	s admines, a	ina cuncar	
CO1	Develop highl		knowleds	reable	man	agem	ent n	rofessional	who can	
001	deal with vario		_			-	reme p	101000101141	WHO Call	
CO2	Develop analyti						ofessio	onal who ca	n be more	
	efficient and inn		-		U	1				
CO3	Gather knowled			nent co	ncept	s and	the the	eories of de	velopment.	
					_				_	
CO4	Encourage the st	tudents towards	Non-tradi	tional tl	hinki	ng.				
CO5	Effectively com	municate scienti	fic and ted	chnical	know	ledge	in a p	rofessional	manner.	
Unit-No.	o. Content Contact Learning					ng Qu	g Outcome BI			
			Hot				8			
I	C Programmi	ng:	6	U	Jpon	com	pletior	n, learners		
	Programming	constructs	3,	W	vill u	nders	tand fu	ındamental		
	Control States	nents, Looping	<u>,</u>	C	pro	gram	ming	constructs,		
	Arrays, Strings			iı	nclud	ing co	ontrol	statements,		
				10	oopin	g me	chanis	ms, arrays,	2	
					nd	string		nipulation,	2	
						_		to write,		
								ze basic to		
							e-level			
	1.1						ficient	•		
II	Advanced C P	_	6		_		_	n, learners		
		nters, Structure	S			maste		vanced C		
	and Unions, Fi	ie Handling.		_	-	ımmir in a	-	concepts,		
					nclud	-	the	use of	3, 4	
					unctio		uniona	pointers,		
								s, and file		
					andli	-		techniques,		
				e.	110011	ng ti	ieiii t	o develop		

			more complex and efficient C programs with enhanced functionality and data management capabilities.	
III	Analog Electronic Circuits:	6	Upon completion, learners will understand the principles and design of analog electronic circuits, including amplifiers, oscillators, filters, and their applications, enabling them to analyze and build analog systems effectively.	2
IV	Digital electronic Circuits	6	Upon completion, learners will understand the design and operation of digital electronic circuits, including logic gates, flip-flops, counters, and memory devices, enabling them to analyze, design, and implement digital systems effectively.	2
V	Data Structure and Algorithms	6	Understand and implement data structures and algorithms to solve computational problems efficiently and optimize program performance.	2

T1:Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

T2:Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,9,10,12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,9,10,12

3	Gather knowledge about various development concepts and	1,2,3,4,5,9,10,12
	the theories of development.	
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,9,10,12
5	Effectively communicate scientific and technical knowledge in	1,2,3,4,5,9,10,12
	a professional manner.	

Course code	Course Name	C O	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	Techno Professio 2 nal Skills III 3 CC	CO 1	2	2	3	2	2				3	2	3	3
22BTCS22		CO 2	3	2	3	2	2				2	2	3	3
5R		CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

		SEMESTE	R – IV						
Course Title	ENGL	ISH LANGUAGE I	PROFIC	CIEN	CY F	OR E	NGI	NEERS	
Course code	22UBPD223R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 36P	0	0	4	0	0	0	2
Pre-requisite	English for	Co-requisite					Nil	l .	
	Employability								
	for Engineers								
Programme	Bache	elor of Technology	Comput	ter sci	ence	and I	Engin	eering	
Semester	F	all/ IV semester of t	he seco	nd ye	ar of 1	the p	rogra	m	
Course		ce the writing sk	ills in	diffe	rent	areas	incl	uding P	aragraph
Objectives		d letter writing.							
(Minimum 3)		tand and enhance the			-				
		rize students with				tual	vocat	oulary an	d Use of
	-	rbs and idioms in a							
CO1		ective written cor	nmunic	cation	skil	Is in	n Eng	glish, en	nploying
	proper grammar a	· · · · · · · · · · · · · · · · · · ·			-		_		
CO2		texts, extracting re	elevant	infor	matic	on, ar	nd sur	nmarizin	g it with
G02	clarity and cohere			•					1 1'
CO3	11 0	language profici	•				nunıc	ation, 1	ncluding
CO4		discussions in engi		-				-tti	ار د د د د داد
CO4	-	hesize complex ted		inior	matic	on, ae	emons	strating a	avancea
CO5	_	nd expression in Entritique engineering	_	d de		nto	anah	oc ron	orta and
COS		ecise language and						as rep	orts and
Unit-No.		tent	Contac				g Out	come	BL
0220 1 (00			Hour			·	5 0 440		
I	Writing Skills		7		pon c	compl	etion,	learners	
	i. Paragraph Wri	ting &		W	ill en	hance	e their	r writing	
	Narratives	8		sl	kills	throu	gh p	aragraph	
	ii. Letter Writing	g		W	riting	, naı	rrative	s, letter	
	iii. Technical Wr	iting		W	riting	, a	nd	technical	
				W	riting	. Th	iey w	vill also	1,2, 3
	Pipe and cistern i.l	Introduction of		u	nderst	and	the b	asics of	
	pipes and			p	ipes	and	cister	ns, and	
	cistern iii.Solving	different types			_			ency in	
	of questions				_			related	
				_			ective		
II	Self- Management	Skills	7	U	pon c	compl	etion.	learners	
I					-	_			
	i. SWOT Analys				ill	dev	elop	self-	
		is		n	nanage	dev ement	elop skills	self- s through	
	i. SWOT Analys	is		n S	nanage WOT	dev ement ar	velop t skills nalysis	self- s through s, goal	
	i. SWOT Analysii. Goal Setting a	is		m S	nanage WOT etting,	dev ement ar a	velop t skills nalysis nd	self- s through s, goal personal	123
	i. SWOT Analysii. Goal Setting a	is		m S se h	nanage WOT etting, ygiene	deverment ar ar e pra	velop t skills nalysis nd actices	self- s through s, goal personal s. They	1,2, 3
	i. SWOT Analysii. Goal Setting a Hygiene	is nd Personal		m S se h	nanage WOT etting, ygiene vill al	devement ar ar e pra	velop t skills nalysis nd actices	self- s through s, goal personal s. They tand the	1,2, 3
	i. SWOT Analysii. Goal Setting at HygieneMixture	is nd Personal ck		m S se h w b	nanage WOT etting, ygiene vill al asics	devement ar ar e pra lso u	velop t skills nalysis nd actices ndersi	self- sthrough s, goal personal s. They tand the mixtures,	1,2, 3
	i. SWOT Analysii. Goal Setting a HygieneMixture allegation and Clo	nd Personal ck basics		m S se h w b	nanage WOT etting, ygiene vill al asics llegati	deverement ar ar e pra lso u of cons,	velop t skills nalysis nd actices ndersi f 1 and	self- s through s, goal personal s. They tand the	1,2, 3

			solving related problems effectively.	
III	Vocabulary Development i.Understanding different aspects of a word (such as the use of say, tell, speak). ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement	7	Develop vocabulary through understanding word usage, learning strategies, contextual learning, phrasal verbs, idioms, and effective dictionary/thesaurus use. Analyze statements and actions.	1,2, 3
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle Matrix	11	Upon completion, learners will master interview skills for various formats, answering strategies for common questions, and dress code ethics. They will also enhance problem-solving abilities through mock interviews and practice with linear and circular arrangement puzzles and matrix-based puzzles.	1,2, 3
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt)	4	Upon completion, learners will enhance grammar skills through word-stress and syllable practice, addressing common errors. They will also master concepts of profit, loss, and discount, including basic principles and problem-solving	1,2, 3

Profit loss and discount	techniques related to these
i.Introduction to basics	financial calculations.
ii.Introduction to discount	
iii. Probems related on the topic	

T1: Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.

T2: • McDowell, Gayle Laakmann.2008.Cracking the Coding Interview (Indian Edition)

REFERENCE BOOKS:

R1: Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction Harper Perennial R2: Taylor J. and Wright, J., IELTS Advantage Reading Skills: A step-by-step guide to a high IELTS reading score, Delta Publishing by Klett

R3: Murphy, Raymond, (2012) English Grammar in Use Book with Answers: A Self- Study and Practice Book for Intermediate Learners of English, Cambridge University Press

R4: Job Interview Skills , Paige Labert, Publisher: DiDio Calderone Giuseppina

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate effective written communication skills in	2,3,7,8,10,12
	English, employing proper grammar and vocabulary.	
2	Analyze technical texts, extracting relevant information,	1,2,3,4,10,12
	and summarizing it with clarity and coherence.	
3	Apply English language proficiency in oral	10,12
	communication, including presentations and discussions	
	in engineering contexts.	
4	Evaluate and synthesize complex technical information,	1,2,3,4,10,12
	demonstrating advanced comprehension and expression	
	in English.	
5	Construct and critique engineering-related documents,	1,2,3,4,10,12
	such as reports and manuals, using precise language and	
	appropriate conventions.	

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	ENGLISH	CO 1		1	1				1	2		3		1
22UBPD22	LANGUAG E PROFICIEN CY FOR	CO 2	2	2	2	2						2		2
3R		CO 3										3		1
	ENGINEER S	CO 4	2	2	2	1						2		2
		CO 5	3	2	2	2						3		3

SEMESTER – IV									
	MOOCS III: Web Application Develop	ment with		pt and Mor	ngo DB				
Course code	22MOCS221R Total credits: 1	L	T P	S R	O/F	C			
	Total hours: 15P	0	0 0	0 0	0	1			
Pre-requisite	Nil Co-requisite			Nil					
Programme									
Semester		Fall/ IV semester of the second year of the program							
Course	1. Discuss the organization and architecture of computer systems and								
Objectives	electronic computers.								
(Minimum 3)	2. Analyze the basic componer	its of coi	mputer sy	stems besi	ides the c	omputer			
	arithmetic.								
	• •	rganizati	on, mei	mory or	ganizatio	n and			
G01	management, and pipelining								
CO1	Grasp the core principles of web de	velopme	nt.						
602	Dagomo proficient in veniting along the	oiont as	1 maintair -	hla Iarra C -	mint and a				
CO2	Become proficient in writing clean, effi				_	omio ca d			
CO3	Leverage JavaScript libraries and frame user-friendly web interfaces with intera				-	amic and			
CO4	Implement client-server communication		nents and a	ummations.					
CO5	Grasp the concepts of NoSQL databa		avnlora Ma	ongoDR fo	r data eto	rage and			
COS	retrieval.	ses and t	explore with	ongodd 10	n data sto	rage and			
Unit-No.	Content	Contac	t Lea	rning Out	come	BL			
CIII-110.	Content	Hour	L	irinig Out	come	DL			
I	Introduction to Web Development	3	Upon c	completion,	learners				
	Fundamentals		will	understand					
	The Web Development Landscape:		develop	oment					
	The Web Development Landscape: Understanding the building blocks		develo _l fundam	oment nentals, i	ncluding				
	•		fundam		•				
	Understanding the building blocks		fundam client-s	nentals, i	hitecture,				
	Understanding the building blocks of the web, including HTTP requests		fundam client-s HTML	nentals, i server arcl , CSS, Ja	hitecture,				
	Understanding the building blocks of the web, including HTTP requests and responses, client-server		fundam client-s HTML and	nentals, i server arcl , CSS, Ja	hitecture, vaScript, eractions.				
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side		fundam client-s HTML and They	nentals, i server arcl , CSS, Ja their inte	hitecture, vaScript, eractions. skills in				
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between		fundam client-s HTML and They using tools,	nentals, i derver arcl , CSS, Ja their inte will gain browser d differ	vaScript, eractions. skills in leveloper rentiating				
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end		fundamental client-sentral HTML and the sentral triangle tools, client-sentral triangle trian	nentals, is server arcles, CSS, Ja their interviewill gain browser differ ide and se	nitecture, vaScript, eractions. skills in developer rentiating erver-side				
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript		fundam client-s HTML and They using tools, client-s scripting	nentals, interver arcles, CSS, Jantheir interverse will gain browser defended and sentent and sentent and sentent and sentent and sentent architectures.	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides.		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools:		fundam client-s HTML and They using tools, client-s scripting	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements,		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests.		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher:		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and structure, along with fundamental		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			
	Understanding the building blocks of the web, including HTTP requests and responses, client-server architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and		fundamental client-seripting tools, client-seripting core Ja	nentals, interver arcles, CSS, Jantheir interverse differentiate and sententials and response to the control of	hitecture, vaScript, eractions. skills in developer rentiating erver-side mastering	3			

	the core syntax of JavaScript,			
	including variables, data types,			
	-			
	operators, control flow statements, and functions.			
***		2	** 1 1	
II	Mastering JavaScript Programming	3	Upon completion, learners	
	DOM Manipulation: Understanding		will master JavaScript	
	the Document Object Model (DOM)		programming, including	
	and using JavaScript to manipulate		DOM manipulation, event	
	elements, attributes, and styles.		handling, reusable	
	Event Handling: Learning to		functions, object-oriented	
	respond to user interactions like		programming, and	
	clicks, scrolls, and form submissions		asynchronous techniques	
	using event listeners.		(callbacks, promises,	
	Working with Functions and		async/await). They will	
	Objects: Creating reusable		also be introduced to	
	functions, understanding object-		popular JavaScript	
	oriented programming concepts, and		libraries and frameworks	
	working with built-in JavaScript		like jQuery and React for	3
	objects.		advanced web	
	Asynchronous Programming:		development.	
	Exploring asynchronous		00 / 01 sp. 1110 1101	
	programming techniques like			
	callbacks, promises, and async/await			
	to handle asynchronous operations			
	effectively.			
	•			
	1			
	Frameworks: Introducing popular			
	JavaScript libraries like jQuery or			
	React for simplifying common tasks			
	and building more complex web			
	interfaces.			
III	Building Interactive Web	3	Upon completion, learners	
	Interfaces		will create engaging web	
	Internation Florents and House		interfaces using interactive	
	Interactive Elements and User		elements, implement form	
	Experience: Focusing on creating		validation and error	
	engaging user experiences with		handling, explore web	
	interactive elements like forms,		APIs for external data	
	animations, and dynamic content.		access, understand single-	
	Form Validation and Error		page applications (SPAs)	2
	Handling: Implementing JavaScript-		with frameworks like	3
	based form validation to ensure user		React or Angular, and	
			learn web application	
	input accuracy and handling		deployment strategies.	
	potential errors gracefully.		1 7	
	Introduction to Web APIs:			
	Exploring web APIs for accessing			
	data and functionalities from			
	external sources like weather APIs			
	CALCINAL SOURCES LIKE WEALIEL AFTS			

	or social media APIs. Building Single-Page Applications (SPAs): Understanding the concept of SPAs and learning how JavaScript frameworks like React or Angular can be used to build them. Deployment Strategies: Learning how to deploy your web			
	applications to a web server for public access			
IV	Server-Side Development with Node.js Introduction to Node.js: Understanding Node.js as a server-side JavaScript runtime environment and its role in web development. Building a Simple Web Server: Creating a basic web server using Node.js to handle HTTP requests and respond with HTML content. RESTful APIs: Learning the principles of RESTful APIs for designing communication protocols between the front-end and back-end of web applications. Routing and Handlers: Implementing routing mechanisms in Node.js to handle different URL paths and associated functionalities. Databases and Data Persistence: Understanding the need for data persistence in web applications and how Node.js can interact with databases.	3	Upon completion, learners will understand Node.js as a server-side runtime, create simple web servers, design RESTful APIs for front-end and back-end communication, implement routing mechanisms, and interact with databases for data persistence in web applications.	3
V	Data Management with MongoDB Introduction to NoSQL Databases: Exploring the concepts of NoSQL databases and their advantages compared to traditional relational databases. MongoDB Fundamentals: Learning about MongoDB as a popular	3	Upon completion, learners will understand NoSQL databases, focusing on MongoDB's document-based structure. They will perform CRUD operations, design efficient data models, and utilize advanced	3

NoSQL document database and its	MongoDB features like	
core data structures (documents and	complex queries, sorting,	
collections).	and data aggregation for	
CRUD Operations: Performing Create, Read, Update, Delete (CRUD) operations on MongoDB data using its query language and drivers for Node.js. Data Modeling for MongoDB: Learning how to design efficient	and data aggregation for robust data management in web applications	
data models for your web		
applications using MongoDB's document structure.		
Advanced Features: Exploring advanced functionalities of MongoDB such as querying with complex filters, sorting, and data aggregation		

T1:Haverbeke, Marijn. Eloquent javascript: A modern introduction to programming. No Starch Press, 2018

T2: Chodorow, C. "Introduction to mongodb." In Free and Open Source Software Developers European Meeting (FOSDEM), vol. 18, pp. 80-83. 2010.

REFERENCE BOOKS:

R1: 1. Robson, Elisabeth, and Eric Freeman. Head First Html With CSS & XHTML. " O'Reilly Media, Inc.", 2005.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Grasp the core principles of web development.	1,2,3,4,5,10,12					
2	Become proficient in writing clean, efficient, and maintainable JavaScript code.	1,2,3,4,5,10,12					
3	Leverage JavaScript libraries and frameworks like jQuery or React to create dynamic and user-friendly web interfaces with interactive elements and animations.	1,2,3,4,5,10,12					
4	Implement client-server communication.	1,2,3,4,5,10,12					
5	Grasp the concepts of NoSQL databases and explore	1,2,3,4,5,10,12					

	1
MongoDB for data storage and retrieval.	
Wongobb for data storage and retrieval.	

Course	Course	СО	PO1	PO	PO	PO	PO	РО	РО	РО	PO	PO1	PO1	PO1
code	Name	CO	*	2	3	4	5	6	7	8	9	0	1	2
	MOOCS	CO	2	2	2	2	3					2		2
	III: Web	1					,							_
	Applicatio	CO	2	3	3	2	3					2		2
22MOCS22	n	2		3										
1R	Developme	CO	2	2	2	2	3					2		2
	nt with	3												
	Java Script	CO	2	2	2	3	3					2		2
	and Mongo	4												
	DB	CO	3	3	3	3	3					2		2
		5				9						_		_

		SEMESTE	R – IV						
Course Title		CO CURRI		RAC	TIVIT	IES			
Course code	22UBCC221	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme	· ·	elor of Technology	Compu	ter sc	ience			eering	
Semester		all/ IV semester of							
Course		ent classroom edu							ences and
Objectives	_	activities that reinf			-			_	
(Minimum 3)	2. Develop e	ssential skills such	as pro	blem-	solvi	ng, cı	ritical	l thinkin	g,
	communic	ation, and collabo	ration t	hroug	h stru	icture	d, cu	ırriculun	-aligned
	activities.								
	3. Encourage	students to exp	olore th	eir ii	nteres	ts an	d tal	lents, bu	uild self-
	confidence	e, and cultivate a	well-r	ound	ed ch	aract	er by	partici	pating in
		-curricular progra							
CO1	Demonstrate the	• • • •				_			sroom to
	real-world situation						-		
CO2	Exhibit improved p			_			ation	, and col	laboration
	skills, essential for l								
CO3	Show increased s				and a	ı wel	l-rour	nded cha	racter by
	exploring and devel								
CO4	Engage in commun	•	cial initia	atives,	foste	ring a	sens	e of resp	onsibility,
		empathy, and active citizenship.							
~~=		. 1 11		1 111.	- 1	1	.1	1	
CO5		teamwork and lea						igh partic	ipation in
	group activities and	leadership roles wi	thin co-	curric	ılar pr	ogran	ns.		
CO5 Unit-No.	group activities and		thin co-c	currici ct	ılar pr	ogran	ns.	igh partic	BL
Unit-No.	group activities and Con	leadership roles wi tent	thin co-c	curricu ct r	ılar pr Lea	ogran	ns. g Out	come	
	group activities and Con AdtU encourage	tent s a range of	thin co-c	currico ct r	llar pr Lea Co-curr	ogran rning ricula	ns. g Out	come activities	
Unit-No.	Con AdtU encourage activities outside	tent s a range of the the regular	thin co-c	curricu ct r	Lea Lo-cur nhanc	ogran rning ricula e stud	ns. g Out	come activities practical	
Unit-No.	AdtU encourage activities outsid curriculum inter	tent s a range of the the regular anded to meet	thin co-c	curricuricuricuricuricuricuricuricuricur	Lea Lo-cur nhance	ricula e stud	r lents'	come activities practical academic	
Unit-No.	AdtU encourage activities outsid curriculum interlearner's interest,	tent s a range of the the regular anded to meet These activities	thin co-c	ct r C e a c	Lea Lea Co-curnhance pplica oncep	ricula e stuction ts, c	r lents' of a	come activities practical academic al skills	
Unit-No.	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve	tent s a range of the regular anded to meet These activities lop the social and	thin co-c	curricu	Lea Co-curr nhance pplicae oncep evelop	ricula e stuction tts, coment	r lents' of a	activities practical academic l skills problem-	BL
Unit-No.	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p	tent s a range of the the regular regular to meet the activities to the social and the romote a holistic	thin co-c	eurrice ct r Ce a cc d s	Lea Co-curr nhanc pplica oncep evelop olving	ricula e stud tion tts, coment	r lents' of a critica	activities practical academic l skills problem- nication),	BL
Unit-No.	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of	tent s a range of the the regular reg	thin co-c	curricu	Lea Co-curr nhance pplicae oncep evelop	ricula e stuction tts, coment pers	r seritica	activities practical academic l skills problem-	BL
Unit-No.	AdtU encourage activities outsid curriculum intellearner's interest, are aimed to deve soft skills and p development of Keeping in mind	tent s a range of the the regular regular to meet the activities to the social and the romote a holistic	thin co-c	curricu	Lea Co-currenhance pplica oncep evelopolying oster	ricula e stud tion ts, coment g, coment pers ence,	r seritica	activities practical academic l skills problem- nication), growth	BL
Unit-No.	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo	tent s a range of the the regular range activities the social and romote a holistic the learners, the 360 degree	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop olving oster confid	ricula e stud tion ts, coment g, coment pers ence,	r seritica	activities practical academic al skills problem- nication), growth self-	BL
Unit-No.	AdtU encourage activities outside curriculum interplete learner's interest, are aimed to development of Keeping in mindelearning methodo are engaged in or	tent s a range of the regular and to meet These activities lop the social and the romote a holistic the learners, the 360 degree logy the students	thin co-c	curricu	Lea Co-curr nhance pplica oncep evelop olving oster confid waren	ricula e stuction ts, coment description, coment pers ence, ess),	r sports	activities practical academic l skills problem- nication), growth self- promote	BL
Unit-No.	AdtU encourage activities outside curriculum interest, are aimed to deversoft skills and produced development of Keeping in mind learning methodo are engaged in the control of the contro	tent s a range of the the regular anded to meet the social and the romote a holistic the learners, the 360 degree logy the students different activities	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop olving oster confide waren ocial nrough	ricula e stud tion ts, coment pers ence, ess),	r slents' of a critica mmur onal	activities practical academic acid skills problem- nication), growth self- promote consibility	BL 3
Unit-No.	AdtU encourage activities outside curriculum interest, are aimed to deversoft skills and produced development of Keeping in mind learning methodo are engaged in the control of the contro	tent s a range of the regular anded to meet the social and the romote a holistic the learners, the 360 degree logy the students different activities ferent clubs viz. totography, drama,	thin co-c	curricu ct r Ce a cc d s fi (() a s t)	Lea Co-currenhance pplicae oncep evelor olving oster confid waren ocial nrough ngage	ricula e stuction ts, coment pers ence, ess),	r spoon and	activities practical academic academic skills problem- nication), growth self- promote consibility mmunity	BL 3
Unit-No.	AdtU encourage activities outside curriculum interlearner's interest, are aimed to deve soft skills and period development of Keeping in minder learning methodo are engaged in content headed under diffusione, music, pheriterary etc., The encouraged to par	tent s a range of the regular	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop olving oster confid waren ocial mrough ngage eamwo bilitie	ricula e stuction tts, coment pers ence, ess), n ment, ork a s, pr	r separate conduction of the c	activities practical academic acidemic	BL 3
Unit-No.	AdtU encourage activities outside curriculum interpletarner's interest, are aimed to deversoft skills and produced development of the total description of the total descri	tent s a range of the the regular anded to meet the social and the remains are the social and the students different activities of the students are the stude	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop oster confid waren ocial nrough ngage eamwo bilities or ho	ricula e stud tion ts, coment pers ence, ess), n ment, ork a s, prolistic	r lents' of a critical mmur onal respondent leeparings successions.	activities practical academic activities practical academic activities proceed activities practical academic activities procedemic activities practical academic activities procedemic activities procedemic activities acti	BL 3
Unit-No.	AdtU encourage activities outside curriculum interplates are aimed to deves soft skills and pure development of Keeping in mindulearning methodo are engaged in the headed under diffusione, music, pholiterary etc., The encouraged to particular activities competitions as personners.	tent s a range of the regular anded to meet the remainded to meet the remainded to meet the social and the romote a holistic the learners, the 360 degree the students different activities are the students are tricipate in regular to the remainder of the students are tricipate in regular to the remainder of the students are tricipate in regular to the students are tricipate are tricipate and the students are tricipate ar	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop olving oster confid waren ocial mrough ngage eamwo bilitie	ricula e stud tion ts, coment pers ence, ess), n ment, ork a s, prolistic	r separate conduction of the c	activities practical academic acidemic	BL 3
Unit-No.	AdtU encourage activities outside curriculum interest, are aimed to deve soft skills and period development of Keeping in minder learning methodo are engaged in content headed under diffusion between the couraged to particular activities competitions as perhobbies, The student description of the couraged to particular activities competitions as perhobbies, The student description of the couraged to particular activities competitions as perhobbies, The student description of the couraged to particular activities competitions as perhobbies, The student description of the courage of the	tent s a range of the the regular anded to meet the social and romote a holistic the learners, the 360 degree dogy the students different activities ferent clubs viz. Totography, drama, the students are sticipate in regular s, workshops, or their interest and tent members of the	thin co-c	curricu	Lea Co-currenhance pplicae oncep evelop oster confid waren ocial nrough ngage eamwo bilities or ho	ricula e stuction tts, coment pers ence, ess), n ment, ork a s, prolistic	r lents' of a critical mmur onal respondent leeparings successions.	activities practical academic activities practical academic activities proceed activities practical academic activities procedemic activities practical academic activities procedemic activities procedemic activities acti	BL 3
Unit-No.	AdtU encourage activities outside curriculum interpleamer's interest, are aimed to deversoft skills and produced development of the teamer's interest, are aimed to deversoft skills and produced development of the team of t	tent s a range of the the regular anded to meet the social and the remains and the social and the romote a holistic the learners, the 360 degree the students different activities are the students are tricipate in regular to the students are the students and the students are the students and the students are the students and the students are th	thin co-c	curricu ct r Ce a c d s f (() a s tl e ta a f a	Lea Co-currenhance pplicae conception evelope over confide waren ocial mrough nrough nrough indicate confide cadem	ricula e stuction tts, coment pers ence, ess), n ment, ork a s, prolistic	r lents' of a critical mmur onal respondent leeparings successions.	activities practical academic activities practical academic activities proceed activities practical academic activities procedemic activities practical academic activities procedemic activities procedemic activities acti	BL 3
Unit-No.	AdtU encourage activities outside curriculum interpleamer's interest, are aimed to deversoft skills and produced development of the teamer's interest, are aimed to deversoft skills and produced development of the team of t	tent s a range of the regular anded to meet These activities the learners, the learners, the 360 degree the students different activities different activities of the students are students are students are tricipate in regular s, workshops, or their interest and the tepresent AdtU in tersity student and	thin co-c	curricu ct r Ce a c d s f (() a s tl e ta a f a	Lea Co-currenhance pplicae conception evelope over confide waren ocial mrough nrough nrough indicate confide cadem	ricula e stuction tts, coment pers ence, ess), n ment, ork a s, prolistic	r lents' of a critical mmur onal respondent leeparings successions.	activities practical academic activities practical academic activities proceed activities practical academic activities procedemic activities procedemic activities procedemic activities procedemic activities a	BL 3

Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands-on experiences and projects.	1,2,3,4,5,6,10,12
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	2	1	2	2				2		2
	СО	CO 2	2	2	2	1	2	3				2		2
22UBCC2 21	CURRICUL AR ACTIVITIES	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – IV						
Course Title		EXTRA CURI	RICUL	AR A	CTIV	ITIE	S		
Course code	22UBEC221	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 30P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme		elor of Technology	Compu	ter sci	ience			eering	
Semester		all/ IV semester of t							
Course		tudents' practical s							ties
Objectives		gaging activities t						_	
(Minimum 3)	_	ersonal growth.		1				C	
		rsical, emotional, s	ocial, a	nd cu	ıltural	l dev	elopn	nent by p	providing
		portunities for cr					_		_
	_	y involvement.		•	ĺ				,
		active particip	ation	in c	ommı	unity	ser	vice an	d social
	•	cultivating a se				•			
	engageme	nt among students.	•	_			,		
CO1	Learn to a plan	so that they can	make 1	meani	ingful	con	tribu	tions, m	aintain a
	commitment, and	manage their time	and pr	ioritie	es.				
CO2	Transform passiona	ite students who dei	monstra	te leac	dershij	p and	pursi	ue interes	ts beyond
	their academics								
CO3	Learn to participat	te in various co-cu	ırricular	activ	ities	leadir	ng to	their m	ıltifaceted
	personality develop	ment.							
CO4	Express their ideas.	views, In-depth ev	aluation	and	analys	is cle	arly i	n the top	ic of their
	interest.								
CO5	_	ractices different a	ctivities	, by I	ntegra	ating	learni	ing exper	riences by
	demonstrating trans								
Unit-No.	Con	tent	Conta		Lea	rning	g Out	come	BL
	A 14TT		Hour	•					
I	AdtU encourage	_	30		T	1	.4:	.4	
	activities outsid				•	_		students	
		nded to meet These activities			/ill kills,		op mwor	practical	
	· · · · · · · · · · · · · · · · · · ·				kills, eaders		iiiwor	k, and abilities,	
		lop the social and romote a holistic				_	olicti	c growth	
	development to				•			athletic,	
	•	the degree the the the the the the the the the t			-			ties, and	
		logy the students			ain	a	sen		
	~	different activities			espons				3
		fferent clubs viz.					•	gh active	
		otography, drama,			articip			in	
	literary etc., The			_	ommu				
	•	ticipate in regular			ocial i	-			
	club activities	-			1				
		er their interest and							
		ent members of the							
		represent AdtU in							
		versity student and							
	1	•		I					1

national level competitions,
Renewed personalities are invited to
conduct workshops that benefit the
members and students by giving
them the platform to learn from
experts in the respective fields.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	2	1	2	2				2		2
22110EC2	EXTRA	CO 2	2	2	2	1	2	3				2		2
22UBEC2 21	CURRICUL AR ACTIVITIES	CO 3	1	1	2	1	2	2				3		3
	ACTIVITIES	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMI	ESTER -	IV										
Course Title		BASIC A	ACCLIM	ATIZI	NG SI	ΚΠ	LLS	S (BAS)						
Course code	23UULS221R	Total	L	T	P	S	R	O/F	C					
		credits: 1	0	0	2	0	0	0	1					
		Total												
		hours: 30												
D '''		P												
Pre-requisite		Co-												
Ducamana	Dool	requisite	ala arri (Ya4				d Eaia	:					
Programme		Bachelor of Technology Computer science and Engineering Fall/ IV semester of the second year of the program												
Semester Course Objectives		1. To impart knowledge of the fundamentals of Hospitality industry and its												
(Minimum 3)	_													
(Millimum 3)		applications.												
	2. Students will be able to familiarize with the cooking equipment's &													
	Utensils. Students will be able to handle different modes of reservations													
CO1	3. Students will be able to handle different modes of reservations.													
	Apply foundational acclimatization principles to adapt effectively in diverse nvironments and situations.													
	nvironments and situations.													
CO2	Analyze enviro	Analyze environmental factors influencing acclimatization, demonstrating a												
	comprehensive	comprehensive understanding of adaptation mechanisms.												
202														
	Evaluate personal adaptability through practical exercises, fostering a													
	proactive approach to acclimatization challenges.													
CO4	Synthesize acclimatization strategies for varying contexts, demonstrating													
	creativity and		_		,	U		,	S					
CO5	"Demonstrate	•				iqu	es,	utilizing o	critical					
	thinking to add	lress unfore	seen cha	llenges	•									
Unit-No.	Conte	ent	Contac	t I	earn	ing	Oı	ıtcome	BL					
			Hour		2041 11	8	, .							
I	Introduction t	to	6											
_	Accommodati													
	Management													
	● Telephone	handling		Upo	n		co	ompletion,						
	technique			lear	ners	wil	11	efficiently						
	• Organizing of	of Rooms		man	age	aco	con	nmodation						
	Organizing	or Rooms.		faci	lities,	d	lem	onstrating	1,2, 3					
	•Cleaning e	•Cleaning equipment's proficiency in telephone												
	and uses.			han	dling,			room						
	D 1 1	D		orga	anizati	on,		cleaning						
	■Bed making	Process.		equi	ipmen	t	ι	ıtilization,						
				and	1	oed	Į.	making						
				prod	cesses									

II	 Fundamental of Cooking Uses of basic cooking equipment's Uses of fire & Fuel Different cuts of vegetables Uses of herbs & spices Regional Food Habits 	6	Upon completion, learners will demonstrate competency in using cooking equipment, managing fire and fuel, preparing vegetable cuts, utilizing herbs and spices, and understanding regional food habits.	2, 3, 4
III	 Food and Beverage skills Introduction to catering industry Types menus and beverages Identifications of Cutlery, crockery & glassware Table etiquettes or manners Customer handling skills or Situation Handling 	6	Upon completion, learners will master the catering industry, understand menu and beverage types, identify cutlery, crockery, and glassware, practice table etiquette, and develop customer handling and situation management skills.	2, 3, 4
IV	Travel management Travel Documentation (Types) Application of passport & Visa Tourism products (UNESCO sites) Types of logistics in travel and tourism management	6	Upon completion, learners will effectively manage travel logistics, handle travel documentation including passports and visas, understand tourism products like UNESCO sites, and apply various types of logistics in travel and tourism management.	1, 2, 3
V	 Basic Hospitality Skills Various Egg Preparations Canapés preparations Mock tail & Shakes Preparations Butter Rice / Lemon 	6	Upon completion, learners will proficiently prepare a variety of dishes including eggs, canapés, mocktails, shakes, rice dishes, lentils, and both vegetarian and nonvegetarian dishes in basic	2, 3, 4

Rice	hospitality settings.	
• Various Lentils Preparations		
• 1 non-veg preparation/ 1 veg preparation		

T1:Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt ltd-New Delhi.

T2: Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restauranteur, Guides.

REFERENCE BOOKS:

R1: Mohammed Zulfikar (2010) - Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	1,2,3,4,7,10,12
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	1,2,3,4,7,10,12
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	1,2,3,4,7,10,12
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	1,2,3,4,7,10,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges	1,2,3,4,7,10,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	1	1	2	2			3			1		2
23UULS11	BASIC ACCLIMATI	CO 2	1	1	2	2			3			1		2
1R	ZIG SKILLS (BAS)	CO 3	1	2	3	2			3			1		2
	(D/IS)	CO 4	2	3	2	3			3			1		2
		CO 5	3	3	3	3			3			1		2

		SEMESTER	R – V											
Course Title		Signal	ls and S	yster	ns									
Course code	22BTCS311R	Total credits: 3	L	T	P	S	R	O/F		C				
		Total hours: 45T	3	0	0	0	0	0		3				
Pre-requisite	Nil	Co-requisite					Nil							
Programme		Computer So	cience &	En ₂	gineer	ring								
Semester		nmer/ V semester of												
Course		tudents for an interm			of flu	ency	with s	signals a	nd sys	stems				
Objectives		inuous time and discr												
(Minimum 3)	_	udents for more ac			-	in c	ligital	signal	proce	ssing				
	_	udio, image and vide	_	_		_								
	_	udents in communic	cation th	neory	, and	l sys	tem t	heory, c	ontrol	and				
	robotics.													
CO1		derstand different types of signals-continuous and discrete, odd and even, periodic and												
~~•	aperiodic etc.				2 21									
CO2		cations of the stand	dard for	ms c	of Sig	nals	with	respect	o sys	stems				
G0.2	based on their prope		C 1	-				1 1						
CO3	-	ots of Laplace trans	torm ba	sed	conti	nuous	time	and dis	crete	time				
CO4	analysis of signals a	-	, ,	1	1				1 1'					
CO4	•	concepts of Fourier	transfo	rm t	oasea	conti	nuous	time ai	ia ais	crete				
COF	time analysis of sign	<u> </u>	a tima a	iono	la and	07104	oma h							
CO5	mathematical tools.	ansform in continuou	is time s	igna	is and	syst	ems o	y using a	ıpprop	priate				
Unit-No.	Con	tont	Contact	<u>. </u>	Loo		~ Out	00000		BL				
Unit-No.	Con	tent	Hour	L	Lea	ITIIIII	g Out	come	I	ЭL				
I	Introduction to	Signal and		T	о Ехр	lain	differe	ent types						
	System: signal an	- C			_			ous and						
	in everyday life,	•	-		-		d and			1.0				
	periodicity, det	erminism and	7	p	eriodi	c and	aperi	odic etc.]	1,2				
	stochastic charac	teristics, special												
	signal, system prop	perties.												
II	Behaviour of	continuous and		C	lassif	icatio	ns	of the	;					
	discrete time LTI	system: Impulse		st	andar	d for	ms o	f Signals	;					
	response, ste	•	8			•		systems	1	1,2				
	convolution, input-	-	o o	b	ased c	n the	ir pro	perties	1	.,2				
	Characterization of	•												
	stability of LTI sys													
III	Laplace Trans	*			•	_		ncepts of						
	Transform and	its inverse:			_			n basec						
	Definition, existe	· ·			ontinu		tim							
		onvergence and	10					alysis o		1.0				
	properties, Applic	-	10	Si	gnals	and	systen	ns.		1,2				
	transform for t	•												
	continuous time	•												
	(stability etc.) Sign	miscance of poles												
TX 7	& zeros.	of C4:			mc1	ot:		. f .1						
IV	Fourier Analysis	of Continuous	12	A	nalyz	auon	C	of the] 1	1,2				

	and discrete Time Signals and		concepts of Fourier	
	Systems: Fourier Series, Fourier		transform based	
	Transform and properties,		continuous time and	
	Parseval"s theorem, Frequency		discrete time analysis of	
	response of LTI systems. Sampling		signals and systems.	
	Theorem.			
V	Z-Transform: Z-Transform and its		Analyzation of Z-	
	inverse: Definition, Existence		transform in continuous	
	Region of convergence and		time signals and systems	
	properties. Application of Z-	8	by using appropriate	1,2
	Transform for the analysis of		mathematical tools.	
	Discrete time LTI systems,			
	Significance of poles and zeros.			

T1: Oppenheim Alan, V., Willsky Alan. S., and Nawab, H., "Signals and Systems", Prentice Hall, 1997.

REFERENCE BOOKS:

R1: Haykin Simon, "Communication Systems", 3rd Edition, John Wiley, 1995.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand different types of signals-continuous and discrete, odd and even, periodic and aperiodic etc.	1,2,3,4,5,10,12
2	Understand Classifications of the standard forms of Signals with respect to systems based on their properties.	1,2,3,4,10,12
3	Analyse the concepts of Laplace transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,10,12
4	Analyzation of the concepts of Fourier transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,10,12
5	Analyzation of Z-transform in continuous time signals and systems by using appropriate mathematical tools.	1,2,3,4,5,10,12

Course Code	Course	CO	PO	PO1	PO1	PO1								
	Name	S	1	2	3	4	5	6	7	8	9	0	1	2

22BTCS311 R		CO 1	3	2	3	2	1			2	3
	Signals and System s	CO 2	3	3	3	3				3	3
		CO 3	3	3	3	3				3	3
		CO 4	3	2	3	2	1			2	3
		CO 5	3	2	3	2	1			2	3

		SEMESTE	$\mathbf{R} - \mathbf{V}$											
Course Title		Database 1	Managei	ment	Syste	ems								
Course code	22BTCS312R	Total credits: 4	L	T	P	S	R	O/F	C					
		Total hours:	3	0	2	0	0	0	4					
		35T+30P												
Pre-requisite	File Systems	Co-requisite					Nil							
Programme		Computer S	Science &	& Eng	ginee	ring								
Semester		Fall/ V semester of												
Course	1. To understand ar	nd use data manipula	ition lang	guage	to qu	ery, u	pdate	, and man	age a					
Objectives	database.													
(Minimum 3)	. To develop an understanding of essential DBMS concepts such as: database security,													
	ntegrity, concurrency.													
	3. To design and build a simple database system and demonstrate competence with the undamental tasks involved with modeling, designing, and implementing a DBMS.													
CO1		ndamental concepts	of data	base	mana	geme	nt sy	stems wit	h DBMS					
~~~	languages and data													
CO2		of query languages	such as	DDL	and I	)ML	tor de	signing a	relational					
G0.2	database.													
CO3	***	properties and conc	urrency	contr	ol sc	heme	s to p	berform tr	ansaction					
CO4	processing with dat	•	· c	.1	,· ,·		1 41	• ,•						
CO4	Apply security to tr	ne database by check	ang for a	utner	iticati	on an	a autn	iorization.						
CO5	Apply advanced to	pics of data wareho	using an	d dat	a min	ing, o	listrib	uted data	pases and					
	web databases.	•	C			O.								
Unit-No.	Con	itent	Contac	et	Lea	arnin	g Out	come	BL					
			Hour											
I	Database system	architecture:	6	Α	nalyz	zing d	ata sy	stem						
	Data Abstraction,						and th	ne data						
	Independence, Da			n	nodels	S.								
	Language (DDL),													
	Manipulation Lan	_							1,2					
		Entity-relationship							,					
	*	model, relational												
	*	ted data models,												
		straints, data												
***	manipulation oper		10		1			1 4' 1						
II	Relational query	0 0	10		nalyz	-		Relational						
	Relational algebra domain relational	-			-	_	_	database						
	DDL and DML co	_			esign rocess		and	query and						
	source and Comm	•		_	ptimiz	_	ı	and						
	MYSQL,	ciciai DDIVIS -			Pum	Zation								
	ORACLE, DB2, S	OL server							1,2					
	Relational databa													
	Domain and data of	_												
	Armstrong's axion	-												
	Dependency prese													
	design.	,												

	Query processing and			
	<b>optimization:</b> Evaluation of			
	relational algebra expressions,			
	Query equivalence, Join strategies,			
	Query optimization algorithms.			
III	Transaction processing:	8	Analysing the concepts of	
	Concurrency control, ACID		Transaction Processing.	
	property, Serializability			
	ofscheduling, Locking and			1.2
	timestamp based schedulers, Multi-			1,2
	version and optimistic, Concurrency			
	Control schemes, Database			
	recovery.			
IV	Database Security: Authentication,	6	Analyzation of the	
	Authorization and access control,		concepts of Database	1,2
	DAC, MAC and RBAC models,		Security.	1,2
	Intrusion detection, SQL injection.			
V	Advanced topics: Object oriented	5	Analyzation of Advanced	
	and object relational databases,		topics of Object oriented	
	Logical databases, Web databases,		and object relational	1,2
	Distributed databases, Data		databases.	
	warehousing and data mining.			
Practical	10. <b>Database Design and</b>		Describe, illustrate, and	
	<b>Modeling:</b> Introduction to		explain the creation of ER	
	Database Systems, Data		Diagrams and Converting	
	Abstraction and Data Models,		ER Models to Relational	
	Entity-Relationship (ER)	6	Schemas.	1,2,3,4
	Modeling, Relational Model and			
	Schema Design, Case Studies			
	and Lab Exercises: Creating ER			
	Diagrams and Converting ER			
	Models to Relational Schemas.		December illustrate and	
	11.SQL Querying and Data Manipulation: Introduction to		Describe, illustrate, and	
	SQL, Data Definition Language		explain the creation of Writing and Executing	
	(DDL), Data Manipulation		SQL Queries.	
	Language (DML), Data Query		SQL Queries.	
	Language (DQL), Advanced	6		1,2,3,4
	SQL Queries: Joins, Subqueries,			
	and Views, Case Studies and			
	Lab Exercises: Writing and			
	Executing SQL Queries.			
	12.Transaction Management and		Describe, illustrate, and	
	Concurrency Control:		explain and creation of	
	Introduction to Transactions,		Transaction Management	
	ACID Properties (Atomicity,	6	and Concurrency Control	1,2,3,4
	Consistency, Isolation,			
	Durability), Concurrency			
	Control Mechanisms, Isolation			
	,	<u> </u>	<u> </u>	

Levels and Locking, Case Studies and Lab Exercises: Implementing Transactions and Concurrency Control.			
13.Database Security and Authorization: Introduction to Database Security, User Authentication and Roles, Access Control and Authorization, SQL Injection and Security Best Practices, Case Studies and Lab Exercises:	6	Describe, illustrate, and explain Database Security and Authorization	1,2,3,4
Securing Databases			
14.Advanced topics: Object- Oriented Databases, Distributed Databases, Data Warehousing and OLAP, NoSQL Databases, Case Studies and Lab Exercises: Implementing Advanced Database Solutions.	6	Describe, illustrate, and explain the Implementation of Advanced Database Solutions.	1,2,3,4

T1: "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

### **REFERENCE BOOKS:**

R1: "Principles of Database and Knowledge-Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

R2: "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.

R3: "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the fundamental concepts of database management systems with DBMS languages and data models.	1,2,3,4,5,9,11,12					
2	Apply the concepts of query languages such as DDL and DML for designing a relational database.	1,2,3,4,5,9,11,12					
3	Apply the ACID properties and concurrency control schemes to perform transaction processing with database recovery.	1,2,3,4,5,9,11,12					

4	Apply security to the database by checking for authentication and authorization.	1,2,3,4,5,9,11,12
5	Apply advanced topics of data warehousing and data mining, distributed databases and web databases.	1,2,3,4,5,9,11,12

Course	Course	CO	PO1	PO	PO1	PO1	PO1							
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		СО												
		1	2	2	3	2	2				3		3	3
22BTCS31 2R	Database Manageme	CO 2	3	2	3	2	2				2		3	3
		CO 3	3	2	3	3	3				3		3	2
		CO 4	3	2	3	1	3				2		3	2
		CO 5	3	2	3	3	3				2		2	2

		SEMESTI	ER - V						
Course Title		Formal Lang	uage & A	uton	nata T	heor	y		
Course code	22BTCS313R	Total credits: 3	L	T	P	S	R	O/F	С
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisite	Knowledge in	Co-requisite					Nil		_
1	Mathematics	1							
	and Data								
	Structure and								
	Algorithm								
Programme	9	Computer	Science &	& Eng	gineer	ing			
Semester	Su	mmer/ V semester					orogra	am	
Course		an introduction to							computer
Objectives	•	m the perspective of							•
(Minimum 3)		ce the fundament		_	-	nal la	ngua	ges, gran	nmar, and
	automata th	neory.	_					-	
		problem-solving	abilities u	ising	deterr	ninist	tic an	d non-det	erministic
	machines.								
CO1	Understand the fund	damental characteri	stics of fo	ormal	langua	ages a	and fo	rmal gran	nmar.
CO2	Understand the sim	ilarity between dete	erministic	and 1	non-de	termi	nistic	finite aut	omata
CO3	Understand the min	imization of detern	ninistic an	d nor	ndeterr	minis	tic fin	ite autom	ata.
CO4	Analyze the similar	rity between non-de	eterminist	tic pu	sh-dov	wn au	itoma	ta and co	ntext-free
	grammars.								
CO5	Analyze the fundar	mental characteristi	cs of Tu	ring r	nachin	nes ar	nd ho	w they ar	e used in
	computing.								
Unit-No.	Con	itent	Contac	et	Lea	rning	g Out	come	BL
			Hour						
I		Finite Automata:			<b>D</b> escrib	,	llustra	ite, and	
		Finite Automata,		I	xplain		he	central	
	Central Concept			I	oncept		of A	utomata	
	•	ministic Finite	8	T	heory.				1,2
		Nondeterministic							
		(NFA), Finite							
	Automata with Ep								
II		oressions and			escrib		llustra		
		ular Expressions,			xplain			regular	
	Finite Automata	U			xpress			and	
	Expressions, A			la	anguag	ges.			
	-	ssions, Proving	8						1,2
		to Be Regular,							,
	_	ies of Regular							
		quivalence and							
	Minimization o	f Automata –							
	Pumping Lemma.								
III	Context Free			I	<b>D</b> escrib				
III	Languages: Def	Grammars and inition, Leftmost grammars, Parse	6	e	xplain	C	ontext		1,2

	trees, Ambiguity: Ambiguous grammar, Removing ambiguity, Normal forms, Applications of context free grammars: Parsers			
IV	Pushdown automata (PDA) and context free languages (CFL): Definition & representation of pushdown automata, Acceptance by PDA: By final state, By empty stack, Deterministic PDA, Equivalence of PDA and CFL, Pumping lemma for CFL Closure properties of CFL.	8	Describe, illustrate, and explain the representation of pushdown automata and context free languages.	1,2
V	Turing machines: Definition, Language of a Turing machine, Programming Turing machines, The Church-Turing thesis, A simple programming language, Extensions of the basic Turing machine.	6	Describe, illustrate, and explain the basic Turing machine.	1,2

T1: Theory of Computer Science : Automata, Languages and Computation – K.L.P. Mishra and N. Chandrasekaran, PHI.

T2: Introduction to Languages and Theory of Computations – Martin J. C., TMH.

## **REFERENCE BOOKS:**

R1: Introduction to Automata Theory, Languages and Computation – Hopcroft, Ullman, Pearson Education.

R2: Elements of the Theory of Computation – Papadimitrou, C. and Lewis, C.L, PH.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the fundamental characteristics of formal languages and formal grammar.	1,2,3,10,12
2	Understand the similarity between deterministic and non- deterministic finite automata	1,2,3,4,5,10,12
3	Understand the minimization of deterministic and nondeterministic finite automata.	1,2,3,4,5,10,12
4	Analyze the similarity between non-deterministic push-down	1,2,3,4,5,10,12

	automata and context-free grammars.	
5	Analyze the fundamental characteristics of Turing machines and how they are used in computing.	1,2,3,4,5,10,12

Course code	Course	CO	PO1	PO	РО	PO	PO	РО	PO	PO	РО	PO1	PO1	PO1
	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1							1		1
	Formal Languag e & Automat a Theory	CO 2	3	3	2	2	1					1		2
22BTCS313 R		CO 3	3	3	3	1	1					1		2
		CO 4	3	3	2	2	1					1		2
		CO 5	3	3	2	2	1					1		2

		SEMESTE	ER – V							
Course Title		Object-Or	riented P	rogr	ammi	ng				
<b>Course code</b>	22BTCS314R	Total credits: 5	L	T	P	S	R	O/F	С	
		<b>Total hours:</b>	3	0	4	0	0	0	5	
		39T+60P								
<b>Pre-requisite</b>	File Systems	Co-requisite					Nil			
Programme		Computer	Science &	& En	gineer	ring				
Semester	Su	mmer/ V semester	of the th	ird y	ear of	f the ]	progr	am		
Course	1. To enable stude	To enable students to understand the basic object-oriented programming concepts								
Objectives	apply them in p	roblem solving.								
(Minimum 3)		ong students the inh			_		_			
	3. To enable stude	nts to develop GUI	-based a	pplica	ations	using	g AW	T, Swing	and Event	
	handling.									
CO1	Understand object-	oriented programmi	ng conce	pts ar	nd imp	oleme	nt in j	ava.		
G0*	T T 1	1 1 11 11 1 1 1		) P .					1 -	
CO2	Understand and ap				-	-	nherit	ance, pac	kage and	
002	interfaces, and anal	·					1 11	• .		
CO3	Understand and ap	pry concepts like m	nuitithrea	aing,	excep	otion	nanai	ing etc.	in object-	
CO4	oriented programs.			.:						
CO4	Apply exception-ha	naiing methods in p	orogramn	ning.						
CO5	Create interactive a	s well as GUI-based	l java app	olicati	ions ir	n proj	ect-ba	sed learni	ng.	
Unit-No.	Con	tent	Contact Learning Outco				come	BL		
			Hour							
I	Java Overview:		7	Α	nalyz	ing J	ava an	nd its		
	Java Introduction,	Platform		p	ropert	ies, a	nd als	o array		
	Independence, JV			a	nd str	ing.				
	types, Operators, I									
	Switch condition,									
	for loop, break and	l continue								
	statement.								1,2	
	Array and String:									
		Multidimensional								
		Classes-String,								
	_	Wrapper Class,								
	Command line	arguments and								
TT	Various String Op		0		1	•	1	-1-1		
II	Classes, Objects		8		-	_		, objects,		
	Constructor:	Object reference, Constructor		a	nd me	unoas	S.			
		Iethod: Method								
	<i>U</i> ,	cursion, Passing								
		ject form Method,							1,2	
	new operator,	this and static								
	-	method, Import								
	*	import, Access								
		class, Inner class,								
	control, rested (	russ, milei class,								

	Anonymous inner class.			
III	Inheritance and Interfaces in Java: Overview of Inheritance, inheritance in constructor, Inheriting Data members and Methods, Multilevel Inheritance – method overriding Handle multilevel constructors super keyword, Stop Inheritance, final keyword. Creation and Implementation of an interface, Interface reference, instance of operator, Interface inheritance, Dynamic method dispatch, Abstract class, Comparison between Abstract Class and interface, inside of System.out.println – statements.	8	Analyzing the concepts of Inheritance and Interfaces in Java.	1,2
IV	Exception Handling in Java: Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class. JAVA File Handling: Overview of Different Stream (Byte Stream, Character stream), Readers and Writers class, File Class, File Input Stream, File Output Stream, Input Stream Reader and Output Stream Writer class, File reader and writer class, File Writer, Buffered Reader class.	8	Analyzation of the concepts of Exception Handling in Java.	1,2
V	Applet, AWT and Swing: Applet: Applet Fundamental, Applet Architecture, Applet Skeleton, Requesting Repainting, Event Handling: various event handling mechanisms, various classes related to event sources and event listeners, AWT: window fundamentals, creating frames, Adding removing various controls, Layout managers, Introduction To Swing.	8	Analyzation of fundamentals of Applet, AWT and Swing.	1,2

Practical	1. Hands-on Introduction to Object- Oriented Programming:		Describe, illustrate and explain coding exercises	
	Practical exercises on creating classes and objects, Implementing encapsulation through practical examples, Coding exercises on constructors and destructors, Applying access modifiers (public, private, protected) in practical scenarios.	12	on constructors and destructors, applying access modifiers in practical scenarios.	1,2,3,4
	2. Practical Inheritance and Polymorphism:  Coding exercises on implementing different types of inheritance (single, multi-level, and multiple), Practical examples of method overriding, Creating and using abstract classes and interfaces, Implementing static and dynamic binding through practical examples.	12	Describe, illustrate and explain practical examples of method overriding, Creating and using abstract classes and interfaces, Implementing static and dynamic binding through practical examples,	1,2,3,4
	3. Advanced OOP Concepts in Practice: Practical exercises on creating and using packages and namespaces, Implementing exception handling in real-world scenarios, Creating and managing multithreaded applications, Practical exercises on generics and collections.	12	Describe, illustrate and explain creation and managing multithreaded applications, Practical exercises on generics and collections.	1,2,3,4
	4. Software Design and Development in Action: Hands-on Object-Oriented Analysis and Design (OOAD) exercises, Implementing design patterns (e.g., Singleton, Factory, Observer) in practical scenarios, Software testing and debugging exercises, Code optimization and refactoring practical sessions.	12	Describe, illustrate and explain Software testing and debugging exercises, Code optimization and refactoring practical sessions.	1,2,3,4
	5. Project-Based Learning and GUI Development: Practical exercises on building Graphical User Interfaces (GUI), Implementing event handling in GUI applications, Developing interactive and GUI-based applications using Swing/JavaFX/Qt, Project-based	12	Describe, illustrate and explain development of a real-world application using OOP concepts and GUI.	1,2,3,4

learning: Developing a real-world		
application using OOP concepts and		
GUI.		

- T1: Herbert Schildt and Dale Skrien, "Java Fundamentals A comprehensive Introduction", McGraw Hill
- T2: Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne.
- T3: T. Budd, "Understanding Object- Oriented Programming with Java", Pearson Education.

### **REFERENCE BOOKS:**

- R1: P.J.Dietel and H.M.Dietel, "Java How to program", Prentice Hall.
- R2: P.Radha Krishna, "Object Oriented programming through Java", CRC Press.
- R3: S.Malhotra and S. Choudhary, "Programming in Java", Oxford University Press.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand object-oriented programming concepts and implement in java.	1,2,3,4,5,10,12
2	Understand and apply building blocks of OOPs language, inheritance, package and interfaces, and analyse real-world problems in terms of these.	1,2,3,4,5,10,12
3	Understand and apply concepts like multithreading, exception handling etc.in object-oriented programs.	1,2,3,4,5,10,12
4	Apply exception-handling methods in programming.	1,2,3,4,5,10,12
5	Create interactive as well as GUI-based java applications in project-based learning.	1,2,3,4,5,10,12

Course	Course	CO	PO1	PO	PO1	PO1	PO1							
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		~~												
22BTCS31 4R	Object-Oriented Programmi ng CC 4	CO 1	2	2	3	1	1							1
		CO 2	2	1	3	1	1							1
		CO 3	2	1	2	1	1							1
		CO 4	2	1	2	1	1							1
		CO 5	2	2	2	1	1							1

		SEMESTE	R - V								
<b>Course Title</b>		PE-1 : Found	ations of	Dat	a Scie	nce					
Course code	22BTCS316R	Total credits: 3	L	T	P	S	R	O/F	C		
		Total hours: 30T	3	0	0	0	0	0	3		
Pre-requisite	Nil	Co-requisite					Nil				
Programme	Computer Science & Engineering										
Semester		Summer/ V semester of the third year of the program									
Course	1.To provide fundamental knowledge on data science with querying and										
Objectives	analytics required for the field of data science.										
(Minimum 3)	2.To understand the process of handling heterogeneous data, pre-process and										
	visualize them for better understanding.  3.To gain the fundamental knowledge of data science tools and gain basic skill										
	_	-		sciei	ice too	ois ar	ia gai	n basic s	K111		
CO1	Acquire foundationa	l-time data science p									
	_										
CO2	Understand and app	<u> </u>				1	- 41	4: 1	1*		
CO3	Apply advanced too										
CO4	Manage diverse da		oy progra	amm	ing ic	or Kr	iowie	age repre	esentation		
CO5	through visualization  Demonstrate numer		ata scienc	re to	nole to	sol	ve re	al-world	nrohleme		
003	through industrial ca	-	ata scient	ic ii	)O15 to	301	vc ic	ui-world	problems		
Unit-No.	_	tent	Contact	f	Lear	rning	Out	come	BL		
			Hour		2001		, out	come			
I	Introduction			Т	o acqu	ire f	ounda	tional			
	NeedforDataScience	ce-		k	nowle	dge i	n data	ı			
	WhatisDataScience	e - Data Science		S	cience.						
	Process	_							1,2		
		ceandDataScience-									
	Prerequisites for a		5								
	ToolsandSkillsrequ										
II		a Analysis (EDA)			o'			derstand			
	and Basic Statist				Explora	•		Data			
		Data Analysis			-			nd Basic			
		measures, Basic ohs and summary	7	3	tatistic	ai III	terrac	e.			
		· · · · · · · · · · · · · · · · · · ·	/								
	statistics) of EDA,Data Analytics Lifecycle, Discovery, Developing								1,2		
	Initial Hypothe										
	• •	ources, EDA case									
		otheses on means,									
	proportions a	nd variances,									
	Errormetrics										
III	Data Science Me				O O	appl	у	various			
		Science–Examples			lgorith		of	Data			
		, Data Discovery,		S	cience				1,2		
	Data Prepara	ation, Model							1,2		
	Planning,	D 11.11									
	Model	Building,	6								

	Communicate Results, Data cleaning -Data integration- Data Reduction-Data Transformation and Data Discretization, Feature Generation and Feature Selection, Feature Selection algorithms:Filters-Wrappers			
IV	BasicMachineLearningAlgorithms:Classifiers-Decisiontree-NaïveBayes-k-NearestNeighbors(k-NN),k-means-SVM,AssociationRulemining-Ensemblemethods	6	Analyzation of the concepts of Basic Machine Learning Algorithms.	1,2
V	Platform for Data Science: PythonforDataScience – PythonLibraries —Data Frame Manipulation with numpyand pandas – Exploration Data Analysis –Time Series Dataset – Clustering with Python– Dimensionality Reduction .Python integrated Development Environments(IDE) for Data Science.	6	Analyzation of Python integrated Development Environments(IDE) for Data Science.	1,2

**T1**Sanjeev Wagh, Manisha Bhende, Anuradha Thakare, 'Fundamentals of Data Science, CRCPress,1st Edition, 2022

T2Datasciencefromscratch-FirstprincipleswithPython,JoelGrus,OâReily,2015.

#### **REFERENCEBOOKS:**

- **R1** Doing Data Science, Straight Talk From The Frontline, Cathy O'Neil and Rachel Schutt,O'Reilly(2014).
- **R2**AvrimBlum,JohnHopcroft,Ravindran Kannan, "FoundationsofDataScience",Cambridge UniversityPress, First Edition, 2020.
- **R3** Data Mining: Concepts and Techniques", Third Edition, 2 Jiawei Han, MichelineKamberand Jian Pei,ISBN 0123814790 (2011).

R4BigDataandBusiness Analytics, JayLiebowitz, CRC press (2013)

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Acquire foundational knowledge in data science.	1,2,3,4,10,12
2	Understand and apply various data analytics techniques.	1,2,3,4,10,12
3	Apply advanced tools to work on dimensionality reduction and mathematical operations.	1,2,3,4,5,10,12
4	Manage diverse data types and employ programming for knowledge representation through visualization.	1,2,3,4,10,12
5	Demonstrate numerous open-source data science tools to solve real-world problems through industrial case studies.	1,2,3,4,5,10,12

Course code	Course	CO	PO1	PO	PO1	PO1	PO1							
	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	3						1		2
	Foundatio	CO 2	2	2	1	3						1		2
22BTCS316 R	ns of Data Science	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	$\mathbf{R} - \mathbf{V}$						
<b>Course Title</b>		PE-1:	Neural I	Netw	orks				
Course code	22BTCS316R	<b>Total credits: 3</b>	L	T	P	S	R	O/F	С
		Total hours: 30T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite					Nil	•	
Programme		Computer S	Science &	k En	ginee	ring			
Semester	Su	ımmer/ V semester	of the th	ird y	ear o	f the	progr	am	
Course	1. To under	rstand, analyze, and	d apply	vari	ous A	Artific	cial N	leural Ne	twork
<b>Objectives</b>	architect	tures.							
(Minimum 3)	2. To train a	algorithms for a rang	ge of app	olicat	ions i	n ma	chine	learning a	and
	deep lea	rning.							
CO1	Understand the his	storical development	ts and po	otenti	al ap	plicat	ions o	of Artifici	al Neural
	Networks (ANN).								
CO2	Analyse Artificial	Neural Network arch	itectures	base	d on	conne	ctivity	y and lear	ning
	strategies.								
G02	A 1 1	.1				D		. 1	
CO3	11.	gorithms for discret	te and c	ontın	uous	Perce	eptron	network	s in Feed
GO4	Forward Networks		1 4		1 '4		C C	1	1 37 1
CO4		ation training and e	explore ti	ne ar	cnited	cture	or Co	nvolution	ai Neurai
COF	Networks in Deep		-1241		. D. 1.	4:.	1 . A		M
CO5		tecture and training	•			rectio	nai A	ssociative	Memory
TI24 NI-		eld Network in Assoc				•_	- 04		DI
Unit-No.	Col	ntent	Contac	et	Lea	arnın	g Out	come	BL
I	Introduction 1	to Neural	Hour	7	20.000	urino f	Counda	tional	
1	Networks	to Neural				-		ntional	
	Introduction,	Humans and			letwo	-	n Neu	ıraı	
	•	anization of the		1	NELWO	11.5.			
	Brain, Biolo								
	•	Artificial Neuron	5						1,2
	_	eristics of ANN,	3						
		Model, Historical							
	Developments,	Potential							
	Applications of A								
II	Essentials of	Artificial		Т	`0 11n4	dersta	nd Fe	sentials	
**	Neural Networks			0		Artific		Neural	
		Model, Operations			Jetwo		741	ricarar	
		euron, Types of							
		on Function, ANN	7						
	Architectures,	Classification	•						1,2
	<u> </u>	NN– Connectivity,							
	Learning Strate	• 1							
	Unsupervised,	Reinforcement),							
	Learning Rules.	,,,							
III	Feed Forward N	etworks		T	o	app	ly	various	
 		screte, Continuous			lgorit		of	Neural	
	and Multi-Cat	·			Vetwo				1,2
						-			
	and Multi-Cat Algorithms:	egory, Training Discrete and		N	letwo	rks.			1,2

	Continuous Perceptron Networks,			
	ADALINE, MADALINE.	6		
IV	Deep Learning		Analyzation of the	
	Introduction, Perceptron, Multilayer		concepts of Deep	
	Perceptron, Delta Rule,		Learning.	
	Backpropagation Training, Learning	6		1.2
	Algorithm, Normalization,			1,2
	Limitations of the Perceptron			
	Model, Convolutional Neural			
	Network, Recurrent NN.			
V	Associative Memories	6	Analyzation of BAM	
	General Concepts of Associative		Training Algorithms.	
	Memory, Bidirectional Associative			
	Memory (BAM) Architecture, BAM			1,2
	Training Algorithms: Storage and			
	Recall Algorithm. Architecture of			
	Hopfield Network.			

T1Simon Haykin,—Neural Networks-A Comprehensive Foundation, Macmillan Publishing Co., New York.

T2Neural Networks-James A Freeman David MSK, Pearson Publication

#### **REFERENCEBOOKS:**

R1 Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House

R2K. Mahrotra, C.K. Mohan and Sanjay Ranka,—Elements of Artificial Neural Networks, MIT Press

R3 S. Rajasekharanand G. A. Vijayalakshmipai,—Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, PHI Publication.

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the historical developments and potential applications of Artificial Neural Networks (ANN).	1,2,3,4,11,12
2	Analyse Artificial Neural Network architectures based on connectivity and learning strategies.	1,2,3,4,5,11,12
3	Apply training algorithms for discrete and continuous Perceptron networks in Feed Forward Networks.	1,2,3,4,5,9,10,11,12
4	Apply backpropagation training and explore the architecture of Convolutional Neural Networks in Deep Learning.	1,2,3,4,5,9,10,11,12

5	Evaluate the architecture and training algorithms of	1,2,3,4,5,9,10,11,12
	Bidirectional Associative Memory (BAM) and Hopfield	
	Network in Associative Memories.	

Course	Course	CO	PO1	PO	PO1	PO1	PO1							
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	1	2							2	2
	Neural	CO 2	3	3	1	2	2						2	1
22BTCS31 6R	Networ ks	CO 3	2	2	3	2	2				1	2	1	3
		CO 4	2	2	3	2	2				1	1	1	2
		CO 5	2	2	2	1	2				1	1	1	2

		SEMESTE	$\mathbf{E}\mathbf{R} - \mathbf{V}$								
Course Title		Techno l	Profession	nal S	kills I	V					
Course code 22BTCS	5315R	Total credits: 1	L	T	P	S	R	0/	F	C	
		Total hours: 30P	0	0	2	0	0	0	١	1	
Pre-requisite	Nil	Co-requisite					Nil				
Programme		Computer S									
Semester		mmer/ V semester									
		letailed revision of	Computer	Scie	ence &	Engi	ineeri	ing co	ncep	ts lear	ned
	so far.										
		confident in Con	_	ience	2 & E	ingine	eering	g conc	cepts	to so	olve
		real-life situations.									
_	lop highly skilled and knowledgeable development professional who can deal w										with
various a	ous areas and aspects of businesses.										
CO2 Develop	analytical	and research ability	as manag	emei	nt prof	essio	nal w	ho cai	n be	more	
efficient	and innova	tive in practice.									
CO3 Gather k	novelodgo (	hout various dovole	onmont co	ncon	ts and	tho t	haori	os of d	lovol	onmoi	nt
	ther knowledge about various development concepts and the theories of development courage the students towards Non-traditional thinking										π.
	-	nicate scientific and			_	a in a	profe	accion	al me	nnar	
Unit-No.	Con	tent	Contact Hour	Į į	Lea	rnıng	g Out	come		BI	4
I C Progr	ramming		Hour	Г	)evelor	n haci	ic eki	11c of (			
1 C 1 logi	anning		7		Develop basic skills of C programming						,
			,	P	programming						2
TT A	1 D	Cate 1 Plantenia		Г	· 1	1					
II Analog Circuits		pigital Electronic			eveloj	•	nalyti		and		
Circuits	S		8		esearch nd I	n abn Digita	-	i Ana Electro	-	1,2	2
					ircuits	_	.1 1	Electro	ilic		
III Data St	ructure and	l Algorithms			ather		wleda	re ah	Out		
	racture and	111goriumiis			arious			ge ao elopm			
			10		oncept			•		1,2	2
					nd Alg			Siruct			
IV Compu	ter Ord	ganization and		_	nalyza			of	the		
Archite	•				oncept			Compu			
			12		)rganiz			•	and	1,2	2
					rchite						
V Operati	ng Systems	8			nalyza		of	f ba	asic		
	•		8		oncept		of (	Operat		1,2	2
				S	ystems	S		_	-		

## **TEXT BOOKS/REFERENCE BOOKS:**

T1: "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

T2: Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

- T3: Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- T4: M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- T5: Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- T6: S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- T7: Stallings, Computer Organization & Architecture, Pearson.
- T8: Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand different types of signals-continuous and discrete, odd and even, periodic and aperiodic etc.	1,2,3,4,5,9,10,11,12
2	Understand Classifications of the standard forms of Signals with respect to systems based on their properties.	1,2,3,4,5,9,10,11,12
3	Analyse the concepts of Laplace transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,9,10,11,12
4	Analyzation of the concepts of Fourier transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,9,10,11,12
5	Analyzation of Z-transform in continuous time signals and systems by using appropriate mathematical tools.	1,2,3,4,5,9,10,11,12

Course	Course	CO	PO1	PO	PO	PO	PO	PO	PO	РО	РО	PO1	PO1	PO1
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	3	2	2				3	2	3	3
	Techno Professio nal Skills	CO 2	3	2	3	2	2				2	2	3	3
22BTCS31 5R	IV	CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

		SEMESTER	R - V							
<b>Course Title</b>		COMPETENT EN	GLISE	I FO	R EN	GIN	EERS			
Course code	22UBPD314R	Total credits: 2	L	T	P	S	R	O/F		C
		Total hours: 60P	0	0	4	0	0	0		2
<b>Pre-requisite</b>	Nil	Co-requisite					Nil			
Programme		Computer So			_					
Semester		mmer/ V semester of								
Course	-	oundation in technic	al voca	bulaı	ry rela	ited t	o eng	ineerin	g di	sciplines
Objectives		, electrical, civil, etc.						2		
(Minimum 3)	_	en and spoken com						y for	pro	tessional
		ing emails, reports, pr lity to understand and					_	to roce	orol	<b>nonor</b> a
		try-specific literature.	_	וכו וכ	CIIIIC	ai uo	Cumer	118, 1080	arci	i papers.
CO1		ient usage of English		e ski	lls in 1	echn	ical co	nmıın	icati	on and
	documentation.	ioni usugo of English	rangaag	,c ski	115 111		icui c	) IIIIII GII	Cuti	on una
CO2	_	e engineering texts, e	extractin	ig ess	sential	info	rmatio	n and s	yntl	nesizing
	complex ideas.									
CO3	Generate clear and	effective technical rep	orts, pr	esent	tations	, and	docu	mentati	on i	n
	English.	1	· 1							
CO4		ral communication sk	ills for	effec	tive pa	artici	pation	in engi	nee	ring
	discussions and pre	sentations.								
CO5	Comprehend advan	ced technical vocabul	ary and	lang	uage s	struct	ures n	ecessar	y fo	r
	_	se and professional co	•	_	•					
<b>T</b>	- C		<u>~</u>	. 1			0 1		1	DI
Unit-No.	Con	tent	Contac Hour	t	Lea	rnin	g Out	come		BL
I	Email Etiquette		8	Г	<b>)</b> evelo	n has	ic skil	ls of C		
•	Eman Enquette		Ū		rograr	•		15 01 0		
	i. Different parts of			ľ	8		0			
	usage of Magic W	ords & Wonder								
	Phrases									1,2
	ii. Effective Emai	1 Communication.								
		,								
		rively to a client's								
	expectations	G1 !!!								
II	Time-Managemen	t Skills	8		Develo	•	nalyti			
	i. Introduction to	Time					-	f Analo	_	
	Management,				nd l Circuits	Digit	ai E	lectron	ic	
		2 77			.ii cuiti	,				
	Purpose and Impo	rtance of Time								1,2
	Management									
	ii. Time Managen	nent Matrix, Basic								
	Tips to Maintain T									
ĺ				1						

	Practice Session: Preparing time management matrix			
III	Interview Skills  i. Preparation before the interview  ii. Non-verbal cues for interview skills,  Interview dos and don'ts  iii. Handling difficult questions in Interview	10	Gather knowledge about various development concepts od Data Structure and Algorithms	1,2
IV	i. Introduction to Conflict Management ii. Conflict Management Strategies	10	Analyzation of the concepts of Computer Organization and Architecture	1,2
V	Practice Sessions	9	Analyzation of basic concepts of Operating systems	1,2

T1: Wren, P.C and Martin, H. 1995. High School English Grammar and Composition, S Chand Publishing.

T2: Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press

#### **REFERENCE BOOKS:**

T1: Mccarthy. (2008) English Vocabulary in Use Upper - Intermediate with CD ROM, Cambridge University Press

T2: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Demonstrate proficient usage of English language skills in technical communication and documentation.	1,2,3,4,5,10,12								

2	Evaluate and critique engineering texts, extracting essential information and synthesizing complex ideas.	1,2,3,4,5,10,12
3	Generate clear and effective technical reports, presentations, and documentation in English.	1,2,3,4,5,10,12
4	Assess and refine oral communication skills for effective participation in engineering discussions and presentations.	1,2,3,4,5,10,12
5	Comprehend advanced technical vocabulary and language structures necessary for engineering discourse and professional communication.	1,2,3,4,5,10,12

Course	Course	СО	PO1	PO	PO	PO	PO	PO	РО	PO	РО	PO1	PO1	PO1
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
	Compete	CO 1	1	1	1	1	1					3		2
	nt English for	CO 2	1	1	1	1	1					3		2
22UBPD31 4R	Engineer s	CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTE	$\mathbf{E}\mathbf{R} - \mathbf{V}$								
<b>Course Title</b>		CO CURRI		ACT	TIVIT	IES					
Course code	22UBCC311R	Total credits: 1	L	T	P	S	R	O/F	С		
		Total hours: 15P	0	0	0	4	0	0	1		
Pre-requisite	Nil	Co-requisite				,	Nil				
Programme	· ·	elor of Technology	Comput	ter sci	ence a			eering			
Semester		all/ IV semester of									
Course		ent classroom educ							ences and		
Objectives	hands-on activities that reinforce and expand upon academic concepts.										
(Minimum 3)	2. Develop essential skills such as problem-solving, critical thinking,										
	communication, and collaboration through structured, curriculum-aligned										
	activities.										
	3. Encourage	students to exp	lore the	eir ir	iteresi	ts an	d tal	lents, bu	ild self-		
	confidence	e, and cultivate a	well-ro	ounde	ed ch	aract	er by	particij	pating in		
		-curricular prograi									
CO1	Demonstrate the					_			sroom to		
	real-world situation						•				
CO2		problem-solving, cri		_			ation	, and coll	laboration		
	skills, essential for l										
CO3		elf-confidence, self			and a	wel	l-rour	nded cha	racter by		
~~.	exploring and devel										
CO4	0 0	nity service and soc	ial initia	tives,	foster	ring a	sens	e of resp	onsibility,		
GO#	empathy, and active	•	1 1.	1 '1'.'	1		.1	1	. ,		
CO5	Demonstrate strong teamwork and leadership abilities, learned through participation in										
I	group activities and leadership roles within co-curricular programs.										
Unit No		leadership roles wi	thin co-c	urricu	ılar pr	ogran	ns.				
Unit-No.			thin co-c	curricu ct	ılar pr	ogran	ns.	come	BL		
	Con	leadership roles wi	thin co-c Contac Hour	et .	ılar pro	ogran rning	ns. g Out	come			
Unit-No.	Con AdtU encourage	tent  s a range of	thin co-c	eurricu et	llar pro Lea	ogran rninş ricula	ns. g Out	come activities			
	AdtU encourage activities outside	leadership roles wittent es a range of le the regular	thin co-c Contac Hour	ct C	Lea Lo-curi	ogran rning ricula e stud	ns. g Out	come activities practical			
	AdtU encourage activities outsid curriculum inte	tent  s a range of le the regular anded to meet	thin co-c Contac Hour	ct C en an	Lea Lo-curi nhance	ogran rning ricula e stuc tion	r lents'	come activities practical academic			
	AdtU encourage activities outsid curriculum interlearner's interest,	es a range of the the regular nded to meet. These activities	thin co-c Contac Hour	ct C en ap co	Lea Lo-curi	ogran rning ricula e stuction ts, c	r lents' of a	come activities practical academic			
	AdtU encourage activities outsid curriculum intelearner's interest, are aimed to deve	tent  s a range of le the regular anded to meet	thin co-c Contac Hour	ct C en an co	Lea Co-currenhance pplicationceptevelor	ogran rricula e stuction tts, coment	r lents' of a	activities practical academic l skills			
	AdtU encourage activities outsid curriculum intelearner's interest, are aimed to deve	es a range of le the regular nded to meet. These activities clop the social and romote a holistic	thin co-c Contac Hour	ct C en an con de so	Lea Co-currenhance pplicationceptevelor	rning ricula e stuction ts, coment	r lents' of a critica	activities practical academic l skills problem-			
	AdtU encourage activities outsid curriculum intelearner's interest, are aimed to deve soft skills and p development of	es a range of le the regular nded to meet. These activities clop the social and romote a holistic	thin co-c Contac Hour	curricu	Lea  Co-currenhance pplicationceptevelopolving	ogran ricula e stuction ts, coment , con pers	r seritica	activities practical academic l skills problem-nication),			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind	es a range of le the regular nded to meet. These activities elop the social and romote a holistic the learners,	thin co-c Contac Hour	curricu	Lea Lea Lo-currenhance pplicar concept cevel options consider the constant of	ogran ricula e stuction ts, coment , coment pers ence,	r seritica	activities practical academic l skills problem- nication), growth			
	AdtU encourage activities outsid curriculum intellearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo	es a range of le the regular nded to meet. These activities clop the social and romote a holistic the learners, I the 360 degree	thin co-c Contac Hour	ct Cerapico	Lea Co-currenhance pplicationcept evelope olving oster confide	ogran ricula e stuction ts, coment , coment pers ence,	r seritica	activities practical academic l skills problem- nication), growth self-	BL		
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in o	es a range of le the regular nded to meet. These activities alop the social and romote a holistic the learners, I the 360 degree logy the students	thin co-c Contac Hour	ct Cer ap co de so fo (() av so th	Lea Co-currenhance pplicationceptolying oster confident wareneocial arough	ogran  ricula e stuction ts, coment pers ence, ess),	r lents' of a critica mmur onal	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity			
	AdtU encourage activities outsid curriculum intelearner's interest, are aimed to deve soft skills and p development of Keeping in mindlearning methodo are engaged in contended under diff Dance, music, pho-	es a range of le the regular inded to meet. These activities alop the social and romote a holistic the learners, I the 360 degree logy the students different activities fferent clubs viz. otography, drama,	thin co-c Contac Hour	curricu	Lea  Co-currentance pplicationcept evelop olving oster confide waren ocial nrough	ograndericular estudition estudition estudition persence, ess),	r spoon and	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate	BL		
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in cheaded under diff Dance, music, pholiterary etc., The	es a range of le the regular nded to meet. These activities clop the social and romote a holistic the learners, I the 360 degree logy the students different activities ferent clubs viz. otography, drama, he students are	thin co-c Contac Hour	curricu	Lea  Co-currenthance pplicationcept evelop olving oster confide warene ocial nrough ngager eamwo	ogran ricula e stuction ts, coment , coment , comens ence, ess), ment, ork a	r lents' of a critica mmur onal responsed and lents'	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership	BL		
	AdtU encourage activities outsid curriculum intellearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in cheaded under difficulties Dance, music, pholiterary etc., Thencouraged to par	tent  s a range of le the regular nded to meet. These activities alop the social and romote a holistic the learners, I the 360 degree logy the students different activities ferent clubs viz. otography, drama, the students are reticipate in regular	thin co-c Contac Hour	ct ct ct cr cy	Lea Lea Co-currenhance pplicationcepte evelop confide warence confide mrough nrough ngagete eamwo bilities	ogran ricula e stuction tts, coment pers ence, ess), ment, ork a s, pr	r separate conduction of the c	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them	BL		
	AdtU encourage activities outsid curriculum intellearner's interest, are aimed to deve soft skills and p development of Keeping in mindlearning methodo are engaged in contact headed under diffusion Dance, music, pholiterary etc., The encouraged to par club activities	es a range of le the regular inded to meet. These activities clop the social and romote a holistic in the learners, it is a students different activities ferent clubs viz. The otography, drama, the students are reticipate in regular is, workshops,	thin co-c Contac Hour	curricu	Lea  Co-currentance pplicationcept evelope obtaine confide warene ocial nrough ngager eamwo bilities or ho	ogran ricula e stuction ts, coment pers ence, ess), ment, ork a s, pr olistic	r lents' of a critica mmur onal respondent leeparings successions.	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them access in	BL		
	AdtU encourage activities outsid curriculum interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in cheaded under diffunce, music, pholiterary etc., The encouraged to par club activities competitions as per section of the competitions as per section of the couraged to par club activities competitions as per section of the couraged to par club activities competitions as per section of the courage of t	es a range of le the regular nded to meet. These activities clop the social and romote a holistic the learners, I the 360 degree logy the students different activities fferent clubs viz. otography, drama, he students are tricipate in regular s, workshops, or their interest and	thin co-c Contac Hour	ct ct ct criminal control cont	Lea Lea Lo-currenhance pplicationcepto evelop obliving oster confide warence ocial nrough nrough nrough camwo bilities or ho	ogran ricula e stuction ts, coment pers ence, ess), ment, ork a s, pr olistic	r separate conduction of the c	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them	BL		
	AdtU encourage activities outsid curriculum intelearner's interest, are aimed to deve soft skills and p development of Keeping in mindlearning methodo are engaged in cheaded under diff Dance, music, philiterary etc., The encouraged to par club activities competitions as perhobbies, The students	es a range of le the regular inded to meet. These activities alop the social and romote a holistic the learners, I the 360 degree logy the students different activities afferent clubs viz. Totography, drama, the students are recipitate in regular in the students are recipitate in regular in the students are recipitate in regular in the students and the students and the students of the students o	thin co-c Contac Hour	ct ct ct criminal control cont	Lea  Co-currentance pplicationcept evelope obtaine confide warene ocial nrough ngager eamwo bilities or ho	ogran ricula e stuction ts, coment pers ence, ess), ment, ork a s, pr olistic	r lents' of a critica mmur onal respondent leeparings successions.	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them access in	BL		
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in cheaded under diff Dance, music, pholiterary etc., The encouraged to particular activities competitions as perhobbies, The stude club are trained in	tent  as a range of the the regular re	thin co-c Contac Hour	ct ct ct criminal control cont	Lea Lea Lo-currenhance pplicationcepto evelop obliving oster confide warence ocial nrough nrough nrough camwo bilities or ho	ogran ricula e stuction ts, coment pers ence, ess), ment, ork a s, pr olistic	r lents' of a critica mmur onal respondent leeparings successions.	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them access in	BL		
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and p development of Keeping in mind learning methodo are engaged in cheaded under diff Dance, music, pholiterary etc., The encouraged to particular activities competitions as perhobbies, The stude club are trained in	tent  es a range of le the regular nded to meet. These activities alop the social and romote a holistic the learners, at the 360 degree logy the students different activities afferent clubs viz. Totography, drama, the students are reticipate in regular set, workshops, or their interest and the represent AdtU in versity student and	thin co-c Contac Hour	ct ct ct criminal control cont	Lea Lea Lo-currenhance pplicationcepto evelop obliving oster confide warence ocial nrough nrough nrough camwo bilities or ho	ogran ricula e stuction ts, coment pers ence, ess), ment, ork a s, pr olistic	r lents' of a critica mmur onal respondent leeparings successions.	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them access in	BL		

Renewed personalities are invited	
conduct workshops that benefit the	
members and students by givin	
them the platform to learn from	1
experts in the respective fields.	

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands-on experiences and projects.	1,2,3,4,5,6,10,12									
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12									
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12									
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12									
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12									

Course	Course	CO	PO1	PO	PO1	PO1	PO1							
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	2	1	2	2				2		2
	CO CURRICUL	CO 2	2	2	2	1	2	3				2		2
22UBCC 221	AR ACTIVITIE	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTEI	R – V										
<b>Course Title</b>		EXTRA	A-CURR	ICU:	LAR								
Course code	22UBEC311R	Total credits: 1	L	T	P	S	R	O/F	C				
		Total hours: 60P	0	0	0	4	0	0	1				
Pre-requisite	Nil	Co-requisite					Nil						
Programme		Computer Se											
Semester		mmer/ V semester o											
Course	•	cial and soft skills: Fo		•	isition	ı of i	nterpe	ersonal sk	ills and				
Objectives	_	gement abilities amon	_		1 , ,			1	. 1				
(Minimum 3)		olistic development: E	_						ceted				
		eyond academics, nurn-depth expression: P	•			•			culate				
		• •	•						Jurate				
CO1		their ideas and opinions clearly and critically analyze topics of interest.  arn to a plan so that they can make meaningful contributions, maintain a commitment,											
	_	ad manage their time and priorities.											
CO2	•	ate students who den	nonstrate	lead	lership	ano	l purs	ue interes	sts beyond				
	their academics.												
CO3	Learn to participa	te in various co-cu	rricular	activ	ities 1	leadi	ng to	their m	ultifaceted				
	personality develop						8						
CO4	_	, views, In-depth eva	aluation	and a	analysi	is cl	early	in the top	ic of their				
	interest.												
CO5	Demonstrate and p	oractices different ac	ctivities,	by I	ntegra	ting	learn	ing expe	riences by				
	demonstrating trans		,	- 3				8 1					
	-			-									
Unit-No.	Con	tent	Contact		Lear	rnin	g Out	come	BL				
I	AdtU encourage	es a range of	Hour 8	C+	udont	o do	walon	a well-					
1		le the regular	o				•	rsonality,					
		nded to meet			cludin		_	effective					
		These activities				_		ip skills,					
		elop the social and		_	-	-		diverse					
		romote a holistic		_	_			pression					
	development to							gration of					
	Keeping in mind	the3 60 degree		le	arning	5	exp	eriences,					
	learning methodo	logy the students		fo	stering	g		holistic					
		different activities		de	evelop	men	t.		2,3				
		fferent clubs viz.											
	_	otography, drama,											
	literary etc., T												
	club activitie	rticipate in regular s, workshops,											
		er their interest and											
		ent members of the											
		represent AdtU in											
		versity student and											
	, arrous muci Om	cisity student and											

national level competitions,	
Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course	Course	CO	PO1	PO	PO1	PO1	PO1							
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	2	1	2	2				2		2
	Extra- Curricul	CO 2	2	2	2	1	2	3				2		2
22UBEC31 1R	ar	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTEI	R – VI											
<b>Course Title</b>		Cor	npiler I	)esigi	n									
Course code	22BTCS321R	Total credits: 4	L	T	P	S	R	O/F	C					
		Total hours:	3	0	2	0	0	0	4					
		45T+30P												
Pre-requisite	Theory of	Co-requisite					Nil							
_	Computation	A.T. 1												
Programme			n Computer Science & Engineering  f the third year of the program											
Semester				•										
Course		process of translating	ng a high	n-leve	el lang	uage	to ma	chine cod	e required					
Objectives	for compiler construction.													
(Minimum 3)	· ·	21. Analyze the software tools and techniques used in compiler construction such as												
		yser and parser gene												
		data structures used		_				h as abstr	act syntax					
		ol tables, three addre												
CO1		t phases of a compil		_			_ •		<b>5.</b>					
CO2		niques to build a lang			-		-							
CO3		ected translations, ev												
CO4		ociation of runtime s	torage a	llocat	ion wi	ith co	ntrol	tlow and p	procedure					
~~=	calls.													
CO5	Apply code optimiz	ation on intermediat			get co	de ge	nerati	on.						
Unit-No.	Con	tent	Contac		Lea	rnin	g Out	come	BL					
			Hour											
I	Compiler structu		8					analysis-	1,2,3					
	Analysis-synthesis				ynthes		mod							
	_	ous phases of a			_			ne role of						
	-	ased approach to			exical		analys							
	compiler constr				onvert	_								
	7	with input, Parser				tens t	ising 1	tools like						
	T	, Token, Lexeme		L	EX.									
	•	egular definition,												
	Transition diagram	ıs, LEX.												
II	Syntax analysis:		8					cepts of	3,4					
	_	ty, Associativity,			ontext		_	rammars						
		p-down parsing,						op skills						
		scend parsing,		ir		vario		parsing						
		n the grammars,			•			ling top-						
	Predictive pars				own	anc		ottom-up						
	parsing, Opera	•		_	_			utilizing						
	grammars, LR	parsers (SLR,		to	ools lil	ke Y	ACC.							
	Canonical, LALR)													
III	Syntax directed t		10		earn	to	desi	_	3,4					
		hesized attributes,			_		-	-directed						
		aph, Evaluation			ranslat			schemes,						
	_	evaluation of S-			ocusin	_	on	attribute						
		ons L- attributed			ramm		and	<b>7</b> I						
	_	down translation				-		sms, and						
	of attributes Type	e checking: Type		u	nderst	and t	he di	fferences						

	system, Type expressions, Structural		between structural and	
	and name equivalence of types,		name equivalence of	
	Type conversion.		-	
IV	Run time environments:	10	types.  Comprehend the	4
1 V		10	<b>.</b>	4
	Storage organization, Storage-		· ·	
	allocation strategies, Access to		management of run-time	
	nonlocal names, Activation tree,		storage, including	
	Activation record, Parameter		activation records and	
	passing, Symbol table and dynamic		parameter passing	
	storage allocation Intermediate code		techniques, and learn the	
	generation: Intermediate		principles of intermediate	
	representations, Translation of		code generation.	
	declarations, Assignments, Control			
	flow, Boolean expressions and			
	procedure calls.			
V	Code generation:	9	Acquire knowledge on the	4
	Issues in the design of a code		design and implementation	
	generator, Basic blocks and flow		of a code generator,	
	graphs, Next use information,		emphasizing optimization	
	Register allocation, Code generation		techniques, basic blocks,	
	algorithm, Dag representation of		flow graphs, and register	
	programs, Code generation from		allocation strategies.	
	dags, Peephole optimization and			
	code generator generators.			
	Practical Con	mponent		
Practical 1	Design a lexical analyser for a	2	Understand the basics of	3
	simple programming language using		lexical analysis and the	
	LEX.		use of tools like LEX to	
			create lexical analysers.	
Practical 2	Implement a program to identify	2	Ability to recognize and	2
	different tokens, lexemes, and	_	classify tokens, lexemes,	_
	patterns in a given source code.		and patterns within a	
	Factorial and Section 1997		source code.	
Practical 3	Create a transition diagram for a	2	Comprehend the	2
1 Tucticui c	given regular expression and	_	conversion of regular	_
	simulate its working.		expressions to transition	
	Simulate its Westing.		diagrams and their usage	
			in lexical analysis.	
Practical 4	Write a recursive descent parser for	2	Develop and implement	3
Tachen 7	a given context-free grammar	_	top-down parsing	5
	(CFG).		techniques using recursive	
			descent methodology.	
Practical 5	Implement an SLR parser for a	2	Understand and apply	3
Tractical 3	specified grammar and test it with	_	bottom-up parsing	5
	various input strings.		techniques, specifically	
	rations input surings.		SLR parsing.	
Practical 6	Using YACC, create a parser for a	2	Gain practical experience	3
T Tactical U	small language and demonstrate its		with parser generators like	3
	usage with sample inputs.		YACC and their	
	usage with sample inputs.		I ACC and then	

			integration with lexical	
			analysers.	
Practical 7	Construct a dependency graph for a	2	Understand the	4
	given annotated parse tree and		relationship between parse	
	determine the order of attribute		trees and attribute	
	evaluation.		evaluation orders.	
Practical 8	Develop an attribute grammar for a	2	Understand and implement	3
	simple language construct and		syntax-directed translation	
	implement its evaluation using		using attribute grammars.	
	synthesized and inherited attributes.			
Practical 9	Write a type checker for a language	2	Implement type checking	3
	that includes basic types, type		mechanisms and	
	expressions, and type conversions.		understand type systems	
			and conversions.	
Practical 10	Simulate the activation record	2	Understand the structure	3
	creation and management for a		and management of	
	simple recursive function.		activation records in a	
			runtime environment.	
Practical 11	Implement intermediate code	2	Develop skills in	3
	generation for a given set of		generating intermediate	
	language constructs (e.g., if-else,		representations of high-	
	loops).		level language constructs.	
Practical 12	Create a symbol table management	2	Design and implement a	3
	system that handles scope and		symbol table for managing	
	lifetime of variables.		variable scopes and	
			lifetimes.	
Practical 13	Design and implement a basic block	2	Understand the concepts	3
	and flow graph generator for a given		of basic blocks and control	
	intermediate code.		flow graphs in code	
D 4: 144	D 1 : 1 1 ::	2	generation.	2
Practical 14	Develop a register allocation	2	Apply graph coloring	3
	algorithm using graph coloring		techniques for efficient	
	techniques.		register allocation during	
Practical 15	Implement a people on timization	2	code generation.	3
Fractical 15	Implement a peephole optimization technique for a given intermediate	2	Understand and apply optimization techniques at	3
	code and demonstrate its		the code generation level.	
	effectiveness.		the code generation level.	
	effectiveness.			

**T9:** A.V. Aho, R. Sethi, J.D. Ullman, "Compilers: Principles, Techniques and Tools", Addison – Wesley.

**T10:** Steven S. Muchnick, "Advanced Compiler Design and Implementation", Elsevier

# **REFERENCE BOOKS:**

R6: W. Appel, "Modern Compiler Implementation in C: Basic design", Cambridge Press

**R7:** Fraser and Hanson, "A Retargetable C Compiler: Design and Implementation", Addison-Wesley **R8:** Dhamdhere, "Compiler Construction", McMillan

#### OTHER LEARNING RESOURCES:

- 1. www.vssut.ac.in/lecture_notes/lecture1422914957.pdf
- 2. 2.http://csenote.weebly.com/principles-of-compiler-design.html
- 3. http://www.faadooengineers.com/threads/32857,Compiler-Design-Notes-full-book-pdf-download
- 4. https://www.vidyarthiplus.com/vp/thread,37033.html#.WF0PhlMrLD

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand different phases of a compiler and explain lexical analysis principles.	1,2,3,4,5,10,12						
2	Apply parsing techniques to build a language-specific syntax analyser.	1,2,3,4,5,10,12						
3	Analyse syntax-directed translations, evaluation order, and type checking.	1,2,3,4,5,10,12						
4	Understand the association of runtime storage allocation with control flow and procedure calls.	1,2,3,4,5,10,12						
5	Apply code optimization on intermediate code for target code generation.	1,2,3,4,5,10,12						

Course	Course	СО	PO	PO	PO	PO	PO	РО	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	2	1	2	2					2		3
	Compil	CO 2	3	3	3	3	2					2		3
22BTCS32 1R	er Design	3	3	3	3	3	2					2		3
		CO 4	3	1	2	2	2					2		3
		CO 5	3	3	3	3	2					2		3

		SEMESTER	R – VI									
<b>Course Title</b>		Comp	uter Ne	twor	ks							
Course code	22BTCS322R	Total credits: 4	L	T	P	S	R	O/F	С			
		Total hours: 45T+30P	3	0	2	0	0	0	4			
Pre-requisite	Programming	Co-requisite			I	L	inux		1			
	Skills											
Programme	Bachelor of Technology in Computer Science & Engineering											
Semester	Winter/ II semester of the third year of the program											
Course		the fundamentals of	data co	mmu	nicati	ons p	rincip	les of med	dia access,			
Objectives		ing and flow control.										
(Minimum 3)		the basics of network	_		_				_			
		with the TCP/IP prot							otocols.			
		write network-capable			_				.1 1 4			
		the structure of cli	ient-serv	er sy	stems	s and	be a	ble to bu	ilia ciient-			
CO1	Server program	s. sics of data comm	unicatio	n no	atwor1	zina	intor	net physic	ical lavor			
COI	techniques, and circ		umcano	11, 110	tworr	ang,	mien	ici, pilys	icai iayei			
CO2	_	ayer techniques, flow	control	and	error	nroto	cols					
CO3		<u> </u>				proto	<b>COI</b> 5.					
CO4	Analyse network layer protocols along with routing issues.  Summarize transport and application layer operations and protocols along with QoS											
	services.											
CO5	Design and execut	te computer network	k progra	ammi	ng pr	oject	s, sho	wcasing	advanced			
	skills in network application development.											
Unit-No.	Con	tent	Contac	t	Lea	rnin	g Out	come	BL			
			Hour						_			
I		networks, internet,	8		nders		the		2			
	^	andards, the OSI			-			uite, and				
	•	OSI model, TCP/IP			asic		oncept					
	suite, Addressin digital signals.	g, Analog and Physical Layer:			ddress	_	signa medi					
		on, multiplexing,		l u	ansm	1881011	i ilicui	a.				
	~	a, circuit switched										
		gram networks,										
	*	works, switch and										
	Telephone networ	•										
II	•	ntroduction, Block	8	L	earn	error	detec	tion and	2,3			
	-	codes, checksum,		C	orrect	ion	tec	chniques,				
	framing, flow a	nd error control,		fr	aming	g, and	l proto	cols like				
	Noiseless channel	s, noisy channels,		Н	DLC	and	point	-to-point				
	HDLC, point to po	oint protocols		p	rotoco	ols.						
TIT	Natwork Lover I	ogical addressing	10		lain In	noxv1	adas s	n logical	2.4			
III	_	ogical addressing,	10				tuge 0	n logical routing	2,4			
	internetworking, tunnelling, address addressing, routing mapping, ICMP, IGMP, forwarding, protocols, and address						•					
		rotocols, multicast					and hnique					
	routing protocols.	rotocois, municast		11	шррп	ig icc	mnqu					
	rouning protocols.											

TX7	Tuenchest I even Due eess to mucees	10	Communication	2.2
IV	Transport Layer: Process to process	10	Comprehend the	2,3
	delivery, UDP and TCP protocols,		fundamentals of process-	
	SCTP, data traffic, congestion,		to-process delivery,	
	congestion control, QoS, integrated		TCP/UDP protocols, and	
	services, differentiated services,		congestion control	
	QoS in switched networks.		mechanisms.	
V	Application Layer – Domain name	9	Understand domain name	2
•	space, DNS in internet, electronic		space, DNS operations,	_
	mail, FTP, WWW, HTTP, SNMP,		email protocols, FTP,	
	multi-media, network security		HTTP, and basics of	
	mutt-media, network security		network security.	
	<u> </u>		network security.	
Practical 1	Configure a simple network	2	Demonstrate the ability to	3
Fractical 1	_	<u> </u>	•	3
	consisting of multiple devices such		configure basic network	
	as routers, switches, and computers.		settings and troubleshoot	
	Test connectivity and troubleshoot		connectivity problems.	
D4: 12	any issues encountered.	2	Cain mark:	
Practical 2	Use network analysis tools like	2	Gain proficiency in	4
	Wireshark to capture and analyze		protocol analysis and	
	network traffic. Identify different		understanding of the OSI	
	protocols, their headers, and their		model layers.	
	roles in the OSI model.			
Practical 3	Use oscilloscopes or signal	2	Understand the	2
	analysers to examine analog and		fundamentals of analog	
	digital signals transmitted over the		and digital signals in	
	network. Interpret signal		networking and their	
	characteristics and identify any		analysis	
	anomalies.			
Practical 4	Implement a block coding technique	2	Gain hands-on experience	3
	such as Hamming codes to detect		in implementing error	
	and correct errors in transmitted data		detection and correction	
	frames. Analyse its effectiveness in		mechanisms in the data	
	error detection and correction.		link layer.	
Practical 5	Implement CRC error detection	2	Understand the theory and	3
	mechanism in a data link layer		practical implementation	
	protocol such as Ethernet. Calculate		of CRC for error detection.	
	CRC values for given data frames			
	and verify error detection capability.			
Practical 6	Implement and analyze flow control	2	Understand the concepts	4
	mechanisms such as Stop-and-Wait		of flow control and error	
	and Sliding Window protocols.		control in data link layer	
	Measure throughput and efficiency		protocols.	
	under different network conditions.			
Practical 7	Configure IP addresses using both	2	Demonstrate proficiency	3
	IPv4 and IPv6 addressing schemes		in configuring logical	
	for a network topology. Verify		addresses	
	connectivity and troubleshoot		andunderstanding IP	
	addressing conflicts.		addressing schemes.	

Practical 8	Implement and compare different routing protocols such as RIP, OSPF, and BGP in a simulated network environment. Analyze routing tables and convergence times.	2	Understand the operation of routing protocols and their impact on network performance.	4
Practical 9	Configure Address Resolution Protocol (ARP) and Neighbor Discovery Protocol (NDP) for mapping network layer addresses to data link layer addresses. Verify mappings and troubleshoot resolution issues.	2	Gain practical experience in address resolution and mapping techniques.	3
Practical 10	Capture and analyse UDP and TCP traffic using packet analysis tools. Compare their characteristics, such as connection establishment, reliability, and overhead.	2	Understand the differences between UDP and TCP protocols and their suitability for different applications.	4
Practical 11	Configure QoS mechanisms such as traffic prioritization, traffic shaping, and congestion management in a network. Measure and analyze QoS metrics under different traffic loads.	2	Understand the importance of QoS in ensuring reliable and efficient network performance.	5
Practical 12	Implement and evaluate congestion control algorithms such as TCP's congestion avoidance and congestion control mechanisms.  Measure throughput and packet loss under congested conditions.	2	Gain practical insights into congestion control mechanisms and their impact on network performance.	4
Practical 13	Configure and troubleshoot DNS servers and clients. Analyze DNS queries and responses using network diagnostic tools.	2	Understand the operation of DNS and its role in translating domain names to IP addresses.	3
Practical 14	Set up email servers (SMTP, IMAP) and FTP servers. Demonstrate the exchange of emails and file transfers between clients and servers. Implement security measures such as encryption and authentication.	2	Gain practical experience in configuring and securing email and FTP services.	3
Practical 15	Deploy web servers (HTTP, HTTPS) and web applications. Implement security measures such as SSL/TLS encryption, HTTPS, and web application firewalls to protect against common attacks.	2	Understand the principles of web service security and implement security measures to protect against threats.	3

**T11:** Data Communications and Networking–Behrouz A. Forouzan, Fourth EditionTMH,2006.

**T12:** Computer Networks—Andrew S Tanenbaum, 4th Edition, Pearson Education.

#### **REFERENCE BOOKS:**

R9: An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education

**R10:** Understandingcommunications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.

**R11:** Computer and Communication Networks, Nader F. Mir, Pearson Education

**R12:** Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross,3rd Edition, Pearson Education.

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the basics of data communication, networking, internet, physical layer techniques, and circuit switching.	1,2,3,4,5,12
2	Analyze data link layer techniques, flow control, and error protocols.	1,2,3,4,5,12
3	Analyse network layer protocols along with routing issues.	1,2,3,4,5,12
4	Summarize transport and application layer operations and protocols along with QoS services.	1,2,3,4,5,12
5	Design and execute computer network programming projects, showcasing advanced skills in network application development.	1,2,3,4,5,12

Course code	Course Name	СО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P O 11	P O 12
		CO 1	3	1	2	1	1							3
	Comput	CO 2	3	2	3	1	1							3
22BTCS32 2R	er Network s	3	3	2	3	1	1							3
		CO 4	3	2	3	1	2							3
		CO 5	3	3	3	3	2					1		3

		SEMESTER	– VI									
Course Title		Professional Ele	ective-	II: Da	ata Mi	ning						
Course code	22BTCS317R	Total credits: 3	L	T	P	$\overline{\mathbf{S}}$	R	O/F	C			
004180 0040		Total hours: 45T	3	0	0	0	0	0	3			
Pre-requisite	Basic	Co-requisite	1			N	IL					
•	Programming	•										
	Skills											
Programme	Bachelo	Bachelor of Technology in Computer Science & Engineering										
Semester		Winter/ II semester of the third year of the program										
Course	1. Learn the basics of data mining, including its applications, challenges, and											
Objectives	various type	s of data attributes.										
(Minimum 3)	2. Gain profici	ency in association ru	ule mir	ing t	echniq	ues, s	uch a	as freque	nt itemse			
	generation a	nd association rule ex	xtractio	n alge	orithm	S.		_				
	3. Study cluste	ering, prediction, and	d classi	ficati	on me	ethods	, inc	luding al	gorithms			
	evaluation m	netrics, and ensemble	metho	ds.								
CO1	Understand diverse	real-life data, mast	tering	statis	tical f	ounda	ations	s, and ic	dentifying			
	challenges in data m	ining.										
CO2	Utilize Association	Rule Mining to	addre	ss p	ractica	ıl pro	oblen	ns, dem	onstrating			
	understanding and pr	roficiency in applicat	ion.									
CO3	Apply Cluster analy	pply Cluster analysis in unsupervised learning to real-world datasets, showcasing										
	competence in data of	clustering techniques.	•									
CO4	Implement popular	methodologies for	predi	ction	using	g Dat	ta M	lining te	chniques			
	demonstrating practi	cal application skills.	•									
CO5	Apply Classification techniques in supervised learning for Machine Learning											
	applications, showca	pplications, showcasing proficiency in categorizing and classifying data.										
Unit-No.	Cont	ent (	Contac	t	Lear	rning	Outo	come	BL			
			Hour									
I	Introduction to Da	O	8		nderst			_	2			
	What is data mining				oncepts							
	data mining, issues	-			tribute							
	faced in data minii	0 11		st	atistica	al desc	cripti	ons.				
	attributes – nomina	l, binary, ordinal,										
	l	-										
Ĩ	numeric, discrete	and continuous,										
	basic statistical des	and continuous, scriptions of data										
	basic statistical des - measures of cent	and continuous, scriptions of data ral tendency and										
	basic statistical des  – measures of cent dispersion, major t	and continuous, scriptions of data ral tendency and										
	basic statistical des  – measures of cent dispersion, major t processing	and continuous, scriptions of data ral tendency and asks in data pre-	0				0					
п	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M	and continuous, scriptions of data ral tendency and asks in data pre-	8		ompre		_	ent	2,3			
п	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset,	8	ite	emset	genera	ation		2,3			
II	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed	8	ite al	emset gorith	genera ms lik	ation e Ap	riori,	2,3			
п	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent frequent itemset, a	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules,	8	ite al D	emset gorith	genera ms lik d FP-	ation te Ap		2,3			
II	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent frequent itemset, a Frequent itemset	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules, generation —	8	ite al D as	emset gorithmeters and gorithmeters and gorient and go	genera ms lik d FP-a ion ru	ation te Ap	riori,	2,3			
II	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent frequent itemset, a Frequent itemset Apriori algorithm,	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules, generation –  DIC algorithm	8	ite al D as	emset gorith	genera ms lik d FP-a ion ru	ation te Ap	riori,	2,3			
II	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent frequent itemset, a Frequent itemset Apriori algorithm, and FP-growtl	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules, generation — DIC algorithm algorithm,	8	ite al D as	emset gorithmeters and gorithmeters and gorient and go	genera ms lik d FP-a ion ru	ation te Ap	riori,	2,3			
II	basic statistical des  — measures of cent dispersion, major t processing  Association Rule M Definitions of fi maximal frequent frequent itemset, a Frequent itemset Apriori algorithm, and FP-growtl Generating associa	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules, generation — DIC algorithm algorithm,	8	ite al D as	emset gorithmeters and gorithmeters and gorient and go	genera ms lik d FP-a ion ru	ation te Ap	riori,	2,3			
III	basic statistical des  – measures of cent dispersion, major t processing  Association Rule M Definitions of fr maximal frequent frequent itemset, a Frequent itemset Apriori algorithm, and FP-growtl	and continuous, scriptions of data ral tendency and asks in data pre-  Mining: requent itemset, itemset, closed association rules, generation — DIC algorithm algorithm,	8	ite al D as ge	emset gorithmeters and gorithmeters and gorient and go	genera ms lik d FP-a ion ru on.	ation te Ap grow	riori, th, and	2,3			

	what is cluster analysis, need for cluster analysis, data matrix, dissimilarity matrix, proximity and dissimilarity measures for different data attribute types, partitioning based clustering methods, density-based clustering methods and hierarchical clustering methods, measuring cluster quality		concepts, dissimilarity measures, and various clustering methods including partitioning, density-based, and hierarchical.	
IV	Prediction: What is prediction, application areas of prediction, Simple linear regression, Multiple linear regression, Predictor Error measures, Common techniques for assessing accuracy – holdout, random sampling, cross-validation, bootstrap	10	Understand prediction concepts, regression techniques, predictor error measures, and methods for assessing accuracy.	2,3
V	Classification: what is classification, differences between classification and prediction, applications of classification, Some classification algorithms - Decision Trees, Naïve Bayes Classification, Logistic Regression and K-nearest Neighbour Classification, Confusion matrix and metrics for evaluating classifier performance, Overview of ensemble methods — Bagging and Boosting, Ensemble- based classifier - Random Forest	9	Understand classification vs. prediction, classification algorithms like decision trees, Naïve Bayes, logistic regression, and evaluation metrics.	2,4

**T13:** Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, India

T14: AK Pujari, Data Mining Techniques, University Press, India

#### **REFERENCE BOOKS:**

R13: Han, Manilla and Smyth, Principles of Data Mining, PHI, India

R14: Tan, Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc.

# OTHER LEARNING RESOURCES:

- 1. https://www.geeksforgeeks.org/data-mining/
- 2. https://www.javatpoint.com/data-mining
- 3. https://www.tutorialspoint.com/data_mining/index.htm

CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand diverse real-life data, mastering statistical foundations, and identifying challenges in data mining.	1,2,3,4,10,12					
2	Utilize Association Rule Mining to address practical problems, demonstrating understanding and proficiency in application.	1,2,3,4,10,12					
3	Apply Cluster analysis in unsupervised learning to real-world datasets, showcasing competence in data clustering techniques.	1,2,3,4,5,10,12					
4	Implement popular methodologies for prediction using Data Mining techniques, demonstrating practical application skills.	1,2,3,4,10,12					
5	Apply Classification techniques in supervised learning for Machine Learning applications, showcasing proficiency in categorizing and classifying data.	1,2,3,4,5,10,12					

Course	Cours	CO	PO	PO	PO	PO	PO	РО	РО	PO	PO	PO1	PO1	PO1
code	e		1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO 1	2	2	1	3						1		2
22BTCS31 7R	Data	CO 2	2	2	1	3						1		2
	Minin g	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	- VI						
<b>Course Title</b>		<b>Professional Electiv</b>	ve-II: A	rtific	cial In	tellig	ence		
Course code	22BTCS317R	<b>Total credits: 3</b>	L	T	P	S	R	O/F	C
		Total hours: 45T	3	0	0	0	0	0	3
Pre-requisite	Basic	Co-requisite				N	NIL		
	Programming								
	Skills, Data								
	structures								
Programme		or of Technology in							
Semester		inter/ II semester of							
Course		e field of AI and its	subfield	ls ma	achine	learr	ning, l	VLP and	computer
Objectives	vision								
(Minimum 3)		implement key NLP	•						•
		entiment classifiers,		guag	e tran	siatoi	s, to	solve a v	ariety of
	~	uage understanding to		omn	utor 1	Vicio	n Invo	stigata r	al morld
	-	ractical Applications of computer vision i		_				-	
		e systems, medical im					-		vennenes,
CO1		erstand relevance of A					curry.		
CO2		Machine Learning app					robler	n.	
CO3		anding deep learning	•			Г			
CO4		data by applying vari	•			ing al	gorith	ms.	
CO5		olving abilities with I							
Unit-No.	Con	tent	Contact	t	Lea	rning	g Outo	come	BL
			Hour				,		
I	Introduction	to Artificial	8	U	Inders	tand	the t	ypes of	2,4,5
	Intelligence: Overv	view of Artificial		A	I, the	mair	n focu	s of AI,	
	Intelligence (AI),	Machine Learning		p	ractica	al	appl	ications,	
	(ML), and Deep				omput	-		eras,	
	Natural Langua	-			etermi			vs.	
	(NLP), Computer	Vision.	probabilistic systems, and						
				_			-		
	Describe the type	es of AI,Explain		_	robabi ne roac		-		
	what the main foc	es of AI,Explain us of AI is,List of		_			-		
	what the main foc practical application	es of AI,Explain us of AI is,List of ons of AI,Describe		_			-		
	what the main foc practical application the eras of comp	es of AI,Explain us of AI is,List of ons of AI,Describe uting,Explain the		_			-		
	what the main foc practical application the eras of comp difference between	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic		_			-		
	what the main foc practical application the eras of comp difference betwee and probabilistic	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic		_			-		
п	what the main foc practical application the eras of comp difference betwee and probabilistic Map of AI.	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road	e	th	ne roac	d map	of Al	Ι.	2.2
II	what the main foc practical application the eras of comp difference betwee and probabilistic Map of AI.	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic	8	th	roac	d map	of Al	epts of	2,3
II	what the main foc practical application the eras of comp difference betwee and probabilistic Map of AI. Introduction Learning:	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road  to Machine	8	th G	rasp upervi	the sed	conc	epts of and	2,3
II	what the main foc practical application the eras of comp difference between and probabilistic Map of AI.  Introduction Learning: Introduction to M	es of AI,Explain us of AI is,List of ons of AI,Describe uting,Explain the en deterministic systems, Road  to Machine  Iachine Learning,	8	G st	rasp upervi	the sed	conc	epts of and ing, and	2,3
II	what the main foc practical application the eras of comp difference between and probabilistic Map of AI.  Introduction Learning: Introduction to Management of Management	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road  to Machine  Iachine Learning, Learning &	8	G su u	rasp ipervi nsuper	the sed rvised	conc	epts of and ing, and	2,3
П	what the main foc practical application the eras of comp difference between and probabilistic Map of AI.  Introduction Learning: Introduction to Management of Management	es of AI,Explain us of AI is,List of ons of AI,Describe uting,Explain the en deterministic systems, Road  to Machine  Iachine Learning, Learning & rning. Supervised	8	G su u:	Grasp Lipervi Insuper Inderst Inderst	the sed rvised and a suj	conc	epts of and and aplement ed and	2,3
II	what the main foc practical application the eras of comp difference between and probabilistic Map of AI.  Introduction Learning: Introduction to Management of Management	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road  to Machine  Iachine Learning, Learning & rning. Supervised rithms: Linear	8	th th	rasp upervi nsuper nderst arious	the sed rvised and a sup	conc	epts of and ing, and	2,3
П	what the main foc practical application the eras of computification difference between and probabilistic Map of AI.  Introduction Learning: Introduction to Management of	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road  to Machine  Iachine Learning, Learning & rning. Supervised rithms: Linear istic Regression,	8	th th	Grasp Lipervi Insuper Inderst Inderst	the sed rvised and a sup	conc	epts of and and aplement ed and	2,3
II	what the main foc practical application the eras of comp difference between and probabilistic Map of AI.  Introduction Learning: Introduction to Management of Management	es of AI,Explain us of AI is,List of ons of AI,Describe outing,Explain the en deterministic systems, Road  to Machine  Iachine Learning, Learning & rning. Supervised rithms: Linear istic Regression, Iachine, Decision	8	th th	rasp upervi nsuper nderst arious	the sed rvised and a sup	conc	epts of and and aplement ed and	2,3

	Unsupervised Learning Algorithms: K-Means Clustering, Hierarchical Clustering.			
III	Introduction to Deep Learning: Introduction to Deep Learning: Neural Networks, Layers, and Activation Functions, Back Propagation, Optimizers, Deep Learning Algorithm: ANN, CNN, RNN, LSTM with Tensor flow and Keras, Introduction to Autoencoders, Generative Adversarial Networks (GANs), Restricted Boltzmann Machines (RBMs) and Applications.	10	Understand the basics of neural networks, activation functions, backpropagation, and deep learning algorithms like ANN, CNN, RNN, LSTM, GANs, and RBMs.	2,3
IV	Introduction to Natural Language Processing and Computer Vision: Introduction to Natural Language Processing, NLP application in real world, components of NLP, Vartual Agents overview, Chatbot and its parts, Tokenization, Stemming & Lemmatization in NLP, BagofWords,TF-IDF,Word2Vec, Word Embedding in NLP. Introduction to Computer Vision, Image Classification and Object Recognition, Feature Detection and Description algorithms with Open CV.	10	Understand the components and applications of NLP, and grasp the basics of computer vision, image classification, and object recognition.	2,3
V	Evolution from DeepQA to Watson services on IBM Cloud: Explain the DeepQA architecture was;Explain why IBM decided to commercialize Watson and Describe the evolution of Watson services from the original DeepQA architecture to the present. Introduction to IBM Watson: explore Watson Studio, IBM's integrated environment for data scientists, developers, and domain experts, to build and deploy ML models.	9	Understand the evolution of Watson services from DeepQA architecture, explore IBM Watson services, and create chatbots using Watson Assistant.	2,3

Creating Chatbots using Watson	
Assistant: learn the basics of Watson	
Assistant, including intents, entities,	
dialog flows, and integration	
capabilities.	
Natural Language Understanding	
(NLU), Language Translator, Text	
to Speech, Speech to Text on IBM	
Cloud.	

T15: Introduction to Data Science: B.UmaMaheswari& R. Sujata.

**T16:** Deep Learning with TensorFlow and Keras by Amita Kapoor, Antonio Gulli& Sujit pal.

**T17:** Artificial Intelligence by Stuart J. Russell & Peter Norvig.

**T18:** Hands-On Artificial Intelligence for IBM Watson: Explore the Power of AI to Innovate and Transform Business Processes" by Dr. Harish Garg.

#### **REFERENCE BOOKS:**

**R15:** Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence" by Jon Krohn, Grant Beyleveld, and AglaéBassens.

**R16:** Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth.

**R17:** Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: AurelienGeron.

#### OTHER LEARNING RESOURCES:

Python & Machine Learning -https://www.w3schools.com/python/python_ml_getting_started.asp

- 1. AI with IBM https://developer.ibm.com/technologies/artificial-intelligence/
- 2. IBM Cloud https://cloud.ibm.com/docs

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Remember and understand relevance of AI in today's world.	1,2,3,4,10,12					
2	Gain an idea about Machine Learning application in real world problem.	1,2,3,4,10,12					
3	Develop an understanding deep learning concept in AI.	1,2,3,4,5,10,12					

4	Apply and Analyze data by applying various machine learning algorithms.	1,2,3,4,10,12
5	Enhance problem-solving abilities with IBM Cloud service.	1,2,3,4,5,10,12

Course code	Course	CO	PO	P	P	P								
	Name		1	2	3	4	5	6	7	8	9	О	О	О
												10	11	12
		CO 1	2	2	1	3						1		2
22BTCS317	Artificial	CO 2	2	2	1	3						1		2
R	Intelligen ce	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	– VI						
<b>Course Title</b>		PE-III: M	achin	e Lea	rning				
Course code	22BTCS318R	Total credits: 3	L T P S R O/F C						С
		Total hours: 45T	3	0	0	0	0	0	3
Pre-requisite	Basic	Co-requisite		•	•	1	NIL		
	Programming								
	Skills								
Programme	Bache	lor of Technology in	Comp	uter S	Scien	ce & 1	Engin	eering	
Semester	W	inter/ II semester of	the thi	ird ye	ar of	the p	rogra	ım	
Course	1. To provide fundamental theoretical foundations knowledge of various learning								
Objectives	algorithms								
(Minimum 3)	2. Apply suit	able machine learning	g techi	niques	for	data 1	nandli	ng and k	nowledge
	extraction								
	3. To gain th	e fundamental knowle	edge a	nd un	derst	and th	ne cor	ntext of si	upervised
	and unsupe	rvised learning throug	h real-	life ex	kampl	es.			
CO1	Recognize the char	acteristics of machine	learnir	ıg stra	tegie	S			
CO2	Demonstrate profi	ciency in data analy	tics a	nd aj	pply	advar	nced	tools to	work on
	dimensionality redu	ction and mathematic	al opei	ations	S.				
CO3	Analyze and Apply	the suitable supervis	ed lear	rning	and u	nsupe	ervise	d learning	methods
	for real-world prob	world problems and for handling unknown patterns.							
CO4	Understand the con	cept of ensemble learr	ing an	d its a	pplic	ations	S.		
CO5	Evaluate the perfor	mance of various algo-	rithms						

Unit-No.	Content	Contact	Learning Outcome	BL
		Hour		
I	IntroductiontoMachineLearning	8	Understand the concept of	2
	WhatisMachineLearning?,Typesof		machine learning, its types	
	Machine Learning:		(supervised, unsupervised,	
	Supervised, Unsupervised, and Reinf		reinforcement learning),	
	orcementLearning,ApplicationsofM		and applications in various	
	achineLearningin Various Fields.		fields.	
II	Data Preprocessing and	8	Gain skills in data	2,3
	Exploratory DataAnalysis		collection, cleaning,	
	DataCollectionandCleaning,Handli		handling missing values,	
	ngMissingValues,FeatureScalingan		feature scaling,	
	dNormalization,DataVisualizationT		normalization, and	
	echniques,ExploratoryDataAnalysis		visualization techniques	
	(EDA),statisticalmeasures,Basictoo		for exploratory data	
	ls(plots,graphsandsummarystatistic		analysis (EDA).	
	s)of EDA.			
III	SupervisedLearningandUnsuper	10	Learn various supervised	2,4
	visedLearning		and unsupervised learning	
	LinearandNon-Linearexamples-		algorithms including linear	
	Multi-Class & Multi-Label		regression, decision trees,	
	Support, Clustering basics (Partitione		k-NN, logistic regression,	
	d,HierarchicalandDensitybased)-K-		clustering basics, and	
	Meanslustering-KModeclustering-		principal component	

	Self organizing maps,		analysis.	
	Expectationmaximization –			
	Principalomponent Analysis			
IV	EnsembleLearning	10	Understand ensemble	2,3
	Bagging-		learning techniques such	
	CommitteeMachinesandStacking-		as bagging, boosting,	
	Boosting-Ranking		stacking, and ranking-	
			based aggregation for	
			improving model	
			performance.	
V	ModelEvaluationandOptimizatio	9	Learn model validation	2,5
	n		techniques including	
	ModelValidationTechniques:Train/		train/test split, cross-	
	TestSplit,Cross-		validation, and	
	Validation,PerformanceMetrics,Co		performance metrics like	
	nfusionMatrix,Accuracy,Precision,		confusion matrix,	
	Recall, F1-Score		accuracy, precision, recall,	
			and F1-score.	

**T19:** T1 S. Shalev-Shwartz, S.Ben-David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge University Press, 2014.

**T20:** T2 EthemAlpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India,

#### **REFERENCE BOOKS:**

**R18:** MehryarMohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning", MIT Press, 2nd Edition, 2018.

R19: Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997...

**R20:** Data Mining: Concepts and Techniques", Third Edition, 2 Jiawei Han, Micheline Kamber and Jian Pei, ISBN 0123814790,(2011).

**R21:** Duda, Richard, Peter Hart, and David Stork, "Pattern Classification," 2 nd Edition, John Wiley & Sons, Hoboken, 2000.

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Recognize the characteristics of machine learning strategies	1,2,3,4,10,12				

2	Demonstrate proficiency in data analytics and apply advanced	1,2,3,4,10,12
	tools to work on dimensionality reduction and mathematical	
	operations.	
3	Analyze and Apply the suitable supervised learning and unsupervised learning methods for real-world problems and for handling unknown patterns.	1,2,3,4,5,10,12
4	Understand the concept of ensemble learning and its applications.	1,2,3,4,10,12
5	Evaluate the performance of various algorithms.	1,2,3,4,5,10,12

Course code	Course	CO	PO	PO	РО	РО	PO	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	Ο	О	О
												10	11	12
		CO 1	2	2	1	3						1		2
22BTCS318 R	<b>Machin</b>	CO 2	2	2	1	3						1		2
	Learnin	Co3	3	3	3	3	3					1		3
	g	CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	-VI							
<b>Course Title</b>		PE-III: B	ig Data	a Ana	lytics					
Course code	22BTCS318R	<b>Total credits: 3</b>	L	T	P	S	R	O/F	C	
		Total hours: 45T	3	0	0	0	0	0	3	
Pre-requisite	DBMS	Co-requisite				1	NIL			
Programme	Bachelor of Technology in Computer Science & Engineering									
Semester	Winter/ II semester of the third year of the program									
Course		4. Gain foundational knowledge of Big Data, including its characteristics,								
Objectives	technologies, and real-world applications across various domains.									
(Minimum 3)		5. Learn the architecture and components of Hadoop and Spark, and develop								
	_	practical skills in data ingestion, processing, and management.								
	_	6. Develop the ability to perform analytics on Big Data, apply machine learning techniques, and utilize visualization tools for insightful data representation.								
G01	_							_		
CO1		acteristics and real-w	orld ap	plicat	tions c	of Big	Data	, different	iating it	
002	from traditional dat		1 C	1			. 1	. 1 .		
CO2		e of Hadoop and Spar	k frame	ework	is by e	xecu	ing ba	asic data j	processing	
CO3	tasks.	re various NoSQL da	to <b>b</b> ooos	and t	haina	vitabi	1:4v. f.	a difforman	t trmes of	
003	Big Data storage re-	-	tabases	ana	men s	unaoi	my ic	or differen	it types of	
CO4		ata preprocessing tech	าทเสมอง	and	machi	ne le	rnino	tools for	effective	
C04	Big Data analytics.	ata preprocessing teer	imques	and	macm	ne ie	arming	toois ioi	effective	
CO5		Big Data analytics pip	eline 11	sing c	·loud-l	hased	solut	ions and e	ncuring	
005	data security and pr		cinic u	sing C	nouu-i	Jasea	Solut	ions and c	Ansuring	
Unit-No.		•	Contact Learn			rning	o Out	BL		
			Hour				<b>,</b>			
I	Introduction to B	ig Data:	8	U	Inders	tand	the d	efinition,	2,4	
	Overview of Big	Data: Definition		c	haract	eristi	es, a	nd real-		
	and characteristic	es of Big Data		W	orld a	applio	cation	s of Big		
	1	ocity, Variety,			oata,		well	as the		
	-	alue), Differences			echnol	•		and		
		al data and Big		c	hallen	ges a	ssocia	ated with		
	Data.			it	•					
	_	ne Real World:								
		various domains								
		e, social media, e-								
	•	Case studies of Big								
	Data applications.	and an Indian American								
	_	ogies: Introduction								
	•	erview (e.g.,								
	MongoDB, Cassar	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \								
		ges: Data storage								
	_	ssues, Privacy and								
	ethical considerati	*								
		ources: Structured								
		data, Data from								
		nedia, and other								
	digital platforms.	,								
									246	

II	<b>Big Data Processing Frameworks:</b>	8	Grasp the fundamentals of	2,3
11	Hadoop Fundamentals: Architecture	0	Hadoop ecosystem,	2,5
	of Hadoop, Hadoop Distributed File		including HDFS,	
	System (HDFS), MapReduce		MapReduce, and related	
	programming model.		tools, as well as Spark	
	Hadoop Ecosystem Components:		framework and its	
	Introduction to Pig, Hive, HBase,		comparison with Hadoop.	
	and other related tools, Use cases		comparison with fradoop.	
	and applications of each component.			
	•			
	Data Ingestion Tools: Overview of			
	Sqoop and Flume, Real-time data			
	processing with Apache Kafka.			
	Spark Framework: Introduction to			
	Apache Spark, Spark vs. Hadoop			
	MapReduce, Spark RDDs (Resilient			
	Distributed Datasets).			
	Hands-On Exercises: Basic HDFS			
	commands, Writing and running a			
	simple MapReduce program.			
III	Data Storage and Management:	10	Gain knowledge of	2,3
	NoSQL Databases: Types of NoSQL		NoSQL databases,	
	databases: Document, Key-Value,		focusing on MongoDB,	
	Column Family, Graph, CAP		Cassandra, HBase, and	
	theorem and BASE properties.		Big Data warehousing	
	MongoDB: Features and		solutions, and their	
	architecture of MongoDB, CRUD		features, architecture, and	
	operations in MongoDB, Indexing		operations.	
	and aggregation.			
	Cassandra: Features and architecture			
	of Cassandra, Data modeling in			
	Cassandra, Querying in Cassandra			
	using CQL.			
	HBase: Introduction to HBase and			
	its architecture, HBase data model			
	and operations, Integration of HBase			
	with Hadoop.			
	Data Warehousing Solutions:			
	Introduction to Big Data			
	warehousing solutions like Amazon			
	Redshift and Google BigQuery.			
IV	Big Data Analytics and Tools:	10	Understand the importance	2,3,5
	Introduction to Big Data Analytics:		of analytics in Big Data,	
	Importance of analytics in Big Data,		pre-processing techniques,	
	Types of analytics: Descriptive,		machine learning	
	Diagnostic, Predictive, Prescriptive.		algorithms, and data	
	Data Pre-processing Techniques:		visualization tools.	
	Data cleaning, transformation, and			
	reduction, Handling missing data			
	and outliers.			
	Machine Learning with Big Data:			
	J . 6		1	

	Overview of machine learning algorithms used in Big Data, Introduction to scalable machine learning tools like MLlib.  Big Data Visualization: Importance of data visualization, Tools for Big Data visualization (e.g., Tableau, D3.js).			
V	Advanced Topics in Big Data Analytics: Real-Time Big Data Analytics: Stream processing with Apache Storm and Spark Streaming, Real- time data pipelines and architectures. Big Data Security and Privacy: Security challenges in Big Data, Techniques and tools for securing Big Data, Cloud-Based Big Data Solutions: Overview of Big Data solutions on AWS, Azure, and Google Cloud, Case studies on cloud-based Big Data implementations. Future Trends in Big Data: Emerging technologies and trends in Big Data, The impact of AI and IoT on Big Data.	9	Explore real-time Big Data analytics, security and privacy challenges, cloud-based Big Data solutions, and future trends in Big Data technologies.	2,4,5

- **T21:** "Big Data: Principles and Best Practices of Scalable Realtime Data Systems" by Nathan Marz, James Warren, Manning Publications.
- **T22:** "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost, Tom Fawcett, O'Reilly Media
- **T23:** "Big Data: A Revolution That Will Transform How We Live, Work, and Think" by Viktor Mayer-Schönberger, Kenneth Cukier, Eamon Dolan/Mariner Books.

#### **REFERENCE BOOKS:**

- **R22:** "Hadoop: The Definitive Guide" by Tom White, O'Reilly Media.
- **R23:** "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems" by Martin Kleppmann, O'Reilly Media.
- **R24:** "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" by Pramod J. Sadalage, Martin Fowler, Addison-Wesley.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the characteristics and real-world applications of	1,2,3,4,10,12						
	Big Data, differentiating it from traditional data.							
2	Demonstrate the use of Hadoop and Spark frameworks by	1,2,3,4,10,12						
	executing basic data processing tasks.							
3	Analyze and compare various NoSQL databases and their	1,2,3,4,5,10,12						
	suitability for different types of Big Data storage requirements.							
4	Evaluate different data preprocessing techniques and machine	1,2,3,4,10,12						
	learning tools for effective Big Data analytics.							
5	Design a real-time Big Data analytics pipeline using cloud-	1,2,3,4,5,10,12						
	based solutions and ensuring data security and privacy.							

Course code	Course	СО	PO	PO	PO	PO	РО	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	О	О	О
												10	11	12
	Big	CO 1	2	2	1	3						1		2
22BTCS318 R	Data Analytic s	CO 2	2	2	1	3						1		2
		CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	R – VI							
<b>Course Title</b>			Project	I						
Course code	22BTCS323R	Total credits: 4	L	T	P	S	R	O/F	C	
		Total hours: 120F	0	0	8	0	0	0	4	
Pre-requisite	NIL	Co-requisite					NIL			
Programme		lor of Technology i								
Semester		inter/ II semester o		•						
Course		vanced technical ski	ills throug	gh in	divid	ual o	r grou	p project	work in	
Objectives	engineering									
(Minimum 3)		2. Enhance project management abilities, including workload management and meeting project deadlines effectively.								
		•	-		****	ntotic		مناطييم		
		esentation skills thro ions of project outco	-	mar	prese	manc	ons and	a public		
CO1		to solve real-world		,						
CO2		lex projects as a tear	_							
CO2	_	g languages and plat			elon s	oftws	are and	l hardwa	re solutions	
		nal and team manage			_				10 bolumons.	
CO5	-	ility skills and profe						F		
Unit-No.		tent	Contact				g Out	BL		
			Hour							
I	This course will be	e conducted	120	D	emor	ıstrat	e prof	iciency	2,3,4,5,6	
	largely as an indiv	idual or small		ir	n con	ductii	ng lite	rature		
	group project unde	er the direct		reviews, performing						
	supervision of a m			te	echnic	cal w	ork,			
	academic staff. Th					_	g progr			
	topic undertaken v				_		ivering			
	common interests	•				_	reparii	_		
	the student(s) and	•				•	rts, an			
	Students will be re	equired to:					oroject			
	1. Perform a	literature search		0	utcon	iles ei	ffectiv	ery.		
		current knowledge								
		opments in the								
	chosen tec	chnical area;								
	2. Undertake	detailed technical								
	work in th	e chosen area								
	using one	or more of:								
	a.	theoretical								
	stı	udies								
	b.	computer								
		mulations								
	c.	hardware onstruction;								
	3. Produce p	rogress reports or								
	maintain a	professional								
	journal to	establish work								

completed, and to schedule additional work within the time frame specified for the project;
4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;
5. Prepare a formal report describing the work undertaken and results obtained so far; and
6. Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

#### **REFERENCE BOOKS:**

R25: "The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams

**R26:** "Doing Your Research Project: A Guide for First-Time Researchers" by Judith Bell and Stephen Waters

**R27:** "How to Write a Thesis" by Umberto Eco

**R28:** "Effective Project Management: Traditional, Agile, Extreme" by Robert K. Wysocki

**R29:** "Writing for Computer Science" by Justin Zobel

**R30:** "The Elements of Style" by William Strunk Jr. and E.B. White

**R31:** "Python Crash Course" by Eric Matthes (if applicable for coding projects)

**R32:** "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett (if applicable for data science projects).

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply IT principles to solve real-world problems.	1,2,3,4,5,6,7,8,9,10,11,12
2	Contribute to complex projects as a team member.	1,2,3,4,5,6,7,8,9,10,11,12

3	Apply programming languages and platforms to develop software and hardware solutions.	1,2,3,4,5,6,7,8,9,10,11,12
4	Demonstrate personal and team management skills in software development.	1,2,3,4,5,6,7,8,9,10,11,12
5	Cultivate employability skills and professionalism commitment.	1,2,3,4,5,6,7,8,9,10,11,12

Course code	Cours	CO	PO	PO1	PO1	PO1								
	e		1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO 1	3	3	2	3	2	1	1	2	3	2	2	3
22BTCS32 3R		CO 2	3	3	3	3	2	1	1	2	3	2	2	3
	Proje ct	CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		CO 5	3	3	3	3	3	1	3	2	3	3	2	3

		SEMESTER -	VI						
<b>Course Title</b>		Techno Prof		Skil	ls V				
Course code		tal credits: 1	L	T	P	S	R	O/F	C
		tal hours: 30P	0	0	2	0	0	0	1
Pre-requisite	NIL	Co-requisite					NII		
Programme		Technology in C							
Semester		II semester of th				_	_		
Course	To reinforce fund		Science	2 & I	Engi	neer	ing co	oncepts e	ensuring a
Objectives	strong foundation	_							
(Minimum	2. To enhance probl	-							
3)	3. To foster critical	thinking and creati	vity, pro	omot	ıng a	analy	/tıcal	and rese	earch
601	abilities.	11 11 11						1 1	1 1 1/1
CO1	Develop highly skilled a	-	manage	emer	it pr	ores	sıona	i wno ca	an deal with
CO2	various areas and aspects			ont n	mo fo	aaia	n o 1 vv	h	2 22 242
CO2	Develop analytical and re efficient and innovative in		ianagem	բու բ	1016	8810	nai w	no can o	e more
CO3	Gather knowledge about		nt conce	nte e	and t	ha tl	aorie	e of day	alonment
CO4	Encourage the students to					iic ti	icoric	is of dev	сторинент.
CO5	Effectively communicate					in a	profe	essional i	manner
Unit-No.	Content	Contact					ıtcon		BL
Omt-140.	Content	Hour		LCai	11111	g O	itton	ıc	
I	C Programming, Data	6	Develo	on ni	ofic	ienc	v in		2,3
_	Structure and		impler				-	s and	_,_
	Algorithms.		data st		_	_		, <b>4114</b>	
			progra						
			enhan		-	_	-	ing	
			skills.	Ū	•			C	
II	Analog and Digita	1 6	Gain t	ındeı	stan	ding	g of a	nalog	2,4
	Electronic Circuits.		and di	gital	elec	tron	ic cir	cuits,	
			their d	esig	n pri	ncip	les, a	nd	
			practio	cal a _l	plic	catio	ns.		
III	Computer Organization	n 6	Comp	rehe	nd th	ne or	ganiz	ation	2,4
	and Architecture	,	and ar				•		
	Operating Systems.		includ	_			•		
			I/O de						
			fundar	nent	als c	of op	eratir	ng	
			system						
IV	Database Managemen		^			_		atabase	2,3
	Systems, Object	t	manag		-			oject-	
	Oriented Programming.		oriente	•	_		_		
								gration	
	7		in soft						
V	Formal Language and	6	Under				_	_	2,4
	Automata.		autom			-			
			applic				_		
			scienc			cing	theor	etical	
			unders	stand	ıng.				

#### **REFERENCE BOOKS:**

- **R33:** "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- **R34:** Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
- **R35:** Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- **R36:** M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- R37: Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- R38: S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- **R39:** Stallings, Computer Organization & Architecture, Pearson.
- **R40:** Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.
- **R41:** C. K. Nagpal, Formal Languages and Automata Theory, Oxford University Press.
- **R42:** Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, Database System Concepts, McGraw Hill.

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,9,10,11,12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,9,10,11,12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,9,10,11,12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,9,10,11,12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,9,10,11,12

Course	Course	CO	PO	PO	РО	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	3	2	2				3	2	3	3
22BTCS32 4R	Techno Professio	CO 2	3	2	3	2	2				2	2	3	3
	nal Skills V	CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

		SEMESTER -	· VI						
<b>Course Title</b>	COL	RPORATE PROFIC		FO	R E	NGI	NEE	RS	
		(Communicative)							
Course code	22UBPD324R	Total credits: 2	L	T	P	S	R	O/F	С
		Total hours: 60P	0	0	4	0	0	0	2
Pre-requisite	22UBPD314R	Co-requisite					NII		ı
-	Competent	-							
	English For								
	Engineers								
Programme	B.Tech in Civil Engi	neering/B.Tech in M	<b>Iechanic</b>	al E	ngir	neeri	ng/B	.Tech in	Computer
	Science and Enginee	ring/ B.Tech in Con	puter S	cien	ce a	nd E	ngin	eering (I	B)/ B.Tech
	in Mechanical Engin	eering (B)/ B.Tech i	n Civil I	Engi	neer	ing	(B)/ I	3.Tech ii	1
	Computer Science an	nd Engineering on C	loud Te	chn	olog	y an	d Inf	ormatio	n Security
Semester	Win	ter/ II semester of th	e third	year	of t	he p	rogra	am	
Course	1. To introduce s	tudents with the vario	ous tools	of e	ffect	ive p	oresei	ntation.	
<b>Objectives</b>	2. To instruct, in	fluence, engage, educ	ate, or e	ntert	ain t	he li	stene	rs.	
(Minimum	3. Students will b	be having corrected re	esumes &	will	be l	haviı	ng a b	etter	
3)	knowledge abo	out how to upload dat	a in soci	al m	edia	also	how	to promo	ote
	self.								
		nnovative ways of de				_		_	
	5. To prepare the	students for the cam	pus drive	es &	wal	king	inter	views.	
	_	lence with the chance	to reflec	ct on	thei	r no	n-ver	bal and v	erbal
	communicatio								
CO1	Construct coherent and		ports, de	mon	strat	ing a	advan	ced writt	ten
	communication skills i								
CO2	Apply effective verbal	communication strat	egies in p	profe	essic	nal s	setting	gs, such	as meetings
	and presentations.								
CO3	Evaluate and analyze of	-	cuments,	sho	wcas	sing	a higl	n level of	English
	language comprehensi								
CO4	Demonstrate proficien		te corpor	ate l	Engl	ish v	ocab	ulary and	l language
	conventions in enginee								
CO5	Synthesize and commu					nd pe	ersuas	sively in	English,
	fostering effective coll								
Unit-No.	Content	Contact		Lea	rnin	g Oı	ıtcon	1e	BL
<del></del>	D ( d) GI III	Hour	D 1	.1		*1*.			2.2
Ι	Presentation Skills	12	Develo	•		•	•	epare	2,3
	i. Introduction		and de					1	
	ii. Essential	a of	_			-		anding	
	characteristic	S Of	essent			cteri	Stics a	ana	
	a good		techni	ques	•				
	presentation iii. Preparation o	fo							
	•	ı a							
	good								
	presentation								

II	Leadership &	12	Gain insights into leadership	2,3,4
	Management Skills		concepts, styles, and the	
	i. Concepts of		differences between managers	
	Leadership,		and leaders, and learn how to be	
	ii. Leadership		an effective leader.	
	Styles,			
	iii. Manager VS			
	Leader,			
	iv. How to be an			
	Effective Leader,			
	v. Mock/ Practice			
	Session,			
	vi. Doubt Clearing			
	Session.			
III	LinkedIn Profile	12	Understand the importance of a	2
			professional LinkedIn profile	
			and learn how to optimize it to	
			enhance career opportunities.	
IV	Emotional Intelligence	12	Develop emotional intelligence	2,3
			by recognizing and managing	
			emotions effectively, leading to	
			improved interpersonal	
			relationships.	
V	Mock Screening	12	Gain practical experience and	3,5
			feedback through mock	
			screening sessions, enhancing	
			interview skills and confidence.	

**T1:** Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.

T2: McDowell, Gayle Laakmann. 2008. Cracking the Coding Interview (IndianEdition)

T3: Adair, John. (2013) Develop Your Leadership Skills (Creating Success, 134), Kogan Page

#### **REFERENCE BOOKS:**

**R43:** Picardi, Dr. Carrie. (2021) Leadership Essentials You Always Wanted to Know, Vibrant Publishers **R44:** Whetten D. (2011) Developing Management Skills, Prentice Hall India Learning Private Limited

#### **OTHER LEARNING RESOURCES:**

- 1. https://youtu.be/4vetoRA3WUA
- 2. https://youtu.be/bgFNTuRYtKE

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Construct coherent and concise technical reports,	1,2,3,4,5,10,12
	demonstrating advanced written communication skills in	
	English.	
2	Apply effective verbal communication strategies in	1,2,3,4,5,10,12
	professional settings, such as meetings and presentations.	
3	Evaluate and analyze complex technical documents,	1,2,3,4,5,10,12
	showcasing a high level of English language comprehension.	
4	Demonstrate proficiency in using appropriate corporate	1,2,3,4,5,10,12
	English vocabulary and language conventions in engineering	
	contexts.	
5	Synthesize and communicate engineering concepts clearly and	1,2,3,4,5,10,12
	persuasively in English, fostering effective collaboration in a	
	corporate environment.	

Course code	Course	CO	PO	P	P	P								
	Name		1	2	3	4	5	6	7	8	9	O	О	О
												10	11	12
		CO 1	1	1	1	1	1					3		2
22UBPD32 4R	Corporat e	Co 2	1	1	1	1	1					3		2
	Proficien cy For Engineer	CO 3	1	1	1	1	1					3		2
	s	CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTE	R – VI						
Course Title		CO CURRI	CULAR	ACT	IVIT	IES			
Course code	22UBCC321	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 15P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme	<u> </u>		G Progr	amm	ies				
Semester	W	/inter/ II semester (				the pi	ogra	m	
Course		l soft skills: Develop							nunication
Objectives		n among learners.	•						
(Minimum 3)	2. Promote holistic	development: Enco	urage ove	erall g	growth	ı by er	ngagir	ng student	s in
	diverse extracum	ricular activities and	experien	ces.					
	3. Cultivate 360-de	gree learning: Imple	ement a co	ompre	ehensi	ive ap	proacl	h to educa	tion that
	integrates acade	mics with practical e	xperience	es and	l skill	devel	opme	nt.	
CO1	Active participation	in club activities: St	udents en	gage	in var	ious c	lubs l	ike dance,	music,
	and photography, for	-							
CO2	Representation in co				institu	ıtion a	t inter	r-universit	y, state,
	and national compet								
CO3	Exposure to expert g				rksho	ps cor	iducte	d by reno	wned
	personalities, enhance								
CO4	Skill development th		_	ain p	ractica	al insi	ghts a	nd experti	se in their
	fields of interest thro	-	_						
CO5	Overall growth and o	_	ourse facil	litates	s the h	olistic	deve	lopment o	f students,
	nurturing their talent								
Unit-No.	Con	tent	Contac	t	Lea	arning	g Out	come	BL
			Hour						
I	AdtU encourages a	•	15			riculaı		activities	
	,	gular curriculum						practical	
	intended to meet	<i>'</i>			. •			academic	
	These activities are	-			oncep		critica		
	the social and soft	•			•	oment		problem-	
		lopment of the		SC	olving			nication),	
	learners, Keeping	in mind the 360 l		C					
						pers	onal	growth	
	degree learning	methodology the		(0	confid	ence,		self-	
	degree learning students are enga	methodology the aged in different		(c av	confid waren	ence, ess), ₁	oromo	self- ote social	
	degree learning students are enga activities headed	methodology the aged in different under different		(c av re	confid waren espons	ence, ess), _j sibility	oromo	self- ote social through	
	degree learning students are enga activities headed clubs viz.	methodology the aged in different under different Dance, music,		(c)	confidwarenesspons	ence, ess), p sibility enity	oromo	self- ote social through agement,	3
	degree learning students are enga activities headed clubs viz. photography, drama	methodology the aged in different under different Dance, music, a, literary etc., The		(c) av	confidwarenespons commund cul	ence, ess), posibility enity tivate	oromo	self- ote social through agement, work and	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate		(c) av reconstruction (c) and le	waren espons ommu nd cul	ence, ess), posibility inity tivate hip	eng team	self- ote social through agement, work and abilities,	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club activities are encour in regular club activities.	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops,		(coaverage) (coave	confidwarencespons commund cultradersite	ence, ess), posibility nity tivate hip	eng team	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as per	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, r their interest and		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities,	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The students	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, a their interest and ant members of the		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), posibility nity tivate hip	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The stude club are trained r	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, at their interest and ant members of the agersent AdtU in		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The stude club are trained revarious inter Univ	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, at their interest and ant members of the agers AdtU in ersity student and		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The stude club are trained revarious inter University national level competitions.	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, a their interest and ant members of the agers and attempts and the epresent AdtU in the ersity student and petitions, Renewed		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The stude club are trained revarious inter Universities are in the competition of the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious inter Universities are in the club are trained revarious interest.	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, a their interest and ant members of the epresent AdtU in ersity student and petitions, Renewed anvited to conduct		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3
	degree learning students are enga activities headed clubs viz. photography, drams students are encour in regular club actic competitions as perhobbies, The stude club are trained revarious inter University national level competitions.	methodology the aged in different under different Dance, music, a, literary etc., The aged to participate ivities, workshops, a their interest and ant members of the epresent AdtU in ersity student and petitions, Renewed anvited to conduct mefit the members		(construction of the construction of the const	confidence waren esponsommund culteradersi reparincess	ence, ess), psibility nity tivate hip ng the	eng team em for acade	self- ote social through agement, work and abilities, r holistic	3

platform to learn from experts in the	
respective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Active participation in club activities: Students engage in various clubs like dance, music, and photography, fostering their interests and talents.	1,2,3,4,5,6,10,12
2	Representation in competitions: Students represent the institution at inter-university, state, and national competitions, showcasing their skills.	1,2,3,4,5,6,10,12
3	Exposure to expert guidance: Learners benefit from workshops conducted by renowned personalities, enhancing their knowledge and skills.	1,2,3,4,5,6,10,12
4	Skill development through workshops: Students gain practical insights and expertise in their fields of interest through hands-on workshops.	1,2,3,4,5,6,10,12
5	Overall growth and development: The course facilitates the holistic development of students, nurturing their talents and capabilities.	1,2,3,4,5,6,10,12

Course	Course	С	РО	PO	РО	PO	РО	РО	PO	РО	РО	PO1	PO1	PO1
code	Name	О	1	2	3	4	5	6	7	8	9	0	1	2
	СО	CO 1	2	2	2	1	2	2				2		2
22UBCC 321	CURRICUL AR ACTIVITIE	CO 2	2	2	2	1	2	3				2		2
	S	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTER - V	VI					
<b>Course Title</b>	F	EXTRA CURRICU	JLAR A	ACT.	IVITI	ES		
Course code		tal credits: 1	L	T		S R	O/F	C
	То	tal hours: 60P	0	0	0	4 0	0	1
<b>Pre-requisite</b>	NIL	Co-requisite				NII	4	
Programme		All UG Pr						
Semester		/ II semester of the						
Course	_	d soft skills: Foster	_	uisiti	ion of	interpe	rsonal sk	ills and
Objectives	•	abilities among lea						_
(Minimum 3)		levelopment: Encou	_			0		ceted
	I	academics, nurturin	-		_			1
	_	expression: Provid						culate their
CO1	•	s clearly and critical		_	_			•, ,
	Learn to a plan so that the and manage their time and	•	igiui coi	uur1b'	uuons	, mainta	un a con	umunent,
CO2	Transform passionate stud	_	ate lead	orchi	in and	nurcue	interests	hevond
	their academics.	ichts who demonstra	aic icau	CI 5111	ip and	pursue	1111010818	ocyona
	Learn to participate in var	ious co-curricular a	ctivities	leac	ling to	their m	ultifacet	ed
	personality development.	ious co curricular a	Ctivities	, icuc	ing to	then i	iaitiiaeet	cu
	Express their ideas, views	. In-depth evaluatio	n and a	nalvs	sis cle	arly in t	he topic	of their
	interest.	, <b>r</b>		J		<i>J</i>		
CO5	Demonstrate and practices	s different activities.	, by Inte	egrat	ing lea	arning e	xperienc	es by
	demonstrating transferable		, ,	U	υ	C	1	J
Unit-No.	Conten	t	Contac	ct	Leari	ning Ou	itcome	BL
			Hour					
I		0				•		
_	AdtU encourages a rai	nge of activities	60	5	Studer	its dev	elop a	2,3
•	outside the regular curric	culum intended to	60	1	well-ro	ounded	•	2,3
1	outside the regular curric meet learner's interest,	These activities	60	I I	well-ro person	ounded ality, in	cluding	2,3
•	outside the regular curric meet learner's interest, are aimed to develop th	These activities e social and soft	60	I E	well-ro person effecti	ounded ality, in ve pl	cluding lanning,	2,3
•	outside the regular curric meet learner's interest, are aimed to develop th skills and promote a holi	These activities e social and soft istic development	60	1 6	well-ro person effecti eaders	ounded ality, in ve pl ship	cluding	2,3
•	outside the regular curric meet learner's interest, are aimed to develop th skills and promote a holi to the learners, Keeping	These activities e social and soft istic development in mind the 3 60	60	1 1 1	well-ro person effecti eaders partici	ounded ality, in ve pl ship pation	acluding lanning, skills, in	2,3
	outside the regular curric meet learner's interest, are aimed to develop th skills and promote a holi to the learners, Keeping degree learning methodo	These activities e social and soft istic development in mind the 3 60 clogy the students	60	1 6 1 1	well-ro person effecti eaders partici diverso	ounded ality, in we pl ship pation e ac	cluding lanning, skills, in ctivities,	2,3
	outside the regular curric meet learner's interest, are aimed to develop th skills and promote a holi to the learners, Keeping degree learning methodo are engaged in different	These activities e social and soft istic development in mind the 360 clogy the students activities headed	60	1 1 1 0	well-ro person effecti eaders partici diverso elear	ounded ality, in ve pl ship pation e ac express	acluding lanning, skills, in ctivities, sion of	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holi- to the learners, Keeping degree learning methodo are engaged in different under different clubs vi	These activities e social and soft istic development in mind the 360 elogy the students activities headed z. Dance, music,	60	I I I I I I I I I I I I I I I I I I I	well-reperson effecti eaders partici diverse elear deas,	ounded ality, in ve pl ship pation e ac express and inte	acluding lanning, skills, in ctivities, sion of egration	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holi- to the learners, Keeping degree learning methodo are engaged in different under different clubs vi- photography, drama, li	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The	60	I I I C C i	well-reperson effecti eaders partici diverso clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs vi photography, drama, li students are encouraged	These activities e social and soft istic development in mind the 360 clogy the students activities headed z. Dance, music, terary etc., The to participate in	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs via photography, drama, li students are encouraged regular club activiti	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops,	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holi- to the learners, Keeping degree learning methodo are engaged in different under different clubs vi- photography, drama, li- students are encouraged regular club activitic competitions as per the	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular curric meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs via photography, drama, li students are encouraged regular club activitic competitions as per the hobbies, The student me	These activities e social and soft istic development in mind the 360 clogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holisto the learners, Keeping degree learning methodo are engaged in different under different clubs viphotography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student means are trained represent.	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs viphotography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student meare trained represent a inter University students.	These activities e social and soft istic development in mind the 360 clogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various and national level	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs via photography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student means are trained represent a competitions, Renewed	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various and national level personalities are	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holicot to the learners, Keeping degree learning methodo are engaged in different under different clubs viphotography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student meare trained represent a competitions, Renewed invited to conduct works.	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various and national level personalities are shops that benefit	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holic to the learners, Keeping degree learning methodo are engaged in different under different clubs via photography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student means are trained represent a competitions, Renewed	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various and national level personalities are shops that benefit its by giving them	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3
	outside the regular currice meet learner's interest, are aimed to develop the skills and promote a holicoto the learners, Keeping degree learning methodo are engaged in different under different clubs via photography, drama, listudents are encouraged regular club activitic competitions as per the hobbies, The student meare trained represent are trained represent accompetitions, Renewed invited to conduct works the members and students.	These activities e social and soft istic development in mind the 360 slogy the students activities headed z. Dance, music, terary etc., The to participate in es, workshops, heir interest and mbers of the club AdtU in various and national level personalities are shops that benefit its by giving them	60		well-reperson effecti eaders partici diverse clear deas, of	ounded ality, in ve pl ship pation e ac express and into	acluding lanning, skills, in ctivities, sion of egration learning ostering	2,3

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course	Course	С	PO	PO	PO	PO	PO	РО	PO	PO	РО	PO1	PO1	PO1
code	Name	О	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	2	1	2	2				2		2
22UBEC 321	EXTRA CURRICUL	CO 2	2	2	2	1	2	3				2		2
	AR ACTIVITIE	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTER	– VII						
<b>Course Title</b>		Softwa	re Engi	neeri	ng				
Course code	22BTCS411R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 43	3	0	0	0	0	0	3
D	Davis Commenter	45T+30P					NI21		
Pre-requisite	Basic Computer Science	Co-requisite					Nil		
Programme	Science	<u> </u>	Tech C	SE.					
Semester	7 TH 9	SEMESTER OF FO			ROI	7 PR	)GR	AM	
Course		to understand theor							d for meson
<b>Objectives</b>	nkoftware developme		iics,iiici	nous,	and	teem	ologi	es applied	a for pusse.
	2.To discussthe cond		ducte an	d soft	ware	nroce	2622		
(William 3)		ocumentation for Sof				•			
CO1		software developmen			pinen	t WOI	<u> </u>		
CO1									
CO2		lopment lifecycle pha			•				
CO3	•	specify software requ							
CO4		standard procedures							
CO5		vely in interdisciplin	ary soft	ware	projec	t tear	ns.		
Unit-No.	Con	itent	Conta	ct	Lea	rnin	g Out	come	BL
			Hou						
I	Introduction:				Compa		and	contrast	
	Lifecyclemodels				ariou			software	
		software design:	13			•		e cycle	1,2
	•	is and structured			nodel			tructured	
	design.				lesign				
II	•	ents, analysis and			•			ocument	
	•	ormal and formal			oftwa		_	irements	
	specification.		12		ısing		forma		1,2
					ormal		spec	ification	
					netho				
III	ObjectOrientedDes	U			Design		•	-oriented	
	User interface des	•			ystem			op user	
	design primitives,							coding	
	management system		7					conduct	1,2
	XWindows system			υ	ınit te	sting.			
	Coding and Testing								
	Codingstandardand								
IV	Projectmanagemen				Estima			esources,	
		cheduling, risk						manage	
	management an	nd configuration	6		isks,	and		plement	1,2
	management.				onfig				
								rojects.	
V		andqualityassurance					-	metrics,	
	Reliability metri	U	5	-	growth		nodel	s, and	1,2
	modelling, ISO-900	00,SEIand CMM.			luality			ssurance	1,2
				S	tanda	rds 1	ike I	SO-9000	

	and CMM.	

- $\textbf{T1}. \ An \ Integrated Approach to Software Engineering by Jalote. Narosa Publishing House.$
- T2. SoftwareEngineeringbyR.Mall,PHI.

## **REFERENCE BOOKS:**

R1. SoftwareEngineeringbyR.S.Pressman, McGraw Hill

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Demonstrate ethical software development practices	1,2,3,4,5,9,11 and 12								
2	Apply systems development lifecycle phases effectively.	1,2,3,4,5,9,11 and 12								
3	Elicit, analyze, and specify software requirements collaboratively	1,2,3,4,5,9,11 and 12								
4	Create and evaluate standard procedures and documentation.	1,2,3,4,5,9,11 and 12								
5	Collaborate productively in interdisciplinary software project teams.	1,2,3,4,5,9,11 and 12								

Course	Course		PO	PO1	PO1	PO1								
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1	2	2	3	2	2				3		3	3
		CO												
22DTCG41	Software	2	3	2	3	2	2				2		3	3
22BTCS41	Engineeni	CO												
1R	Engineeri	3	3	2	3	3	3				3		3	2
	ng	CO												
		4	3	2	3	1	3				2		3	2
		CO												
		5	3	2	3	3	3				2		2	2

		SEMESTE	R – VII						
<b>Course Title</b>		PE- IV: Data H	landling	and	Visua	lizati	on		
Course code	22BTCS414R	Total credits: 5	L	T	P	S	R	O/F	C
		Total hours: 40 45T+30P	3	0	4	0	0	0	5
Pre-requisite	Basic	Co-requisite					Nil		
	Programming								
	knowledge								
Programme			B.Tech C						
Semester	<b>7TH</b>	I SEMESTER OF I	FOURTI	H YE	CAR (	)F PI	ROGE	RAM	
Course Objectives (Minimum 3)	<ol><li>Develop profice visualization.</li></ol>	ding of the signification ciency in using R te data visualization	programı	ning	and	Pytho	on for	data ana	alysis and
CO1	Understand the imp decision-making pr	oortance of data visu ocesses.	alization	in IT	`appli	catio	ns and	its role ir	ı
CO2	Demonstrate profic visualization tasks.	iency in using R pro	grammin	g and	d Pyth	on fo	r data	analysis a	and
CO3	Utilize data visualiz	zation libraries like g zations.	ggplot2 (l	R) an	d Mat	plotli	b (Pyt	hon) to cr	reate
CO4	Design clear and peand storytelling	ersuasive visualizatio	ons using	prin	ciples	of ef	fective	data pres	sentation
CO5	Utilize interactive of	lata visualization too	ols like C	ogno	s to cı	reate	dynam	ic visuali	zations.
Unit-No.	Con	tent	Contac Hour	t	Lea	arnin	g Out	come	BL
I	and R Programm Understanding the data visualization Overview of R data analysis and valuation Introduction to libraries: ggplot2 (Python). Basic plotting tea representation in F Hands-on exercise	te importance of in IT applications. programming for visualization. data visualization (R) and Matplotlib	12	o b	f data asic	a visı plotti	ıalizat	portance ion, and chniques n.	1,2 and 3

	examples.			
II	Advanced Data Visualization Techniques:  Advanced Features of ggplot2 for Customized Plots in R. Customizing Plot Aesthetics and Themes in ggplot2 Introduction to Interactive Data Visualization Tools: Cognos. Creating Interactive Visualizations using Cognos. Hands-on Exercises: Advanced Plotting Techniques and Interactive Visualizations.	12	Utilize advanced features of ggplot2 and interactive tools like Cognos for customized and interactive visualizations.	3
III	Maps, Geospatial Data Visualization, Export Features: Introduction to Folium. Maps with Markers, Choropleth Maps. Export Feature – Data Visualization. Generating a PNG picture. Generating PDF documents Multiple graphs plotting and export. Inserting subfigure Hypothesis and Gradient Descent. Understanding Hypothesis. Implementation of hypothesis in Python. Gradient Descent Implementation	8	Create geospatial visualizations using Folium and export visualizations as images and documents.	1,2,3
IV	Visualization by using Seaborn Library: Relational plot: Dist Plot, Line Plot, Lmplot. Categorical plot: Stripplot, Swarmplot,Barplot, Countplot, Boxplot, Violinplot, Stripplot Distribution plot: Joinplot, Distpot, Pairplot, Rugplot. Regression plot: Simple Linear plot with additional parameters (hue and markers), Setting size and color of the plot, Displaying multiple plots, Size and aspect ratio of plots. Matrix plot: Heatmaps, Cluster Maps. Style and Color: Set the background to be white, Set the background to be ticks, Set the background to be darkgrid, Set the background to be	4	Implement various types of plots and customize visualizations using Seaborn in Python.	1,2,3,4

	whitegrid. Remove axes spine: Despine Size and aspect: Non grid plot, Grid type plot Scale and Context: Poster, paper, notebook and talk			
V	Application of Data Visualization in Engineering: Case studies demonstrating data visualization. Visualizing datasets & Creating dashboards for analysis Real-world applications and projects.	4	Apply data visualization techniques to real-world engineering problems and create dashboards for data analysis.	3,5,6

T1: Data Visualization with R" by Carson Sievert and Chris Parmer

T2: Python Data Visualization Cookbook" by Igor Milovanović

#### **REFERENCE BOOKS:**

R1: Interactive Data Visualization for the Web" by Scott Murray

R2: Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole NussbaumerKnaflic.

#### OTHER LEARNING RESOURCES:

- 1. IBM Cognos Analytics
- 2. R Programming Tutorial

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the importance of data visualization in IT applications and its role in decision-making processes.	1,2,3,4,10 and 12
2	Demonstrate proficiency in using R programming and Python for data analysis and visualization tasks.	1,2,3,4,10 and 12

3	Utilize data visualization libraries like ggplot2 (R) and Matplotlib (Python) to create customized visualizations.	1,2,3,4,5,10 and 12
4	Design clear and persuasive visualizations using principles of effective data presentation and storytelling	1,2,3,4,10 and 12
5	Utilize interactive data visualization tools like Cognos to create dynamic visualizations.	1,2,3,4,10 and 12

Course	Course		PO	PO1	PO1	PO1								
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
	DE 117	CO 1	2	2	1	3						1		2
22DTCC41	PE- IV: Data Handling and Visualizati on	CO 2	2	2	1	3						1		2
22BTCS41 4R		CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	R – VII												
<b>Course Title</b>		Professional Ele	ctive-IV	: Cor	npute	er Vis	ion								
Course code	22BTCS414R	Total credits: 5	L	T	P	S	R	O/F	C						
		Total hours: 45 45T+30P	3	0	4	0	0	0	5						
Pre-requisite	Basic	Co-requisite	Nil												
	Programming														
	knowledge														
Programme			B.Tech C												
Semester		SEMESTER OF													
Course	1. Introduce the fundamental problems of Computer Vision and image formation.														
Objectives (Minimum 3)	<ol><li>Provide understanding of techniques, mathematical concepts and algorithms used in computer vision to facilitate further study in this area.</li></ol>														
	3. Provide pointers into the literature and exercise a project based on a literature search and one or more research papers.														
CO1	Identify basic con computer vision.	cepts, terminology,	theories	s, mo	odels	and	metho	ods in the	e field of						
CO2	Describe known pri	Describe known principles of human visual system and computer vision system.													
CO3		Describe methods of computer vision related to multi-scale representation, edge detection and detection of other primitive.													
CO4	Use computer vis	sion algorithm for	3D co	nstru	ction,	ster	eo, n	notion an	d object						
CO5	detection, training	cy in object recograte deep learning mode as for practical comp	els, evalu	ating	perfo	orman	_		Ū						
Unit-No.	Con	tent	Contac Hour	t	Lea	rnin	g Out	come	BL						
I	Computer Vision, Vision - Low- High-level. Div Vision Applicat Image Analysis, I Recognition, Tr Image Analysis Image Retrieva	verse Computer tions: Document Biometrics, Object tacking, Medical Content-Based I, Video Data Itimedia, Virtual	Understand the fundamentals of compute vision and explore diverse applications such as object recognition and medical image analysis.						1						
П		ntion Models: naging system, & Perspective	10	n	nodels	;	i	ormation ncluding pinocular	1,2						

III	Projection, Camera model and Camera calibration, Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading, Depth from Defocus, Construction of 3D model from images.  Image Processing and Feature		systems, camera calibration, and 3D model construction from images.  Implement image	
	Extraction: Image preprocessing, Image representations (continuous and discrete), Edge detection. Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.	10	preprocessing techniques, edge detection, and motion estimation methods like optical flow and stereo vision.	2,3
IV	Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis	8	Apply various shape representation and segmentation techniques including contour-based, region-based, and deformable models like snakes and level sets.	2,3
V	This unit covers principles and techniques of object recognition and the application of machine learning in computer vision. Topics include feature extraction methods for object detection, classification algorithms, and training of recognition models. Students will explore supervised and unsupervised learning techniques, neural networks, and deep learning architectures specifically designed for image analysis. The unit also addresses the evaluation of model performance using various metrics and validation techniques, providing hands-on experience with popular machine learning frameworks and libraries.	10	Understand and apply object recognition techniques and machine learning algorithms in computer vision applications.	1,2,3,4

- T1:Szeliski R., "Computer Vision: Algorithms and Applications", Springer, 2010.
- T2. Richard Szeliksy., "Computer Vision: Algorithms and Applications", Springer, 2020.
- T3. Davies, E.Roy., "Computer and machine vision: theory, algorithms, practicalities" Academic Press, 2017.

### **REFERENCE BOOKS:**

- R1: "Concise computer vision" by R. Klette, Reinhard, Springer, London, 2014.
- R2. "Digital Image Processing", by R. Gonzalez and R. Woods, 4th edition, Pearson, 2017.
- R3. "Computer Vision: Advanced Techniques and Applications" , by S. Holden, CLANRYE International, 2019.

#### OTHER LEARNING RESOURCES:

- 1. https://nptel.ac.in/courses/117105079
- 2. <a href="https://nptel.ac.in/courses/106105216/">https://nptel.ac.in/courses/106105216/</a>

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision.	1,2,3,4,5,10 and 12
2	Describe known principles of human visual system and computer vision system.	1,2,3,4,5,10 and 12
3	Describe methods of computer vision related to multi-scale representation, edge detection and detection of other primitive.	1,2,3,4,5,10 and 12
4	Use computer vision algorithm for 3D construction, stereo, motion and object recognition.	1,2,3,4,5,10 and 12
5	Develop proficiency in object recognition principles, applying machine learning for detection, training deep learning models, evaluating performance metrics, and utilizing relevant frameworks for practical computer vision applications.	1,2,3,4,5,10 and 12

Course	Course		PO	PO1	PO1	PO1								
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO	3	3	3	2	3					1		3
	Professio nal Elective-	CO 2	2	2	2	2	2					1		2
22BTCS41 4R	IV:	CO 3	3	2	3	2	3					1		3
	Compute r Vision	CO 4	3	3	3	2	3					1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	R – VII												
<b>Course Title</b>		PE-V: P	redictiv	e An	alysis	,									
Course code	22BTCS416R	Total credits: 5	L	T	P	S	R	O/F	С						
		Total hours: 40	3	0	4	0	0	0	5						
		45T+30P			_	Ů									
Pre-requisite	Basic	Co-requisite	Nil												
	Programming														
Ducanama	knowledge	<u> </u>	B.Tech C	SCE											
Programme Semester	771	I SEMESTER OF F			'AD (	)E DI	POCE	AM							
Course															
<b>Objectives</b>		<ol> <li>To familiarize the students with various Statistical Data Analysis tools</li> <li>Tools that can be used for effective decision making.</li> </ol>													
(Minimum 3)	To make student handle data with various meters														
(1/2222200000000000000000000000000000000															
CO1	Tindenstond and said			1 1		f Das	d:	1							
	Understand and crit	tically apply the conc	cepts and	ı meti	noas (	or Pre	aictive	analytics	S.						
CO2	Understand and apply IBM SPSS Modeler in Data Mining, what kinds of data can be mined, what kinds of patterns can be mined.  Applying and analysing how to use functions, deal with missing values, use advanced field operations, handle sequence data and improve efficiency.														
CO3															
CO4	•	Set exposed to the testing of hypothesis and solving assumptions													
CO5	-	BM Watson Studio w				_									
Unit-No.	Con	itent	Contac	et	Lea	arnin	g Out	come	BL						
			Hour												
I	ANALYTICS OV	/ERVIEW	8	a	Inders nalysi	redictive rinciples,									
	What is Predictive	Analysis, how		_											
		<u> </u>													
	predictive modeling	ng, what are the				•		ia iiio							
	models in Predicti	ve Analysis.		1	ature .	msigi	103.		1.2						
	How Prodictive or	volvition													
		•													
	· ·														
	Predictive enterpri														
II	Statistical Analys	sis	8												
	Define Statistics a	nd its types				-									
		* *													
					neasul	.05 01									
			dispersion.					1,2							
	_														
l .	_	-													
	Quartile Deviation	n, Mean Deviation,													
	Quartile Deviation Standard Deviation														
CO5 Unit-No.	Get exposed to the to Understanding of II Com  ANALYTICS OV  What is Predictive predictive models in Predictive models in Predictive an Transforming data insights, Analytics Present & Future, Predictive enterprity Statistical Analyst Define Statistics at Measures of Centre Median and Mode Dispersion: Absolute measures of dispersions and measures of dispersions.	resting of hypothesis BM Watson Studio watent  VERVIEW  Analysis, how works, why ng, what are the ve Analysis.  Allytics:  Into future a trends: Past, Towards a see.  Sis  Ind its types,  Ind its types,  Ind its types,  Ind waten its types,  Ind waten its types,  Ind waten its types,  Ind its types,  Ind waten its types,  Ind wa	nd impros and solvith Mac Contac Hour	Dive efficient of the state of	Learn	ptioning Marnin stand is ive approximately medical insight.	p point mode polication data.	redictive rinciples, and on in ta into	1,2						

	Kurtosis.			
III	DATA MINING  What is a Data Mining applications? Strategy for data mining: CRISP-DM, Steps of Data Mining, Stages and tasks in CRISP-DM, Life Cycle of a Data Mining Project, Skills Needed for Data Mining.  Identify nodes and streams, The framework of a Data – mining project, Brief the unit of analysis, Explain the type of dialog box.	8	Explain data mining applications, strategy using CRISP-DM, stages in a data mining project, and required skills.	2,3
IV	UNIT OF ANALYSIS  Concepts of Unit of analysis (Distinct, Aggregate, SetToFlag), Integrate data, CLEM Expression, Role of Relationship between two fields, Identifying the modeling objective.	8	Define unit of analysis concepts (distinct, aggregate, SetToFlag), integrate data using CLEM Expression, and identify modeling objectives.	2,3
V	PREDICTIVE ANALYTICS WITH IBM WATSON STUDIO  Understanding of IBM Cloud, IBM Watson Studio, Watson studio Components, Creating a Machine Learning Model, Data preparation, Watson Machine learning, Data Refinery, Watson Studio Neural Network Modeler, IBM Watson Studio jobs, Use case with AutoAI.	8	Utilize IBM Watson Studio for machine learning model creation, data preparation, Watson Machine Learning, Data Refinery, Neural Network Modeler, and AutoAI use cases.	1,2,5,6

T1: Predictive Analytics Mesmerizing & fascinating by ERIC SIEGEL

### **REFERENCE BOOKS:**

- R1: "Applied Predictive Modeling" by Max Kuhn and KjellJohnsonDatabase Management Systems
- R2: "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy
- R3: "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" by Eric Siegel

#### OTHER LEARNING RESOURCES:

- 1. <a href="https://www.ibm.com/topics/predictive-analytics">https://www.ibm.com/topics/predictive-analytics</a>
- 2. <a href="https://www.simplilearn.com/what-is-predictive-analytics-article">https://www.simplilearn.com/what-is-predictive-analytics-article</a>
- 3. <a href="https://www.ibm.com/products/watson-studio">https://www.ibm.com/products/watson-studio</a>

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and critically apply the concepts and methods of Predictive analytics.	1,2,3,4,5,10 and 12
2	Understand and apply IBM SPSS Modeler in Data Mining, what kinds of data can be mined, what kinds of patterns can be mined.	1,2,3,4,5,10 and 12
3	Applying and analysing how to use functions, deal with missing values, use advanced field operations, handle sequence data and improve efficiency.	1,2,3,4,5,10 and 12
4	Get exposed to the testing of hypothesis and solving assumptions	1,2,3,4,5,10 and 12
5	Understanding of IBM Watson Studio with Machine Learning Model.	1,2,3,4,5,10 and 12

Course	Course		PO	PO1	PO1	PO1								
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
22BTCS41 6R		CO 1	2	2	1	1	1					1		2
	PE-V: Predicti	CO 2	3	3	3	3	2					2		3
	Analysi 3	CO 3	3	2	3	3	3					2		3
	S	CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

		SEMESTER	2 – VII												
<b>Course Title</b>		PE-V: Soci	al Netw	ork A	Analy	sis									
Course code	22BTCS416R	Total credits: 3	L	T	P	S	R	O/F	C						
		Total hours: 40	2	1	0	0	0	0	3						
		45T+30P													
Pre-requisite	Nil	Co-requisite	Nil												
Programme			.Tech (												
Semester	7TH SEMESTER OF FOURTH YEAR OF PROGRAM  1 To understand the concept of semantic web and related applications														
Course		<ol> <li>To understand the concept of semantic web and related applications.</li> <li>To learn knowledge representation using ontology.</li> </ol>													
Objectives															
(Minimum 3)															
		<ul><li>4. To learn visualization of social networks.</li><li>5. To have access to a variety of descriptive measures for networks and software to</li></ul>													
		5. To have access to a variety of descriptive measures for networks and software to calculate them, and have the ability to interpret the results.													
CO1	Understand the	limitations of the cur	ront wo	h and	tho re	otiono	la bab	ind the							
COI		the Semantic Web a				шопа	ie den	illa tile							
CO2	•	oficiency in ontology				ronse	contat	ion for the							
CO2	_	using ontology langu			_	•		ion for the	,						
CO3		lyze the evolution of ection algorithms, and													
CO4	-	edict human behavior Idress privacy concer		socia	l com	muni	ties, m	nanage use	er data						
CO5		theory, centrality a				_		jues, and	variou						
Unit-No.		tent	Contac				g Out	come	BL						
			Hour												
I	Limitations of Development of Emergence of the Social Networks Networks, Blog communities	Semantic Web: current Web — Semantic Web — ne Social Web — ork analysis: Social Network y concepts and twork analysis — tes for network ronic discussion gs and online — Web-based ications of Social	15	fi th S c a d	rom to see the second to second the second to second the second to second the	the common web, ots in the sion	urrent tic W and a social to e	evolution web to Yeb and pply key network electronic orks and es.	1						

II	MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION  Ontology and their role in the Semantic Web: Ontology-based knowledge Representation — Ontology languages for the Semantic Web: Resource Description Framework — Web Ontology  Language — Modelling and	7	Explain the role of ontology in the Semantic Web and apply ontology languages (RDF, OWL) for modeling social individuals and relationships, and advanced data representation techniques.	3
	aggregating social network data: State-of-the-art in network data representation — Ontological representation of social individuals — Ontological representation of social relationships — Aggregating and reasoning with social network data — Advanced representations.			
III	EXTRACTION AND MINING COMMUNITIES IN WEB SOCIAL NETWORKS  Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi- Relational characterization of dynamic social network communities.	6	Extract and analyze web community evolution from archives, employ community detection algorithms, and evaluate community structures in dynamic social networks.	5
IV	PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES  Understanding and predicting human behavior for social		Predict human behavior in social networks, manage user data, address privacy concerns, and implement trust models and security measures in online social	4

	communities — User data management — Inference and Distribution — Enabling new human experiences — Reality mining — Context — Awareness — Privacy in online social networks — Trust in online environment — Trust models based on subjective logic — Trust network analysis — Trust transitivity analysis — Combining trust and reputation — Trust derivation based on trust comparisons — Attack spectrum and counter measures.	6	environments.	
V	VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS  Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co- Citation networks.	6	Apply graph theory, centrality measures, and clustering techniques to visualize and interpret online social networks, using various visualization methods for collaboration, co-citation, and community welfare applications.	3

- T1 Peter Mika, —Social Networks and the Semantic Web, First Edition, Springer 2007.
- T2 BorkoFurht, —Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010

#### **REFERENCE BOOKS:**

- **R1** Guandong Xu ,Yanchun Zhang and Lin Li,-Web Mining and Social Networking Techniques and applications, First Edition, Springer, 2011.
- **R2** Dion Goh and Schubert Foo,-Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.

**R3** Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 2009.

**R4**John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 2009.

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the limitations of the current web and the rationale behind the development of the Semantic Web and Social Web.	1,2,3,4,5,6,10 and 12
2	Demonstrate proficiency in ontology-based knowledge representation for the Semantic Web, using ontology languages such as RDF and OWL.	1,2,3,4,5,6,10 and 12
3	Extract and analyze the evolution of web communities from web archives, apply community detection algorithms, and evaluate community structures in dynamic social networks.	1,2,3,4,5,6,10 and 12
4	Analyze and predict human behavior within social communities, manage user data securely, and address privacy concerns.	1,2,3,4,5,6,10 and 12
5	Apply graph theory, centrality measures, clustering techniques, and various visualization methods to analyze and interpret social networks.	1,2,3,4,5,6,10 and 12

Course code	Course Name		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	PE-V:	CO 1	2	2	1	1	1	2				1		2
22BTCS416	Social Networ	CO 2	3	3	3	3	2	2				2		3
R	k	Co3	3	2	3	3	3	2				2		3
	Analysi s	CO 4	2	2	2	2	2	3				2		2
		Co5	2	2	3	2	2	2				2		3

		SEMESTE	R – VII											
<b>Course Title</b>			Projec											
Course code	22BTCS412R	Total credits: 6	L	T	P	S	R	O/F		C				
		Total hours: 156	0	0	12	0	0	0	6					
		45T+30P												
Pre-requisite	Nil	Co-requisite					Nil							
Programme			. Tech.											
Semester		SEMESTER OF												
Course	_	he knowledge, ski	lls and	attit	udes	of a	prof	fessional	Co	mputer				
Objectives	engineering pro													
(Minimum 3)		To become confident in designing engineering solutions to complex software												
	problems utilis	problems utilising a systems approach.												
CO1	Apply IT principle	ply IT principles for real-world problem-solving using programming languages and												
COI	network solutions.	s for rear-world pro	obieiii-sc	nving	using	g prog	granni	ning rang	uag	es and				
CO2		olex projects as a tea	m mom	har d	omon	ctrotiv	na off	ootivo po	rcor	val and				
COZ	team management.	nex projects as a tea		ber, u	emon	suaui	ng en	ective pe	ISOI	iai aiiu				
CO3		ning skills to creat	and o	) CCACC	cofts	vora	hards	wara and	1 n	atwork				
003	solutions	ing skins to creat	ie and a	155055	SOIL	ware,	naru	ware, and	1 110	ELWOIK				
CO4		team management	ckille ac	a prof	Paccion	nal co	ftwar	a davalon	or					
CO5	Appry personal and	team management	skiiis as	a proi	CSSIOI	nai so	rtwar	c develop	CI.					
	Cultivate employab	ility skills and upho	ld profes	ssiona	lism i	n soft	tware	developn	nent	- ·•				
Unit-No.	Com	tent	Conta	ot .	Loc	mnin	a Out	come	1	BL				
Cint-No.	Con	itent	Hour		Lea	a1 111111 ₃	g Out	Come		DL				
I	This course wi	ll be conducted	11041		his co	ourse	is de	signed as						
_		dividual or small						or small						
	•	ınder the direct						nder the						
	supervision of				uidan			academic						
	•	he specific project		-				ll embark						
		will reflect the						ned with						
	•	and expertise of			_	-	_	pervisors'						
	the student(s)	and supervisor.			ommo		intere							
	Students will be re	*			xperti			course						
		•			ntails		evera							
	1. Perform a	a literature search		c	ompo	nents	:	firstly,		- ,				
	to review	current knowledge	156		_			thorough	3	,5 and				
	and deve	elopments in the				_		o review		6				
		chnical area;		c	urrent	t kn	owled	lge and						
		detailed technical			evelo			n their						
		the chosen area			hosen	•	chnica							
		or more of:						nts will						
	0	theoretical studies			ngage	•	in	detailed						
	0	computer						utilizing						
		mulations			neoret		,	studies,						
	0	hardware					imula	tions, or						
		onstruction;			ardwa			struction						
		progress reports or						propriate						
		6 31to 31	<u> </u>			1	up	rispilate						

maintain a professional journal to establish work completed, and to schedule additional work within the time frame specified for the project;

- 4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;
- 5. Prepare a formal report describing the work undertaken and results obtained so far; and

Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

their project goals. Throughout the course, students will document their progress through regular progress reports or a professional journal, ensuring they stay on track within the project's specified timeframe.

Furthermore, students will deliver a seminar presentation to their communicate understanding of the general area of work and highlight their specific contributions to the field. They will also prepare a formal report detailing the scope of their work, methods employed, and results obtained thus far. Finally, course the culminates in a forum where students will present their work through poster presentations and demonstrations, showcasing operational hardware and software developed or utilized during their project. This integrated approach equips students not only with technical skills but also with essential communication and abilities presentation necessary for effectively sharing their research findings in an academic and professional context.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply IT principles for real-world problem-solving using programming languages and network solutions.	1,2,3,4,5,6,7,8,9,10,11 and 12
2	Contribute to complex projects as a team member, demonstrating effective personal and team management.	1,2,3,4,5,6,7,8,9,10,11 and 12
3	Develop programming skills to create and assess software, hardware, and network solutions	1,2,3,4,5,6,7,8,9,10,11 and 12
4	Apply personal and team management skills as a professional software developer.	1,2,3,4,5,6,7,8,9,10,11 and 12
5	Cultivate employability skills and uphold professionalism in software development.	1,2,3,4,5,6,7,8,9,10,11 and 12

Course code	Course Name		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
						_			-					
		CO 1	3	3	2	3	2	1	1	2	3	2	2	3
22BTCS412	Projec         2           t-II         CC           3	CO 2	3	3	3	3	2	1	1	2	3	2	2	3
R		CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		Co5	3	3	3	3	3	1	3	2	3	3	2	3

		SEMESTER -	- VII												
<b>Course Title</b>		Summe	er Inter	nshij	p										
Course code	22BTCS413R	Total credits: 3	L	T	P	S	R	O/F	C						
		Total hours:	0	0	0	0	0	0	2						
		45T+30P													
Pre-requisite	Nil	Co-requisite	Nil												
Programme			ech. C												
Semester		SEMESTER OF FO													
Course		with practical experi						_	-						
Objectives		nsition smoothly int		-	oles	by 1	nastei	ng mod	ern tools,						
(Minimum 3)		d industry-standard pr				:4		1							
		ts' soft skills, includ				_									
		and documentation, as well as office etiquette, to ensure they can effectively navigat and contribute to professional environments.													
		and contribute to professional environments.  Foster a deep understanding of professional and ethical responsibilities engineering, encouraging students to adhere to industry best practices, processes, a regulations													
	_														
	regulations.														
		lity to work effective	lv in te	ams	esneo	rially	with	in multidi	sciplinary						
		Promote the ability to work effectively in teams, especially within multidisciplina contexts, emphasizing collaboration, communication, and the integration of diver													
	perspectives and				,			- 8							
	^ ^	essional work ethic	characte	erized	by r	orodu	ctivit	y, consist	ency, and						
	_	paring students to mee							•						
		· ·				•			•						
CO1	Apply modern too	ls and technologies	in re	al-wo	orld	scena	rios	to solve	complex						
	engineering problem	S.													
CO2	A natura industry sta	ndand namenting math	ada ta m	مداه مس	t	hnica	1 doo	umanta ac	lhanina ta						
CO2	professional guidelin	ndard reporting methods	ous to p	roauc	e tec	IIIIICa	ii doc	uments ac	mering to						
CO3	• •	sing design, developr	nont or	d tos	ting r	rooti	000 ol	ianad wit	hourront						
CO3	industry standards.	sing design, developi	nent, an	iu ies	ung į	ласи	ces ai	igiicu wii	ii cuiteiii						
CO4	-	ve communication, to	eamwor	·k an	d int	erner	conal	ckille in	a multi-						
CO4	disciplinary team en		camwor	K, an	ia iii	cipci	sonai	SKIIIS III	a munti-						
CO5		al and ethical respon	cibilitio	s to	maka	info	rmad	docicion	in						
003	engineering practices	-	SIUIIIIIC	s to	шакс	illio	inea	uccision	5 111						
Unit-No.		atent	Contac	ot	Loc	rnin	a Out	come	KL						
UIIIt-NO.	Con	itent	Hour		Lea	ırıııı	g Oui	come	KL						
I	- G	.1.1111	11001												
1	• Summer intern	-													
	at least 90 hou	· ·													
	summer vacation	•													
	Department/Ins														
	help students	to find an													
	appropriate	4 /													
	company/indus														
	ion for th	ne summer													
	internship.														
	The student mu	•													
	get approved	a Summer													

- Internship Acceptance form by the company and provide it to the Coordinator of the department within the specified deadline.
- Students shall commence the internship after the approval of the department Coordinator. Summer internships in research centers is also allowed.
- During the entire period of internship, the student shall obey the rules and regulations of the company/industry/organizat ion and also those of the University.
- Due to inevitable reasons, if the student will not able to attend the internship for few days with the permission of the supervisor, the department Coordinator should be informed via email and these days should be compensated later.
- The student shall submit two documents to the Coordinator for the evaluation of the summer internship:
  - Summer Internship Report
  - Summer Internship
     Assessment Form
- Upon the completion of summer internship, a hard copy of "Summer Internship Report" must be submitted to the Coordinator by the first day of the new term.
- The report must outline the experience and observations gained through practical internship, in accordance with the required content and the format described in

this guideline. Each will be evaluated faculty member of department on satisfactory/unsatisfact basis at the beginning semester.  • If the evaluation report is unsatisfact shall be returned student for revision rewriting. If the report is still unsatis	by a of the a dectory g of the of the tory, it to the and/or revised
student for revision rewriting. If the	and/or revised sfactory all be

## **REFERENCE BOOKS:**

## OTHER LEARNING RESOURCES:

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply modern tools and technologies in real-world scenarios to solve complex engineering problems.	1,2,3,4,5,6,9,10 and 12
2	Analyse industry-standard reporting methods to produce technical documents adhering to professional guidelines.	1,2,3,4,5,6,9,10 and 12
3	Develop solutions using design, development, and testing practices aligned with current industry standards.	1,2,3,4,5,6,9,10 and 12
4	Demonstrate effective communication, teamwork, and interpersonal skills in a multi-disciplinary team environment.	1,2,3,4,5,6,9,10 and 12
5	Evaluate professional and ethical responsibilities to make informed decisions in engineering practices.	1,2,3,4,5,6,8,9,10 and 12

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
	Summe r Interns hip	CO 1	3	3	3	3	3	3			2	1		2
		CO 2	2	2	3	3	2	2			2	1		2
22BTCS41		CO 3	2	2	3	2	2	2			2	1		2
3R		CO 4	3	3	3	3	3	3			2	3		2
		CO 5	2	2	2	2	2	2		3	2	1		2
		AV G	2.4	2.4	2.8	2.6	2.4	2.4		3	2	1.4		2

		SEMESTE	R – VII								
<b>Course Title</b>		Techno I	Profession	nal S	kills `	VI					
Course code	22BTCS125R	Total credits: 1	L	T	P	S	R	0/	F	C	
		Total hours: 26	0	0	2	0	0	0		1	
		45T+30P									
Pre-requisite	Nil	Co-requisite		~~~			Nil				
Programme			. Tech. (		<b>A.D.</b> C	· · · · · ·	2001				
Semester	7TH SEMESTER OF FOURTH YEAR OF PROGRAM  1. To have a detailed revision of Computer Science & Engineering concepts learnt so									1 4	
Course		alled revision of Co	mputer S	cienc	e & I	Engin	eering	g conc	epts	s learnt so	
Objectives (Minimum 2)	far.	efidant in Computer	Sajanaa 8	r Enc	ringar	ina a	0 <b>n</b> 00 <b>n</b>	to to o	ماييم	nrohlomo	
(Minimum 3)	2. To become con in real-life situa	afident in Computer	Science &	x eng	gmeer	mg co	опсер	is to s	orve	problems	
	III Teat-IIIe Situa	ations.									
CO1	Develop highly ski	illed and knowledge	eable man	agen	nent r	rofes	sional	l who	can	deal with	
		spects of businesses		8	г						
		1									
CO2	Develop analytical	and research abilit	y as man	agem	nent p	rofes	sional	who	can	be more	
	efficient and innova				•						
CO3	Gather knowledge	Gather knowledge about various development concepts and the theories of development.									
CO4	Encourage the stud	ents towards Non-tra	aditional	think	ing.						
CO5	Effectively commu	nicate scientific and	technical	knov	wledg	e in a	profe	essiona	al m	anner.	
	J	medie scientifie dia	tecimical	KIIO							
Unit-No.	-	ntent	Contac				_	come		BL	
Unit-No.	Con	ntent	Contac Hour	t	Lea	rnin	g Out	come			
	Con	ntent	Contac	t Si	Lea tuden	ts ,	_				
Unit-No.	Con	ntent	Contac Hour	t Si	Lea tuden	ts cent	g Out will	beco	me C		
Unit-No.	Con	ntent	Contac Hour	Si pi	Lea tuden roficion rogran	ts tent	g Out will ir g, r	becon n master	me C		
Unit-No.	Con	ntent	Contac Hour	Si pi pi ac	Lea tuden roficion rograndvance	ts tent mmin	g Out will ir g, r featur	becon master res 1	me C ing		
Unit-No.	Con	ntent	Contac Hour	Si pi pi ac po	Lea tuden roficio rogran dvanc ointer	ts tent mmin ed s and	will ir g, r featur	becon master res l	me C ing ike		
Unit-No.	Con	ntent	Contac Hour	Si pi pi ac po ai	Lea tuden roficio rogran dvanc ointer nd i	ts yent mmin ed s and	g Out will ir g, r featur l file	becon master res 1 handli	me C ing ike ng,		
Unit-No.	Con	ntent	Contac Hour	Si pri pri accipo ari st	Lea tuden roficion rogrand dvance ointer and inter	ts yent mmin ed s and mpler	will ir g, r featur l file l mentin	becone naster res l handli ng d s arra	me C ing ike ng, lata	BL	
Unit-No.	Con	ntent	Contac Hour	Si pi pi ac po ai st lii	Lea tuden roficion rogrand dvance ointer and inter interucturanted	ts ts ent mmin ed mpler res sullists,	will ir g, r featur l file l mention	becon master res l handli ng d as arra	me C ing ike ng, lata iys,		
Unit-No.	Con	ntent	Contac Hour	Si pi ac po ar st lin tr	Lea tuden roficio rogran dvanc ointer nd i cructur nked	ts sent mmin ed mpler res stilists, and	will ir g, r featur l file l mentir uch a stacks graph	become  master res 1 handli ng d s arra s, queu	me C iing iike ng, lata ays, nes, ney	BL	
Unit-No.	Con	ntent	Contac Hour	Si pri pri acci po ari sti iri w	Lea tuden roficion rogrand dvance ointer and in cructuranted rees, vill	ts yent mmin ed s and mpler res su lists, and	g Out  will  ir g, r featur l file l mention uch a stacks graph so	becon master res 1 handli ng d s arra s, queu as. Th	me C iing iike ng, lata lys, nes, ney ply	BL	
Unit-No.	Con	ntent	Contac Hour	Si pri pri acci pri a	Lea tuden roficio rogran dvanc ointer nd i cructu- nked rees, vill	ts yent mmin ed s and mpler res silists, and almental	will  g, r featur l file l mentiouch a stacks graph so al	becon master master fes l handli ng d as arra s, queu as. Th ap	me C iing iike ng, lata lays, nes, ney ply	BL	
Unit-No.	Con	ntent	Contac Hour	Si pi pi ac po ai st lii tr w fu	Lea tuden roficio rogran dvanc ointer nd i cructu- nked rees, vill undan or sor	ts ts ent ed es and estand almental ting,	will  g, r featur l file l mentir uch a stacks graph lso al searcl	become  become  master res l handling d s arra s, queu as. Th ap	me C iing iike ng, lata lys, nes, ney ply	BL	
Unit-No.	Con	ntent	Contac Hour	Si pri pri acci pri a	Lea tuden roficio rogran dvanc ointer nd i cructu nked rees, vill undan or sor ashing	ts yent mmin ed s and mpler res si and almental ting, g, ena	will  g, r feature I file I mention uch a stacks graph lso al search abling	become  become  master  res I  handli  ng d  s arra  s, queu  ns. Th  ap  Igorith  ning, a  t them	me C iing iike ng, lata lays, less, ney ply lams and	BL	
Unit-No.	Con	ntent	Contac Hour	Si pri pri acci pri acci pri acci structuru w fu fu fu de	Lea tuden roficio rogran dvanc ointer nd i cructu nked rees, vill undam or sor ashing	ts yent mmin ed s and mpler and al nental ting, g, enap	will  g, r featur l file l mentir uch a stacks graph so al search abling	become  become  master res 1 handling das arras, queuens. The application of the ming, as them and the ming, as them are the ming, as them are the ming, as the m	me C iing iike ng, lata lys, nes, ney ply	BL	
Unit-No.	Con C Programming, I Algorithms	Data Structure and	Contac Hour 6	Si pri pri acci pri a	Lea tuden roficio rogran dvanc ointer nd i cructu nked rees, vill undan or sor ashing eveloj ptimiz	ts yent mmin ed s and mpler s si and almental ting, g, enapped ed pred pred treed tre	will  ir g, r featur l file l mention uch a stacks graph lso al search abling efficie	become become master res l handli ng d s arra s, queu ns. Th ap lgorith ning, a them nt a ms.	me C iing iike ng, lata lys, nes, ney ply ims and to	BL	
Unit-No.	Con C Programming, I Algorithms  Analog and D	ntent	Contac Hour	Si pri pri ad pri at st lii tr w fu fu do oj	tuden roficio rogran dvanc ointer nd i cructu nked ees, vill undan or sor ashing evelop ptimiz	ts yent mmin ed s and mpler res si and almental ting, g, enap e ezed prots yent manner to the state of the st	will  g, r featur l file l mentiouch a stacks graph so al search abling efficie rogran will	becone becone master res l handli ng d s arra s, queu ns. Th ap gorith ning, a them nt a ns. gain	me C ing ike ng, lata lays, les, les, les, lata lays in to land a	BL	
Unit-No.	Con C Programming, I Algorithms	Data Structure and	Contac Hour 6	Si pri pri accionali structura de de oj	tuden roficio rogran dvanc ointer nd i cructus nked rees, vill undan or sor ashing evelo ptimiz tuden noroug	ts yent mmin ed s and stists, and nental ting, g, enap ed potential ting, the state of the state	will  ir g, r featur l file l mention uch a stacks graph lso al search abling efficie rograr will dersta	becone becone master res l handli ng d as arra as, queu ns. Th ning, a them nt a ms. gain anding	me C ing ike ng, lata lys, nes, ney ply lams and a to and	BL	
Unit-No.	Con C Programming, I Algorithms  Analog and D	Data Structure and	Contac Hour 6	Si pri pri accion pri accional pri accion pri accional pri accion	tuden roficio rogran dvanc ointer nd i ructu nked rees, vill undan or sor ashing evelop ptimiz tuden noroug nalog	ts yent mmin ed s and mpler res si and almental ting, g, enap e zed prots yengh un	will  g, r feature I file I mention uch a stacks graph search abling efficie rogran will dersta	becone becone master res I handli ng d s arra s, queu ns. Th ap lgorith ning, a them nt a ns. gain anding dig	me C ing ike ng, lata lays, nes, ney ply lata to and a c of ital	<b>BL</b> 2,3	
Unit-No.	Con C Programming, I Algorithms  Analog and D	Data Structure and	Contac Hour 6	Si pri pri accion por an structure with fixed decorporation of the area of the	tuden roficio rogran dvanc ointer nd i cructur nked rees, rill undan or sor ashing evelop timiz tuden noroug nalog lectro	ts yent mmin ed s and al nental ting, g, ena p ezed prots verifications, and al nental ting, g, ena p ezed prots verifications, and al nental ting, ena p ezed prots verifications, and al nental ting, ena p ezed prots verifications, and enable ting, ena	will  g, r featur l file l mentinuch a stacks graph so al search abling efficie rogran will dersta and learn	become become master res l handling d s arra s, queu ns. Th ap lgorith ning, a them nt a ms. gain anding dig ning	me C ing ike ng, lata lys, nes, ney ply ams and a to and a fof ital the	BL	
Unit-No.	Con C Programming, I Algorithms  Analog and D	Data Structure and	Contac Hour 6	Si proposed and state of the st	tuden roficio rogran dvanc ointer nd i ructu nked rees, vill undan or sor ashing evelo ptimiz tuden noroug nalog lectro perati	ts yent mmin ed s and mpler res si and almental ting, g, enarch gh un anics, on a	will  g, r feature I file I mention uch a stacks graph search abling efficie rogran will dersta and learn nd d	become become master res I handli ng d s arra s, queu ns. Th application ing, a them nt a ms. gain anding dig ning esign	me C ing ike ng, lata lays, nes, ney ply ims and to and a c of ital the of	<b>BL</b> 2,3	
Unit-No.	Con C Programming, I Algorithms  Analog and D	Data Structure and	Contac Hour 6	Si pri pri ad pri at st lii tr w fu fu do oj	Lea tuden roficio rogran dvanc ointer nd i cructur nked rees, vill undam or sor ashing evelop ptimiz tuden noroug nalog lectro- perati	ts yent mmin ed s and mental ting, g, enapts with the work on a mental ting, on a mental ting.	will  g, r featur l file l mention uch a stacks graph so al search abling efficie rograr will dersta and learr nd d	become become master res l handling d s arra s, queu ns. Th ap lgorith ning, a them nt a ms. gain anding dig ning	me C ing ike ng, lata lays, les, lata lays, lata lays and lata lays and lata lata lata lata lata lata lata lat	<b>BL</b> 2,3	

	1		as well as disital assesses	
			as well as digital concepts	
			like binary numbers, logic	
			gates, and sequential logic	
			circuits. This knowledge	
			will equip them to analyze,	
			design, and troubleshoot	
			electronic systems.	
III	Computer Organization and	6	Students will understand	
	Architecture, Operating Systems		computer systems'	
			structure and functioning,	
			including the CPU,	
			memory, and I/O devices,	
			and will analyze	
			instruction sets and	
			performance optimization	
			techniques. They will also	2,3
			explore operating system	2,3
			concepts like process and	
			memory management, CPU scheduling, and	
			storage management,	
			equipping them to manage	
			system resources	
***	D. 1. M. C.		efficiently.	
IV	Database Management Systems,	6	Students will develop a	
	Object Oriented Programming		strong foundation in	
			database design, SQL, and	
			ensuring database integrity	
			and security, while also	
			gaining proficiency in	
			object-oriented	
			programming principles	2,3
			such as classes,	
			inheritance, and	
			polymorphism. This unit	
			prepares them to design	
			robust software systems	
			and manage complex	
			databases effectively.	
V	Formal Language and Automata	4	Students will understand	
			the theoretical foundations	
			of computer science	
			through formal languages,	
			grammars, and automata	
			theory, analyzing different	2,3
			types of automata such as	-
			finite automata and Turing	
			machines. This knowledge	
			provides a deep	
			understanding of	
			and or standing of	287

computation limits and the	
formal frameworks	
underpinning	
programming languages	
and algorithms.	

#### **REFERENCE BOOKS:**

- **R1.** "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- **R2**. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
- **R3.** Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- **R4.** M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- **R5**. Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- R6. S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- **R7**. Stallings, Computer Organization & Architecture, Pearson.
- **R8.**Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.
- R9. C. K. Nagpal, Formal Languages and Automata Theory, Oxford University Press.
- R10. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, Database System Concepts, McGraw Hill.

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses	1,2,3,4,5,6,7,8,9,10,11 and 12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice	1,2,3,4,5,6,7,8,9,10,11 and 12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,6,7,8,9,10,11 and 12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,6,7,8,9,10,11 and 12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,6,7,8,9,10,11 and 12

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1	3	3	3	2	3	1	1	1	1	1	1	1
		CO												
	Techno Professio nal Skills	2	2	2	2	2	2	1	1	1	1	1	1	1
**************************************		CO												
22BTCS12		3	3	2	3	2	3	1	1	1	1	1	1	1
5R		CO												
	VI	4	3	3	3	2	3	1	1	1	1	1	1	1
		CO												
		5	3	3	3	3	3	1	1	1	1	1	1	1
		AV	20	2.6	20	2.2	20	1	1	1	1	1	1	1
		G	2.8	2.6	2.8	2.2	2.8	1	1	1	1		1	1

		SEMESTE	R – 8													
Course		PE-VI: Natura	l Langua	age Pi	rocessir	ng										
Title					1 _		T									
Course coo	de 22BTCS127R	Total credits: 3	L	T	P	S	R	O/F	C							
<b>D</b>	2701	Total hours: 45T	3	0	0	0	0	0	3							
Pre-	Nil	Co-requisite				N	11									
requisite Programm	no Poshol	on of Toohnology in (	Compute													
Semester	Dacher Dacher	8th semester of fou	_			_		g								
Course	1. Explore human lan							renresenta	tion in							
Objectives	•	guage processing pa	nadigins,	11121	pnas	.s, and	ı text	representa	11011 111							
(Minimum	_	guistic resources like	e corpora	. Tre	e Bank	. and t	ools su	ich as GA'	ΓE and							
3)	NLTK for NLP tasks.		F	,		,										
	3. Acquire proficiency in	language modeling, p	oarsing, s	emant	tics, and	disco	urse									
	analysis, applying them	nalysis, applying them to real-world NLP applications.  Define human languages and NLP paradigms, applying comprehension skills to identif														
CO1	Define human language	es and NLP paradign	ms, appl	ying	compre	hensio	n skills	s to identif	y text							
	representation schemes.															
CO2	Evaluate linguistic reso	ources, demonstrating	XML 1	nanag	gement	profici	iency 1	using GAT	E and							
	NLTK.															
CO3	Construct word recognit		ular expr	ession	ns and I	Finite S	State A	utomata, ap	plying							
CO4	N-gram models with pro	· · · · · · · · · · · · · · · · · · ·	4 4	<b>C</b>		C	44'	·	σ							
CO4	Analyze natural language	e structures, employin	g context	-free	gramma	ars for s	syntacti	ic parsing								
CO5	Justify NLP application	s, integrating seman	tic analy	sis ar	nd disco	ourse 1	resoluti	on techniq	ues for							
	diverse tasks.		·					•								
<b>T</b> T *4			<b>G</b> 4	<u>.                                     </u>		•	0.4		DI							
Unit-	Conter	it	Contac	t	Le	earning	g Outco	ome	BL							
No.	Introduction to Natural Lan	nguaga Propagaing	Hour 12	Lo	orn f	undom	ntola	of NLP,								
1	introduction to Natural Lai	iguage Processing	12		cluding			processing,								
					nguage	sentiment										
					0		dels, machin	e learning	2,3							
					-			l language								
				_	ıderstan			0 0								
II	Linguistic Resources and T	Cools	10				nguisti	c resources								
	-			an			for	analyzing,								
				pr	ocessin	g, an	d unc	derstanding	2, 3							
				laı	nguage	data	effect	ively and								
					ficiently											
III	Language Modeling and A	nalysis	8					techniques								
					r buil	_		-	+ $+$ $+$ $+$ $+$							
					_			els for text								
***	G . 1P .				alysis a											
IV	Syntax and Parsing		8		_	_		yntax and								
					_		-	sentences	1 / 4							
						_		al structure								
				an	d deper	1										

V	Semantics, Discourse, and Applications	8	Explore semantic theories,	
			discourse analysis, and their practical applications in natural language understanding and generation	4,5
Practic al	NA	30		1,2, 3,4

T1 Daniel Jurafsky and James H Martin. Speech and Language Processing, 2e, Pearson Education, 2009

# **REFERENCE BOOKS:**

R1 James A.. Natural language Understanding 2e, Pearson Education, 1994

R2 Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000

R3 Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping											
SN	Course Outcome (CO)	Mapped Program Outcome										
1	Able to explain the fundamentals and advances of cytology including structure and functions of cell and cell organelles.	1, 2, 3, 4, 5, 11, 12										
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 11, 12										
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 9, 10, 11, 12										
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 9, 10, 11, 12										
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 9, 10, 11, 12										

Course code	Cours	CO	PO	PO1	PO1	PO1								
	e	S	1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO												
		1	3	3	1	2							2	2
	NLP	CO												
		2	3	3	1	2	2						2	1
<b>22BTCS12</b>		CO												
7R		3	2	2	3	2	2				1	2	1	3
		CO												
		4	2	2	3	2	2				1	1	1	2
		CO												
		5	2	2	2	1	2				1	1	1	2

Title		_													
Course co	ode 22BTCS127R	Fotal credits: 3	L	T	P	S	R	O/F	C						
	7	Fotal hours: 45T	3	0	0	0	0	0	3						
Pre-	Nil	Co-requisite				N	il		•						
requisite															
Program	ne Bachelo	or of Technology in C	ompute	r Scie	nce an	d Engi	ineerin	g							
Semester		8th semester of four	th year	of the	progr	amme									
Course	Grasp the basics of s	speech production, per	ception,	and d	igital si	gnal p	rocessin	ng techniqu	es for						
Objective	s analysis and synthes	is.													
(Minimun	<b>n</b> 2. Explore automatic sp	peech recognition syste	ems, incl	luding	HMM	and do	eep lear	ning approa	aches,						
3)	for accurate speech i	ecognition and speake	r identif	icatio	n.										
	_	deo signal processing,				_			ation,						
	and advanced topics	like object tracking, d	eep learı	ning, a	and AR	/VR ap	plication	ons.							
CO1	Analyze speech production and perception mechanisms applying DSD fundamentals t														
	Analyze speech production and perception mechanisms, applying DSP fundamen														
	process speech signals eff	fectively.													
CO2	Implement speech coding	techniques and synth	esis syst	ems.	utilizin	g featu	res like	MFCC an	d LPC						
002	for efficient speech proce			,		5 10000	100 11110	1111 00 411							
CO3	Evaluate the performance		mployin	g HM	IM and	deep	learnin	g approach	es for						
	accurate speech recognition	· · · · · · · · · · · · · · · · · · ·	_	5				<b>6 11</b>							
CO4	Create video processing s	•		dge o	f video	signal	s, comp	ression sta	ndards						
	and motion estimation for			-		_									
CO5	Apply advanced technique	•	_	_	_		rveillan	ice applicat	ions to						
	analyze and enhance vide	os, paving the way for	· AR and	VR i	nnovati	ons.									
Unit-	Content	t	Contact	t I	Le	arning	g Outco	ome	BL						
No.			Hour				•								
I	Introduction to Speech Pr	ocessing: Basics of	12	Ur	derstar	nd fund	lamenta	ls of							
	Speech Production and Pero	ception. Speech		spe	eech pr	ocessir	ıg, inclu	ıding							
	Signal Characteristics. Phor	netics and		_	_		-	thesis, and							
	Phonology. Digital Signal F	Processing		sig	nal ana	lysis to	echniqu	es.	2,3						
	Fundamentals for Speech. T	Time-Domain													
	Methods for Speech Process	sing. Short-Time													
	Fourier Transform, Wavelet	t Transform.													
II	Speech Analysis and Synt	hesis: Feature	10	Le	arn te	chniqu	es for	analysing							
	Extraction: MFCC, LPC, Pl	LP. Speech Coding		and	d syntl	nesizin	g speed	ch signals,							
	Techniques. Speech Enhand	cement and Noise		foo	cusing	on pra	ctical a	pplications							
	Reduction. Text-to-Speech	(TTS) Systems.		an	d tools.				3,4						
	Speech Synthesis Technique	es: Formant													
	Synthesis, Concatenative Sy	ynthesis, Parametric													
	Synthesis.														
III	Speech Recognition	and Speaker	8	Ur	derstar	nd a	and	implement	3,4						
	<b>Identification:</b> Automatic 3	Speech Recognition		tec	hnique	s for	automa	tic speech	3,4						
		1							292						

SEMESTER – 8

PE-VI: Speech and Video Processing

Course

	(ASR) Systems. Hidden Markov Models		recognition and speaker	
	(HMM) for Speech Recognition. Deep		identification, focusing on	
	Learning Approaches in ASR. Language		accuracy and efficiency.	
	Models and Acoustic Models. Speaker			
	Identification and Verification. Applications of			
	Speech Recognition in Industry.			
IV	<b>B</b> asics of Video Signals and Systems. Video	8	Understand fundamentals of video	
	Capture and Representation. Color Spaces and		signals including processing	
	Color Models. Video Compression Standards:		techniques and practical	
	H. Introduction to Video Processing264,		applications.	2,3
	HEVC. Motion Estimation and Compensation.			
	Key Frame Extraction and Video			
	Summarization.			
V	Advanced Topics in Video Processing: Video	8	Master advanced video processing	
	Segmentation and Object Tracking. Video		techniques, including	
	Enhancement and Restoration. Deep Learning		segmentation, object tracking,	
	for Video Analysis. Action Recognition and		enhancement, and restoration.	4,5
	Video Understanding. Video Surveillance and			4,5
	Security Applications. Introduction to			
	Augmented Reality (AR) and Virtual Reality			
	(VR) Applications			
Practic	NA	30		1,2,
al				3,4

**T1**Rabiner, L., & Schafer, R. (2007). *Introduction to Digital Speech Processing*. Foundations and Trends in Signal Processing.

T2 Gonzalez, R. C., & Woods, R. E. (2018). Digital Image Processing. Pearson.

T3 Gonzalez, R. C., & Woods, R. E. (2018). Digital Image Processing. Pearson.

# **REFERENCE BOOKS:**

R1Jurafsky, D., & Martin, J. H. (2008). Speech and Language Processing. Pearson.

R2Szeliski, R. (2010). Computer Vision: Algorithms and Applications. Springer.

R3 Richardson, I. E. (2010). The H.264 Advanced Video Compression Standard. Wiley.

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 11, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 11, 12
3	Learn and develop skills for operating microscope,	1, 2, 3, 4, 5, 9, 10, 11, 12
	preparing slides by various staining techniques	
4	Apply knowledge of cellular processes to explain how cells	1, 2, 3, 4, 5, 9, 10, 11, 12
	operate and interact within living organisms.	
5	Demonstrate a comprehensive understanding of cell	1, 2, 3, 4, 5, 9, 10, 11, 12
	structure and function.	

Course	Course	CO	PO	PO	PO	P	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	s	1	2	3	О	5	6	7	8	9	0	1	2
						4								
		CO												
		1												
			3	3	1	2							2	2
	Speech	CO												
22BTCS12	and	2	3	3	1	2	2						2	1
7R	Video	CO												
/1	Processi	3	2	2	3	2	2				1	2	1	3
	ng	CO												
		4	2	2	3	2	2				1	1	1	2
		CO												
		5	2	2	2	1	2				1	1	1	2

		SEMEST	TER – 8								
Course		PE-VII: A	dvanced I	ata N	<b>lining</b>						
Title					1		r				
Course co	ode 22BTCS128R	Total credits: 3	L	T	P	S	R	O/F		С	
_		Total hours: 45T	3	0	0	0	0	0		3	
Pre-	Nil Co-requisite Nil										
requisite		A.T. 1	<u> </u>	<b>a</b> •		1.77					
Programm	ne Bache	lor of Technology in					neerin	g			
Semester	1 Understand and and	8th semester of fo	-						1	4:	
Course Objective	Understand and apples metrics and model selections		insupervise	ı iear	ning an	gorium	ns aioi	ig with e	vai	uation	
(Minimun			ıms sentim	≏ntan	alveie	tonic m	nodelin	g and we	sh n	nininc	
3)	techniques.	tupii iiiiiiig uigoritii	iiiis, sentiiii	ciit aii	iaiy515,	topic ii	ioaciiii	s, and we	<i>50</i> 11	311111111	
	3. Learn advanced data	mining methods li	ke deep lea	rning	, transf	er lear	ning, a	nd addre	ss e	ethical	
	concerns in data mining	-	r	0			٠, ٠.				
CO1	Apply decision trees,	•	networks	in pr	actical	examp	oles to	underst	and	how	
	supervise d learning wor	ks.		_		_					
CO2	Evaluate K-means and I	DBSCAN clustering	algorithms	to lea	rn abou	ıt unsuj	pervise	d data mi	nin	g and	
	how to interpret results 6	<u>*</u>									
CO3	Analyze network struct	0 0 1	neory princ	ples	and alg	orithm	s like	PageRan	k to	find	
	important insights in gra	ph data.									
CO4	•		and web	mının	ig tech	nıques	to ex	mact and		naiyze	
CO4	Use sentiment analysis information from text an		and web	mının	ig tech	nıques	to ex	ii act aiic		naiyze	
CO4	•	nd web data.									
	information from text an	nd web data.  ta, use deep learning	ng models,								
CO5	Evaluate time series da advanced data mining sk	nd web data.  ta, use deep learnin  cills in real-world sco	ng models, enarios.	and c	consider	· ethica	al aspe	cts to de		nstrate	
CO5	information from text an  Evaluate time series da	nd web data.  ta, use deep learnin  cills in real-world sco	ng models, enarios.	and c	consider	· ethica		cts to de			
CO5 Unit- No.	Evaluate time series da advanced data mining sk	nd web data.  ta, use deep learnin  tills in real-world sco	ng models, enarios.  Contac Hour	and c	consider Le	ethica	al aspec	ome		nstrate	
CO5	Evaluate time series da advanced data mining sk	nd web data.  ta, use deep learnin  tills in real-world sco	ng models, enarios.	and c	consider Le	ethica earning	aspece of a spece of a	ome mining		nstrate	
CO5 Unit-No.	Evaluate time series da advanced data mining sk	nd web data.  ta, use deep learnin  tills in real-world sco	ng models, enarios.  Contac Hour	and c	Le aster su ethods a	ethica earning	d aspect	ome mining	moi	nstrate	
CO5 Unit-No.	Evaluate time series da advanced data mining sk	nd web data.  ta, use deep learnin  tills in real-world sco	ng models, enarios.  Contac Hour	and c	Le aster su ethods a	ethica arning pervise and eva	d aspect	ome mining neir	moi ve	nstrate	
CO5 Unit- No.	Evaluate time series da advanced data mining sk	ta, use deep learning tills in real-world sco	ng models, enarios.  Contac Hour	and c	Le aster su ethods a fectiven odeling aster un	pervise and classing and classi	d aspect	ome mining neir predictive tion tasks	mor	nstrate	
CO5 Unit- No. I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a	ta, use deep learning tills in real-world sco	ng models, enarios.  Contac Hour  12	and contact of the state of the	aster su ethods a fectiven odeling aster unchnique	pervise and classupervise and supervise and	g Outco	mining neir predictivition tasks ata mininuate the	more we see in the second seco	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a	ta, use deep learning tills in real-world sco	ng models, enarios.  Contac Hour  12	and contact and co	aster su ethods a fectiven odeling aster un chnique ficacy i	pervise and class and class and class and clust	g Outco	ome mining neir predictive tion tasks	more we see in the second seco	nstrate	
CO5  Unit- No.  I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining	ta, use deep learning tills in real-world sco	Contac Hour 12	and contact and co	aster suethods a fectiven odeling aster unchnique ficacy is scovery	pervise and class and clust tasks.	ed data aluate the solving assification evaluated described as	mining meir predictivition tasks ata minimum the	we ss.	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a	ta, use deep learning tills in real-world sco	ng models, enarios.  Contac Hour  12	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery	pervise and eva and cla ansupervise and cla supervise and clast supervise and clast graph	d aspected data aluate the solving assification with evaluation and the solving assification of the solving assifi	mining meir predictivition tasks ata mining uate the	more we will be a second of the second of th	BL 4,5	
CO5  Unit- No.  I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining	ta, use deep learning tills in real-world sco	Contac Hour 12	and control of the co	aster su ethods a fectiven odeling aster unchnique ficacy i scovery tilize chnique	pervise and class and class and clust tasks.	ed data cluate the solving assification evaluation and data analyzed	mining neir predictivata mining ata mining ata mining ata mining ata mining ata mining ata mining e comple	more we see in the see	BL 4,5	
CO5  Unit- No.  I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining	ta, use deep learning tills in real-world sco	Contac Hour 12	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery cilize chnique lationsh	pervise and class and class and class tasks.  graph s to a lips a	ed data aluate the solving assification of the evaluation of the e	mining meir predictivation tasks ata mining uate the and patte	more we see in the see	BL 4,5	
CO5  Unit- No.  I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining  Graph Data Mining	ta, use deep learning tills in real-world sco	rig models, enarios.  Contac Hour  12  10	and control of the co	aster suethods a fectiven odeling aster unchnique ficacy i scovery tilize chnique lationsh terconne	pervise and class and class and class tasks.  graph s to ips a ected d	ed data cluate the solving assification evaluates analyzed at a structure of the solving at a st	mining neir spredictivation tasks at a mining uate the and pattern atterns actures.	more we say the say th	BL 4,5	
CO5  Unit- No.  I	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining	ta, use deep learning tills in real-world sco	Contac Hour 12	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery cilize chnique lationsh terconne	pervise and classes and classes and classes and classes and classes are tasks.  graph s to a pected dext are	ed data cluate the solving assification of the evaluation of the e	mining meir predictivition tasks ata mining atta mining and patte a mining comple atterns actures.	more we see that the see that t	<b>BL</b> 4,5 4,5	
CO5  Unit- No.  I  III	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining  Graph Data Mining	ta, use deep learning tills in real-world sco	rig models, enarios.  Contac Hour  12  10	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery cilize chnique lationsh terconne	pervise and evanuess in supervise and class and class tasks.  graph s to ips a ected dext ar s to ext	ed data aluate the solving assification and partial attaction and partial attaction and we tract in	mining neir spredictivation tasks at a mining uate the and pattern atterns actures.	more we see in the see	BL 4,5	
CO5  Unit- No.  I  III	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining  Graph Data Mining	ta, use deep learning tills in real-world sco	rig models, enarios.  Contac Hour  12  10	and control of the co	aster suethods a fectiven odeling aster unchnique ficacy i scovery cilize chnique lationsh terconnoply to chnique	pervise and evanuess in supervise and class and class tasks.  graph s to ips a ected dext ar s to ext	ed data aluate the solving assification and partial attaction and partial attaction and we tract in	mining meir predictivition tasks ata mining uate the mining comple atterns actures.	more we see in the see	<b>BL</b> 4,5 4,5	
CO5  Unit- No.  I  III	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining a  Unsupervised Data Mining  Graph Data Mining	ta, use deep learning tills in real-world scont nt nd Evaluation	rig models, enarios.  Contac Hour  12  10	and control of the co	aster suethods a fectivent chnique ficacy is scovery cilize chnique lationsh terconnecting to the chnique chnique extructururces.	pervise and evanuess in standers and class tasks.  graph storights are ected dext are stoext are detected dext are described a	data analyze ata strund we tract in ata analyze ata ata	mining meir predictivition tasks ata mining uate the mining comple atterns actures.	more more more more more more more more	<b>BL</b> 4,5 4,5	
Unit-No. I II III	Evaluate time series da advanced data mining sk  Conter  Supervised Data Mining at Unsupervised Data Mining  Graph Data Mining  Text and Web Mining	ta, use deep learning tills in real-world scont nt nd Evaluation	rig models, enarios.  Contac Hour  12  10  8	and control of the co	aster surethods a fectiven odeling aster unchnique ficacy i scovery cilize chnique lationsh terconne oply to chnique astructururces.	pervise and evanuess in supervise tasks. graph s to ips a ected dext are s to extred dut advantations.	ed data cluate the solving assification and para attract in atta.	mining meir predictivation tasks ata mining uate the mining to comple atterns actures. b mining sights fro	more we see in a see	4,5 4,5	

			applications and methodologies.	
Practic al	NA	30		1,2, 3,4

T1"Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei

# **REFERENCE BOOKS:**

R1"Pattern Recognition and Machine Learning" by Christopher M. Bishop

R2 "Introduction to Data Mining" by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	2	2	2	1					1		3
22BTCS12	Advanc	CO 2	3	3	3	3	1					1		3
8R	ed Data Mining	CO 3	3	2	2	2	1					1		3
		CO 4	3	2	2	2	1					1		3
		CO 5	3	3	2	2	1					1		3

		SEMESTE	R – 8											
Course Title		PE-VII: Data Mo	odelling	and S	Simulat	tion								
Course co	de 22BTCS128R	Total credits: 3	L	T	P	S	R	O/F	С					
		Total hours: 45T	3	0	0	0	0	0	3					
Pre-	Nil	Co-requisite				N	il							
requisite														
Programn	ne Bache	lor of Technology in (						ıg						
Semester		8th semester of fourth year of the programme  idents with a comprehensive understanding of the fundamental principles of data												
Course		•		_				principles	of data					
Objectives		•							,					
(Minimun		2.Enable students to develop, validate, and assess mathematical and statistical models using world data, ensuring accuracy and reliability.												
3)		•		lation	, taabai		nd tool	a to aolivo a	ommlov					
	3.Provide practical expending and industry	11.	erse siint	паног	i teciiii	iques a	na toon	s to solve c	ompiex					
CO1			modellin	a and	cimula	otion i	ncludin	g types of	models					
CO1 Understand the fundamental concepts of data modelling and simulation, including types of and their applications, through analysis of case studies.														
CO2	Develop and validate m			ls usi	ng nrol	nahility	distrib	utions, hvn	othesis					
002	_				<b>6</b> P100	, we 1110j	0150110	weromo, my p	01110010					
CO3		esting, and regression analysis for real-world data scenarios.  mplement discrete-event, continuous, and Monte Carlo simulations using simulation software,												
	ensuring accurate model						C		ĺ					
CO4	Analyze complex system	ms using advanced sin	nulation	techn	iques s	uch as	system	dynamics	, agent-					
	based modelling, and op	timization methods like	e genetic	algor	rithms.									
CO5	Apply data modalling a	Apply data modelling and simulation techniques to solve industry-specific problems, demonstrating												
COS	ethical and practical con	-			iusu y-s	респіс	proble	ins, demon	strating					
	etinear and practical con	siderations in rear-wor	ia projec											
Unit-	Conte	nt	Contac	t	Le	earning	g Outco	ome	BL					
No.			Hour											
I	Introduction to Data	Ü	12					al concepts						
	Simulation: Overview	C					_	simulation						
	Types of Models: Phy							predicting						
	· · · · · · · · · · · · · · · · · · ·	mulation Models.		co	mplex	system	S.		2 2					
	Introduction to Simulat								2, 3					
	Importance. Steps in a Applications of Modellin	*												
	Engineering. Case Students	-												
	Modelling and Simulation													
II	Mathematical and Sta	•	10	Aı	pply	matl	nematic	al and						
	Mathematical Modelling							chniques to						
	Stochastic Models. St						•	blems and						
	Probability Distributions,				terpret		•							
	Regression Analysis. M	• •			-				2, 3					
	Assumptions, Formulation	on, and Validation.												
	Data Collection and Prepa	ration for Modelling.												
	Model Fitting and Pa	rameter Estimation.												
Ī	Goodness-of-Fit Tests.			- 1										

III	Simulation Techniques and Tools: Types of	8	Learn to analyze data and data	
	Simulations: Discrete-Event, Continuous, and		modelling algorithms though	
	Monte Carlo Simulations. Simulation		simulations	
	Methodologies: Time-Driven, Event-Driven,			
	and Process-Oriented Approaches.			
	Introduction to Simulation Software:			4, 5
	MATLAB, Simulink, Arena, AnyLogic.			
	Building Simulation Models: Entity, Attribute,			
	Event, and Queue Concepts. Verification and			
	Validation of Simulation Models. Output			
	Analysis and Interpretation.			
IV	Advanced Topics in Simulation: System	8	Learn to analyze data and data	
	Dynamics and Agent-Based Modelling. Hybrid		modelling algorithms through	
	Simulation Techniques. Optimization in		simulations	
	Simulation: Genetic Algorithms, Simulated			
	Annealing. Simulation of Complex Systems:			3, 4
	Supply Chains, Healthcare, Manufacturing			
	Systems. Real-Time and Parallel Simulations.			
	Case Studies of Advanced Simulations in			
	Industry.			
V	Real-world Applications: Application of Data	8	Apply data modelling techniques	
	Modelling and Simulation in Real-World		and algorithms to solve real world	
	Scenarios. Industry-Specific Simulation		problems	
	Projects: Finance, Engineering, IT,			3, 4
	Environmental Systems. End-to-End			3, 4
	Modelling and Simulation of a Given Problem.			
	Ethical and Practical Considerations in Data			
	Modelling and Simulation.			
Practic	NA	30		1,2,
al		•		3,4

T1 Law, A. M., & Kelton, W. D. (2015). Simulation Modeling and Analysis. McGraw-Hill.

T2 Banks, J., Carson, J. S., Nelson, B. L., & Nicol, D. M. (2010). Discrete-Event System Simulation. Pearson.

# **REFERENCE BOOKS:**

R1Ross, S. M. (2014). Introduction to Probability Models. Academic Press.

R2 Jain, R. (2010). The Art of Computer Systems Performance Analysis. Wiley.

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOME

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Data	CO 1	3	2	2	2	1					1		3
22BTCS12	Data Modellin g and	CO 2	3	3	3	3	1					1		3
8R	Simulati on	CO 3	3	2	2	2	1					1		3
		CO 4	3	2	2	2	1					1		3
		CO 5	3	3	2	2	1					1		3

			SEMESTE	R – 8											
<b>Course Tit</b>	tle	PE-V	III: Introduction to	Virtual	and	Augn	nent	ed Rea	ality						
Course coo	de	22BTCS129R	Total credits: 3	L	T	P	S	R	O/F	C					
			Total hours: 45T	3	0	0	0	0	0	3					
Pre-requis	site	Nil	Co-requisite					Nil							
Programm	1e		r of Technology in (						eering						
Semester		8th semester of fourth year of the programme													
Course		1.Understand core concepts, historical context, and hardware, preparing for practical													
Objectives		evelopment and app													
(Minimum		Acquire skills in en	ind int	eract	ion de	sign, usin	ig popular								
3)		•	te Unity or Unreal E	•	1.										
		•	industry uses, eth		•				ging tren	ds, while					
001			d development techn						VD	1 4 D					
CO1		nderstand key nist volution.	orical milestones ar	ia techn	ologi	cai ac	ivano	emen	ts in VR	and AR					
CO2			amantal principles	of 2D m	and al	ing or	d in	torooti	on docion	for VD					
CO2		nderstand the fund ivironments.	amental principles	ת אר זו	iouel	mg ar	iu III	cracti	on design	1 10F VK					
CO3			ks and design princ	cinles to	cre	ate im	merc	ive A	R evneri	ences for					
03		obile devices.	.ks and design pilli	cipies it	, 0100	1111	mici S	IVC A	к слрен	101					
CO4			implications and s	ocietal	impa	cts of	· VR	/AR a	applicatio	ns across					
		verse industries.	impireurions und	0010141	mpu	0.00	, , _,	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	аррисано	ns across					
CO5		Design and develop an innovative VR/AR application integrating advanced techniques and													
	te	echnologies.													
Unit-No.		Conte	nt	Contac	et	Lea	rnin	g Out	come	BL					
				Hour											
I	Fou	ndations of Virtua	l and Augmented	12	U	nderst	tand	he							
	Rea	lity			fı	ındam	ental	princi	iples and						
							_		d virtual	2,3					
						nd aug	•		ılity						
				applications.											
II	Virt	tual Reality Develor	oment	10			-		e virtual						
						-	_		es using						
						dvance		tools		3, 6					
						chniq		for	various						
***		15 11 5	1			pplicat	ions								
III	Aug	gmented Reality De	velopment	8		reate	4. 1	in	teractive						
						ugmen			reality						
						pplicat		1	using						
						dvance			elopment	3,6					
							ind		ques for						
						iverse		re	eal-world						
<b>**</b> 7		1' .' 1 * * * *	,			cenario		1 .	1						
IV	App	olications and Use C	Cases	8		xplore			nplement						
					_			_	tions of	4, 5					
						-		-	y across						
					ir	dustri	es i	or e	nhancing						

Practical	NA		experiences, integrating AR/VR technologies for interactive social interactions.	4,6
V	Advanced Topics: AR/VR Development Techniques, social VR experiences	8	Master development techniques for creating immersive social VR	
TV.	Advanced Torical ADAID Development	0	user experiences and functionality.	

T1"Augmented Reality: Principles and Practice" by Dieter Schmalstieg and Tobias Hollerer

# **REFERENCE BOOKS:**

R1"Virtual Reality Technology" by Grigore C. Burdea and Philippe Coiffet

R2"Virtual Reality: Concepts and Technologies" edited by Giovanna Calogiuri

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	_
SN	Course Outcome (CO)	Mapped Program Outcome
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2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course code	Course Name	CO s	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	1	1	1					1		2
	Introducti on to	CO 2	3	3	3	3	2					2		3
22BTCS12 9R	Virtual and	CO 3	3	2	3	3	3					2		3
	Augmente d Reality	CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

		SEMESTE	2R-8								
Course		PE-VIII: Cryptography &Network Security									
Title		<del>,</del>							_		
Course	22BTCS129R	Total credits: 3	L	T	P	S	R	O/F	C		
code		Total hours: 45T	3	0	0	0	0	0	3		
Pre-	Nil	Co-requisite					Nil				
requisite											
Programi	me Bachelo	r of Technology in (						eering			
Semester	1 T	8th semester of fou									
Course Objective	1.To provide deeper threats/vulnerabilities	_				рриса	uon t	o networi	security,		
(Minimur						niane	e etr	enoths o	f Traffic		
3)	Confidentiality, Mess			uon	teem	inque	s, sti	enguis e	'i iiaiiic		
	3.To familiarize Digit	-		ovide	e solut	ions f	or the	ir issues.			
	4.To familiarize with	-	_						nication of		
	two parties over an in	<b>71</b> C 1	•		,						
	of a message.										
CO1	Identify basic security	attacks and services	S.								
CO2	*	Use symmetric and asymmetric key algorithms for cryptography.  Design a security solution for a given application.									
CO3		• 11		4	C	1.	Tl.				
CO4	Analyze Key Manage	ment techniques and	the imp	ortan	ice of	numb	er i ne	eory.			
CO5	Understanding of Au	thentication function	ns the n	nanne	er in v	which	Mess	sage Auth	entication		
	Codes and Hash Fund	tions work.									
Unit-	Conte	Content Contact Learning Outcome						come	BL		
No.			Hour								
I	INTRODUCTION: Se	•	12					tional			
	•	tecture, Security			_			graphy			
	Attacks, Security Serv	*						curity for			
	Mechanisms, A mod	iel for Network			ecurin			nd data.			
	security. CLASSICAL	ENCRYPTION			Jiiiiiu	meau	ons ai	iu uata.	3, 4		
		mmetric Cipher									
	Modes, Substitute	C.p.i.o.									
	Techniques, Transpos	ition Techniques.									
	Rotor Machines, Stenog	-									
II	BLOCK CIPHER	AND DATA	10	A	nalyz	e ar	nd ii	nplement			
	ENCRYPTION STAI	NDARDS: Block		b	lock c			ithms and			
	Cipher				• •			ards for			
	Principles, Data Enci	yption Standards,					trai	nsmission			
	the Strength of DES			aı	nd sto	rage.			4,5		
	Linear Crypt Analys	is, Block Cipher							.,5		
	Design Principles.										
	ADVANCED	ENCRYPTION									
	STANDARDS: Evalu										
	AES, the AES Cip	ner. MORE ON									

Encryption, Triple DES, Block Cipher Modes of Operation, Stream Cipher and RC4.  III PUBLIC KEY CRYPTOGRAPHY AND RSA: Principles Public key crypto Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.  MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACS. HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Kerberos, X.509Authentication Service, Public Key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,		SYMMETRIC CIPHERS: Multiple			
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PUBLIC KEY CRYPTOGRAPHY AND RSA: Principles Public key crypto Systems, Diffie Hellman Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.    MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.   HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature, Standard.    IV					
RSA: Principles Public key crypto Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.  MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACS. HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Kerberos, X.509Authentication Service, Public key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,	III	*	8	Understand and apply	
Systems, Diffie Hellman Key Exchange, the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.  MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.  HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC.  DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Kerberos, X.509Authentication Service, Public Key Infrastructure.  EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME.  IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.  FIREWALL: Firewall Design principles,			-	11 2	
the RSA algorithm, Key Management, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.  MESSAGE AUTHENTICATION AND HASH FUNCTIONS: Authentication Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs.  HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC.  DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature, Authentication Service, Public Key Infrastructure.  EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME.  IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.  FIREWALL: Firewall Design principles,		_			
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Requirement, Authentication Function, Message Authentication Code, Hash Function, Security of Hash Function and MACs. HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Kerberos, X.509Authentication Service, Public Key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,				C	
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MACS. HASH AND MAC ALGORITHM: Secure Hash Algorithm, Whirlpool, HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Kerberos, X.509Authentication Service, Public Key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  A Develop and evaluate authentication methods for secure access control and identity verification in various applications.  4, 5  Understand and apply web security measures to protect against vulnerabilities and threats in online environments.					
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HMAC, CMAC. DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: Rerberos, X.509Authentication Service, Public Key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,		HASH AND MAC ALGORITHM:			
DIGITAL SIGNATURE: Digital Signature, Authentication Protocol, Digital Signature Standard.  IV AUTHENTICATION APPLICATION: 8 Develop and evaluate Authentication Service, Public Key Infrastructure. EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME. IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,		Secure Hash Algorithm, Whirlpool,			
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EMAILSECURITY: Pretty Good Privacy (PGP) and S/MIME.  IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  identity verification in various applications.  4, 5  Understand and apply web security measures to protect against vulnerabilities and threats in online environments.		Kerberos, X.509Authentication Service,		authentication methods for	
(PGP) and S/MIME.  IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  Various applications.  4, 5  Understand and apply web security measures to protect against vulnerabilities and threats in online environments.		Public Key Infrastructure.		secure access control and	
IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  4, 5  Understand and apply web security measures to protect against vulnerabilities and threats in online environments.		· · · · · · · · · · · · · · · · · · ·		<b>*</b>	
IPSECURITY: Overview, IP Security Architecture, Authentication Header, Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  In the security of the security measures to protect against vulnerabilities and threats in online environments.  2,3		(PGP) and S/MIME.		various applications.	4.5
Encapsulating Security Pay load, Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  Encapsulating Security Pay load, Combining Security Associations and Understand and apply web security measures to protect against vulnerabilities and threats in online environments.		IPSECURITY: Overview, IP Security			7, 3
Combining Security Associations and Key Management.  V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.  FIREWALL: Firewall Design principles,  Security Associations and Understand and apply web security measures to protect against vulnerabilities and threats in online environments.		Architecture, Authentication Header,			
V       WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats.       8       Understand and apply web security measures to protect against vulnerabilities and threats in online environments.         2,3		Encapsulating Security Pay load,			
V WEB SECURITY: Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  8 Understand and apply web security measures to protect against vulnerabilities and threats in online environments.  2,3					
Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  security measures to protect against vulnerabilities and threats in online environments.  2,3					
Security (TLS), Secure Electronic Transaction (SET), Intruders, Viruses and related threats. FIREWALL: Firewall Design principles,  against vulnerabilities and threats in online environments.	V		8	** *	
Transaction (SET), Intruders, Viruses and related threats.  FIREWALL: Firewall Design principles,  threats in online environments.				_	
related threats.  FIREWALL: Firewall Design principles,  environments.				_	
FIREWALL: Firewall Design principles,					2,3
				environments.	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1					
Trusted Systems		Trusted Systems			
Practical NA	Practical	NA	20		1001
30 1,2,3,4			30		1,2,3,4

- **T1** William Stallings (2006), Cryptography and Network Security: Principles and Practice,4th edition, Pearson Education, India.
- **T2** William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

# **REFERENCE BOOKS:**

**R1** Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.

**R2** Atul Kahate (2008), Cryptography and Network Security, 2nd edition, Tata McGraw hill, India.

Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata McGraw-Hill, India.

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12					
	including structure and functions of cell and cell organelles.						
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12					
3	Learn and develop skills for operating microscope, preparing	1, 2, 3, 4, 5, 10, 12					
	slides by various staining techniques						
4	Apply knowledge of cellular processes to explain how cells	1, 2, 3, 4, 5, 10, 12					
	operate and interact within living organisms.						
5	Demonstrate a comprehensive understanding of cell structure	1, 2, 3, 4, 5, 10, 12					
	and function.						

Course	Course	CO	PO	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	1	1					1		2
	Cryptogra	CO 2	3	3	3	3	2					2		3
22BTCS1 29R	phy & Network	CO 3	3	2	3	3	3					2		3
	Security	CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

		SEMESTER	. – 8						
<b>Course Titl</b>	e	Proj	ect III						
Course cod	e 22BTCS421R	Total credits: 7	L	T	P	S	R	O/F	С
		Total hours: 156 P	0	0	14	0	0	0	7
Pre-requisi	te Nil	Co-requisite			•		Nil	•	•
Programmo	e Bachelo	or of Technology in C	omput	ter S	cience	and	Engir	eering	
Semester		8th semester of fourt							
Course		knowledge gained thro					gram	to solve	real-world
Objectives	r -	innovative solutions in	•						
(Minimum	_	ficiency in project pla	_					-	_
3)	_	ment analysis, design,	_			-	-		
	-	ndent research, explo				-			_
GO1		ancement of knowledg		_					
CO1	Apply IT principles network solutions.	for real-world proble	em-sol	ving	using	prog	ramm	ing langu	ages and
CO2		oioats as a taam maml	har da	mon	atrotin	a offe	otivo	narcanal	and taam
CO2	management skills.	ojects as a team memb	ber, de	HIOH	Strating	g ene	cuve	personar	and team
CO3		ing skills to create a	and as	CACC	softw	are	hardu	vare and	network
003	solution.	ing skins to create t	ana as	13033	SOILW	arc,	nara w	arc, and	network
CO4		eam management skill	ls as a 1	profe	ssiona	1 soft	ware (	developer	
	ippij personar and			p101 <b>0</b>	5510114	2 5510	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ac , crop cr	•
CO5	Cultivate employabi	ity skills and uphold p	rofessi	ionali	ism in	softw	are d	evelopme	nt.
Unit-No.	Conte	ent	Contac	Learning Outcome			come	BL	
			Hour						
I	This course will be con	nducted largely as	156	Iı	ndeper	ndent	ly con	ceive,	
	an individual or small	group project		d	esign,	impl	ement	, and	
	under the direct superv	vision of a member		p	resent	a sig	nifica	nt	
	of academic staff. The				•			project,	
	topic undertaken will i				emons		_		
	interests and expertise				echnic	_		-	
	and supervisor. Studer	ts will be required					ving s	kills, and	
	to:			11	nnovat	ion.			
	6. Perform a liter	actives soonals to							
		knowledge and							
	developments	-							5,6
	technical area:								3,0
	7. Undertake det								
		osen area using							
	one or more of	· ·							
	· · · · · · · · · · · · · · · · · · ·	pretical studies							
		nputer simulations							
	c) hard	dware construction;							
	0 5 1	,							
	8. Produce progr	-							
	maintain a pro	fessional journal to							

	establish work completed, and to schedule additional work within the time frame specified for the project;  9. Deliver a seminar on the general		
	area of work being undertaken and specific contributions to that field;  10. Prepare a formal report describing the work undertaken and results obtained so far; and		
	Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.		
Practical	NA	30	1,2,3,4

# OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12				
	including structure and functions of cell and cell organelles.					
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12				
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12				
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12				
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12				

Course code	Cours	CO	PO	PO1	PO1	PO1								
	e	S	1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO 1	3	3	2	3	2	1	1	2	3	2	2	3
22D/F/C/C/42		CO 2	3	3	3	3	2	1	1	2	3	2	2	3
22BTCS42 1R	Proje ct III	CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		CO 5												



# **Curriculum and Syllabus**

# **Bachelor of Technology**

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# Computer Science and Engineering on Data Science and Artificial Intelligence

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 1.0

# FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

# Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson

Board of Studies

Member Secretary

Academic Council

# Vision

To become a Globally Recognized University from North Eastern Region of India, Dedicated to the Holistic Development of Students and Making Society Better

# Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators.
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

# **Programme Details**

# Programme Overview (not more than 100 words)

Bachelor of Technology in Computer Science and Engineering is an Under Graduate Degree awarded for the programme of Computer Science and Engineering. As one of the best computer engineering colleges, we intend to create a cohesive learning experience with the latest technological developments to that of industry demand.

# I. Specific Features of the Curriculum

The B. Tech CSE curriculum, guided by the outlined Program Specific Outcomes (PSOs), emphasizes a comprehensive educational framework. It prepares students for competitive exams through updated and focused syllabi. It integrates advanced research principles with sustainable technology applications, ensuring graduates possess the necessary engineering and management skills for societal impact. The curriculum fosters effective communication, teamwork, and project management in multidisciplinary settings. Additionally, it incorporates contemporary industrial and research trends, encouraging innovation and entrepreneurial proficiency. This holistic approach equips students to develop novel software engineering solutions, addressing real-world problems with cutting-edge techniques and strategies.

# II. Eligibility Criteria:

Minimum 45% with English, Physics & Mathematics in HS.

# **III.** Program Educational Objectives (PEOs):

- **PEO 1:** To produce graduates who have strong foundation of knowledge and skills in the field of Computer Science and Engineering.
- **PEO 2:** To produce graduates who can provide solutions to challenging problems in their profession by applying Computer Engineering theory and practices.
- **PEO 3:** To produce graduates who are employable in industries/public sector/research organizations or work as an entrepreneur, as well as can provide leadership and are effective in multidisciplinary environment.

# **IV.** Program Specific Outcomes (PSOs):

# **PSO 1: Educational Advancement**

Graduates will be prepared for state, national and international competitive examinations with focused and updated syllabi.

# **PSO 2: Advanced Research**

Graduates will have a holistic comprehension of engineering and management principles

required for application of sustainable technologies for societal development, and also will be able to communicate effectively in oral, written, visual and graphic modes as a member and leader in a team, to manage projects in multidisciplinary environments.

# **PSO 3: Entrepreneurial Proficiency**

Graduates will be acquainted with the contemporary trends in industrial/research environments and also will capable of innovating novel solutions to prevailing problems by applying software engineering techniques and strategies.

# V. Program Outcome: (8-12)

- PO1 Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- PO3 Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- PO5 Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6 The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7 Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

# VI. Total Credits to be Earned: 176

# VII. Career Prospects:

A B. Tech in Computer Science and Engineering (CSE) offers diverse and promising career prospects. Graduates can pursue roles such as software developers, data scientists, cybersecurity analysts, and AI/ML engineers in top tech firms. They are well-suited for positions in research and development, working on cutting-edge technologies. The curriculum also prepares them for competitive exams, enabling careers in public sector and government organizations. Additionally, the strong emphasis on entrepreneurial skills allows graduates to innovate and launch their own start-ups. With rapid advancements in technology, CSE graduates remain in high demand across various industries, ensuring robust career opportunities.

# **EVALUATION METHODS**

The student performance shall be evaluated through In-semester (Sessional) and semester-end examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

# A. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting insemester (sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks Allotted
1	In Company I (ICE I) (White a English tion)*	
1.	In-Sem Exam – I (ISE-I) (Written Examination)*	30
2.	In-Sem Exam – II (ISE-II) (Written Examination)*	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

# **INSTRUCTION**

- If a student fails to appear in the any of the component without any valid reason he/she shall be
  marked zero in that component. However, the course teacher at his discretion may arrange for the
  missed test on an alternate date for the absentee students after determining ground with
  genuine/valid reasons for the absent.
- 2. The report of evaluation of an activity towards the in-semester (sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.
- 3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

# **B. SEMESTER END EXAMINATION:**

Time table for end semester examination is published at least 25 days prior to the start of Examination.

# I. Pre-Examination:

# Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

# II. Admit Card:

Admit card for the examination may be downloaded through ERP where the system will generate a Unique ID Cards through online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

# **III. Pattern of Question Papers:**

The question paper shall follow the principles of Bloom's Taxonomy. Table

S. N.	Level	Questions /verbs for test				
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.				
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.				
3	Apply	Predict, apply, solve, illustrate, determine, examine, modify				
4	Analyse	Classify, outline, categorize, analyze, diagrams, illustrate, infer, etc.				
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.				
6	Create	Design, Formulate, Modify, Develop, integrate, etc.				

Note: No course is to be evaluated on basis of all 6 knowledge levels.

The format of the question paper across all the program follow a unique pattern and the total marks is 60

Table 1: Question paper pattern for End semester examination

Sl no	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

# **IV. Examination Duration:**

Each paper of 60 marks shall ordinarily be of two hours duration.

# V. Practical Examinations, Viva-Voce etc.:

- i) Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

# VI. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the centre may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the exam with new answer sheet or may expel the student from appearing the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribe expulsion form. The student may not be allowed to write that examination.

# **VII.** Instruction to the Students:

- (i) The students shall not bring to the Examination Hall, any electronic gadget used as a means of communication or record except electronic calculator, if required.
- (ii) The students shall not receive any book or printed or hand written or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during course of examination.
- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.

- (iv) The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi) The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix) The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

# **VIII.** Provision for an Amanuensis (writer):

- (i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by Medical Certificate from a competent Medical Officer.
- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.
- (iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

# C. Credit Point:

It is the product of grade point and number of credits for a course, thus,  $CP = GP \times CR$ 

# i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

# ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

# iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

- (i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.
- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in Table 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

**Table 2: Letter Grades and Grade Points** 

Letter Grade	Grade Points	Description
O	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
С	5	Average
P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

# iv. Grade Point Average:

# a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} C_{i}G_{i}}{\sum_{i=1}^{n} C_{i}}$$
(1.1)

The SGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

# **b.** CGPA (Cumulative Grade Point Average)

- (i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrolment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrolment.
- (ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and Ci is the Credit (weight)of that Course.

$$CGPA = \frac{\sum_{i=1}^{N} C_{i}G_{i}}{\sum_{i=1}^{N} C_{i}}$$
(1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

# **D.** Post-Examination

# i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

# ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

- (i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.
- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a University appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or viva voce and wish to appear again may apply to be evaluated can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of Vice Chancellor.
- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.

(ix)	If as a result of revaluation of the candidate attracts the provision of condonation of deficiency,
	the same may be applied to his/her only for fresh attempt.

# INSTRUCTION TO TEACHERS AND STUDENTS

# (Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

# 1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centric classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- a. **Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programme the student has to undergo project-based learning at least 4 months duration. This approach will help the student to think critically, evaluate, analyze, make decisions, collaborate, and more.
- **b.** Inquiry-Based Learning: The teacher/ students are supposed to list at least five questions in each contact hour and student solve these question or search for answer which becomes the home work for the students "question-driven" learning approach. The teacher may look for the correctness of the solution or the best possible answer and discuss in the successive class. This will help in the preparation for various competitive examination and develop a habit for search for solutions.

- c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watchvideo or lecture prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time inclassroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are more passive to an approach where students are active participants. As a result, this approach is also a student- centric teaching method.
- **d.** Cooperative Learning: The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

### The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence of	
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

### Inquiry-based approach has to be followed in all of the classes

The teacher has to distribute the topics to be considered for teaching by the above-mentioned approaches and prepare a lesson plan for execution and maintain a file.

# **Curriculum Framework**

# **Breakdown of Credits**

Sl. No	Category	Total credits
1	University Core (UC)	13
2	University Elective (UE)	18
3	Program Core (PC)	123
4	Program Elective (PE)	24
5	Faculty Elective (FE)	7
		185

### Breakdown by category of courses:

Sl no	Category	Credits	%
1	Science	22	11.89%
2	Engineering	128	69.18%
3	Commerce and Management	35	18.91%
Total		185	100%

			B.Tech C	CSE (DS &	k AI) C	ur	ric	ulu	ım	20	22-2	6			
	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	Total Marks
	1	Engineering Mathematic s I	22BTCS111R	DSC (Minor) / PC	4	3	1	0	0	0	0	40	60	0	100
	2	Introduction to Basic Mathematic s, Logic and Coding	22BTCS112R	DSC (Major) / PC	4	2	1	2	0	0	0	40	60	100	200
Semest	3	Engineering Physics	22BTCS113R	DSC (Minor) / PC	4	2	1	2	0	0	0	40	60	100	200
er I	4	Basic Electrical Engineering	22BTCS114R	DSC (Minor) / PC	4	2	1	2	0	0	0	40	60	100	200
·	5	Workshop / Manufacturi ng Practices	22BTCS115R	DSC (Minor) / PC	3	1	0	4	0	0	0	40	60	100	200
	6	Introductory English for Engineers	22UBPD114R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	7	Extra- Curricular	22UBEC111	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
Ţ		Tota	al Credit in 1st	Semester	22	1 0	4	1 4	4	0	0	200	300	600	1100
Semest er II	<u>Sl.N</u> <u>0</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
	1	Engineering Mathematic s II	22BTCS121R	DSC (Minor) / PC	4	3	1	0	0	0	0	40	60	0	100

Semest er III	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
		Total	Credit in 2nd	Semester	24	1 0	2	1 8	18	0	0	200	300	900	1400
	12	Extra- Curricular	22UBEC121	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Co- Curricular	22UBCC121	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Computatio nal Systems and Digital World	22UCDL103 R	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	9	UHV+ Program Ethics	22UUHV101 R	VAC / UC	2	1	0	2	0	0	0	40	60	0	100
	8	MOOCS I	22MOSY124 R	AEC / CBCS / FE	1	0	0	0	0	0	0	0	0	100	100
	7	Effective English for Engineers	22UBPD124R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	6	Techno Professional Skills I	22BTCS125R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	5	Engineering Graphics and Design	22BTCS124R	DSC (Minor) / PC	3	1	0	4	0	0	0	40	60	100	200
	4	Programmin g for Problem Solving	22BTCS123R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	2	Engineering Chemistry	22BTCS122R	DSC (Minor) / PC	4	2	1	2	0	0	0	40	60	100	200

Semest	<u>Sl.N</u>	Course	Course Code	Categor	Cred	L	Т	P	S	R	0/	Max In-Sem	Max End-	Max End	TOTA L
		Total	Credit in 3rd	Semester	23	1 2	0	1 6	8	0	0	200	300	1000	1500
	12	Extra- Curricular	22UBEC211	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Co- Curricular	22UBCC211	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	MOOCS II	2MOCECS21 7R	MDC / FE	1	0	0	0	0	0	0	0	0	100	100
	9	English for Employabili ty for Engineers	22UBPD214R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	Personal Financial Planning	22UUFL213R	MDC / UE	1	0	0	2	0	0	0	0	0	100	100
	7	Basic Life Saving Skills	22UULS212R	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	6	Techno Professional Skills II	22BTCS216R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	5	Mathematic s III (Differential Calculus)	22BTCS215R	DSC (Minor) / PC	2	2	0	0	0	0	0	40	60	0	100
	4	Biology for Engineers	22BTCS214R	DSC (Minor) / PC	2	2	0	0	0	0	0	40	60	0	100
	3	Data Structure & Algorithms	22BTCS213R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	2	Digital Electronic Circuits	22BTCS212R	DSC (Minor) / PC	3	2	0	2	0	0	0	40	60	100	200
	1	Analog Electronic Circuits	22BTCS211R	DSC (Minor) / PC	4	3	0	2	0	0	0	40	60	100	200

er IV	<u>o</u>	Title		y I	it						F	Marks [Theor y]	Sem Marks [Theor y]	Sem Practic al Marks	Marks
	1	Computer Organizatio n & Architecture	22BTCS221R	DSC (Major) / PC	3	2	1	0	0	0	0	40	60	0	100
	2	Operating Systems	22BTCS222R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	Design & Analysis of Algorithms	22BTCS223R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
	4	Discrete Mathematic s	22BTCS224R	DSC (Minor) / PC	4	3	1	0	0	0	0	40	60	0	100
	5	Techno Program Skills III	22BTCS225R	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	6	Environmen tal Science	22BTCS226R	SEC / PC	2	2	0	0	0	0	0	40	60	0	100
	7	English Language Proficiency for Engineers	22UBPD224R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS III	22MOCS221 R	SEC / FE	1	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC221	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC221	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Basic Acclimatizi ng Skills (BAS)	22UULS201R	MDC / UE	1	0	0	2	0	0	0	40	60	0	100
		Tota	l Credit in 4th	Semester	23	1 3	2	1 0	8	0	0	240	360	600	1200

	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
	1	Signals and Systems	22BTCS311R	DSC (Minor) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	Database Managemen t Systems	22BTCS312R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	Formal Language and Automata Theory	22BTCS313R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
Semest	4	Object Oriented Programmin g	22BTCS314R	DSC (Major) / PC	5	3	0	4	0	0	0	40	60	100	200
er V	5	Program Elective I	22BTCS316R	PE	3	3	0	0	0	0	0	40	60	0	100
	6	Techno Program Skills IV	22BTCS315R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	Competent English for Engineers	22UBPD314R	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS IV	MOOCSCEC S4	MDC / FE	2	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC311	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC311	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Predictive Analysis	22BTCS316R	DSC (Major) / PC	3	2	0	2	0	0	0	40	60	100	100

		Tota	l Credit in 5th	Semester	28	1 7	0	1 4	8	0	0	240	360	800	1300
	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
	1	Compiler Design	22BTCS321R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	0	100
	2	Computer Networks	22BTCS322R	DSC (Major) / PC	4	3	0	2	0	0	0	40	60	100	200
	3	Program Elective II	22BTCS317R	PE	3	3	0	0	0	0	0	40	60	0	100
	4	Program Elective III	22BTCS318R	PE	3	3	0	0	0	0	0	40	60	0	100
Semest	5	Project I	22BTCS323R	DSC (Major) / PC	4	0	0	8	0	0	0	0	0	100	100
er VI	6	Techno Program Skills V	22BTCS324R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	Corporate Proficiency for Engineers	22UBPD324R	VAC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	MOOCS V	MOOCSCEC S6	MDC / FE	2	0	0	0	0	0	0	0	0	100	100
	9	Co- Curricular	22UBCC321	Co- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	10	Extra- Curricular	22UBEC321	Extra- Curricul ar / UC	1	0	0	0	4	0	0	0	0	100	100
	11	Data Science	22BTCS325R	DSC (Major) / UC	3	2	0	2	0	0	0	40	60	100	100
		Tota	l Credit in 6th	Semester	28	1	0	2	8	0	0	200	300	800	1200

						4		0							
	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
	1	Software Engineering	22BTCS411R	DSC (Major) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	Program Elective IV	22BTCS414R	PE	3	2	1	0	0	0	0	40	60	0	100
	3	Program Elective V	22BTCS416R	PE	3	2	1	0	0	0	0	40	60	0	100
Semest er VII	4	Project II	22BTCS412R	DSC (Major) / PC	6	0	0	1 2	0	0	0	0	0	100	100
	5	Summer Internship	22BTCS412R	Summer Internshi p / PC	2	0	0	0	0	0	0	0	0	100	100
	6	Techno Program Skills VI	22BTCS125R	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	Artificial Intelligence	22BTCS413R	DSC (Major) / UC	3	2	0	2	0	0	0	40	60	100	100
		Tota	l Credit in 7th	Semester	21	9	2	1 6	0	0	0	160	240	400	700
Semest	<u>Sl.N</u> <u>o</u>	Course Title	Course Code	Categor y I	Cred it	L	Т	P	S	R	O/ F	Max In-Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTA L Marks
er VIII	1	Program Elective VI	22BTCS127R	PE	3	3	0	0	0	0	0	40	60	0	100
	2	Program Elective VII	22BTCS128R	PE	3	3	0	0	0	0	0	40	60	0	100
	3	Program Elective	22BTCS129R	PE	3	3	0	0	0	0	0	40	60	0	100

	VIII													
4	Project III	22BTCS421R	DSC (Major) / PC	7	0	0	1 4	0	0	0	0	0	100	100
	Tota	l Credit in 8th	Semester	16	9	0	1 4	0	0	0	120	180	100	400

List of Program Electives (PE)Paper									
Semester	Program Electives No.	Electives Name							
V	PE-I	1. Foundation of Data Science 2. Neural Network							
VI	PE-II	1.Artifical Intelligence 2. Data Mining							
VI	PE-III	1. Machine Learning 2. Big Data Analytics							
VII	PE-IV	1. Data Handling and Visualization 2. Computer Vision							
VII	PE-V	1. Predictive Analysis 2. Social Network Analysis							
	PE-VI	1. Natural Language Processing 2. Speech and Video Processing							
VIII	PE-VII	1. Advanced Data Mining 2. Data Modeling and Simulation							
	PE-VIII	1. Introduction to Virtual and Augmented Reality 2. Cryptography and Network Security							

					·						
Semester	Credit	L	T	P	S	R	O/F	Max In-Sem Marks [Theory]	Max End-Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
1	22	10	4	14	4	0	0	200	300	600	1100
2	24	10	2	18	8	0	0	200	300	900	1400
3	23	12	0	16	8	0	0	200	300	1000	1500
4	23	13	2	12	8	0	0	240	360	600	1200
5	28	17	0	13	8	0	0	240	360	800	1300
6	28	14	0	19	8	0	0	200	300	800	1200
7	21	9	2	15	0	0	0	160	240	400	700
8	16	9	0	14	0	0	0	120	180	100	400
Total	185	94	10	121	44	0	0	1560	2340	5200	8800

List of MOOCS									
Sl. No	MOOCS Course No	Course Code	Semester						
1	MOOCS I	ENHANCING STUDY SKILLS	22MOSY124R	· II					
2	MOOCS I	COMMUNITY ENGAGEMENT AND SOCIAL RESPONSIBILITY	22MOSY125R	11					
1	MOOCS II	HTML		· III					
2	MOOCS II	Foundation of Cybersecurity		111					
1	MOOCS III	Writing, Running and Fixing Code in C		IV					
2	MOOCS III	Foundations of Digital Marketing and E-Commerce		1 V					
1	MOOCS IV	JAVASCRIPT, JQUERY, AND JSON	MOOCSCECS4	V					
2	MOOCS IV	INTERMEDIATE POSTGRESQL		v					
1	MOOCS V	Mean Stack		V					
2	MOOCS V	Java Full Stack Developer	MOOCSCECS7	v					

	SEMESTER – I							
Course Title		Engineering Mat	hematics	I				
Course code	22BTCS111R	Total credits: 4	L T			R	O/F	C
		Total hours: 39T	3 1	. 0	0	0	0	4
Pre-requisite	Mathematics	Co-requisite			•	Nil		
Programme	Bachelor	r of Technology in Compu	uter Scien	ce & l	Engi	neeri	ng	
Semester		1						
Course	To make understand to	evaluate definite and imp	ronor into	orolo	Anos	rt from	n thasa	
Objectives		like Beta and Gamma func	•	_	•		n tnese	
(Minimum 3)	-	ion of differential and integ			ouu	eu.		
		e convergence and divergen	-		and a	arias		
CO1		egrals and computation of						etrating
COI	proficiency in integration		surface a	icas ai	iu vo	nume	s, ucilion	strating
CO2		n and mean value theorems	s to analyz	e func	rtion	e enci	uring cor	centual
CO2	mastery.	i and mean value meorems	s to analyz	c runc	, tion	s, C115	uring cor	iceptuai
CO3	· · · · · · · · · · · · · · · · · · ·	of sequences and series, ap	onlying tes	sts and	Con	struct	ing nowe	er series
	for functions.	or sequences and series, ap	, p 1, 1118 to	, , ,			g po	201100
CO4		functions, determining lin	nits, conti	nuity,	and	extre	ma using	partial
	derivatives and Lagran			•				
CO5		nce in matrix operations,	eigenvalu	e con	nputa	tions,	, and ort	hogonal
	transformations, applyi	ng linear algebra principles	S.					
Unit-No.	Co	ntent	Contact	Lea	arnii	ng Ou	tcome	BL
			Hour					
I	Calculus:		8	Eval	uates	defi	nite and	3, 5
	Evaluates and involut	es; Evaluation of definite		impr	_		ntegrals,	
		rals; Beta and Gamma		Beta			Gamma	
		operties; Applications of		func			applies	
	_	valuate surface areas and		_	-		calculate	
	volumes of revolution			surfa		area		
						nc	of	
II	Calculus:		12	revo			d apply	2, 3
11	Calculus:		12	Roll			heorem,	2, 3
	Rolle's Theorem,	Mean value theorems,		Mea		1	Value	
	Taylor's and Mac	laurin theorems with		Theo		s	varue	
	remainders; indete	rminate forms and				aclau	rin	
	L'Hospital's rule; Max	ima and minima.		serie			with	
				rema		rs,		
							ule, and	
				techi	nique	es for	finding	
				maxi	ima/ı	ninin	ıa.	
III	Sequences and series	:	8	Gras	р со	nverg	gence of	3, 4
	G			sequ	ence	s/serie	es,	
	-	ence and series, tests for			-		analyze	
	~	series, Taylor's series,		^		ıylor		
	_	ial, trigonometric and Fourier series: Half range		and		ıdy	Fourier	
	sine and cosine series.	~		serie	-		lf-range	
	Sine and cosine series,	i alsoval s illeutelli.		expa	nsio	ns,	and	

			Parseval's theorem.	
IV	Multivariable Calculus(Differentiation):  Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	6	Understand and apply limits, continuity, partial/directional/total derivatives, tangent planes, extrema, Lagrange multipliers, and gradient, curl, and divergence concepts.	2, 3
V	Matrices:  Inverse and rank of a matrix, rank- nullity theorem; System of linear equations; Symmetric, skew-symmetric	5	Understand and apply matrix inverses, rank, rank-nullity theorem, solve linear systems, and analyze symmetric and skew-symmetric matrices.	2, 3

- **T1:** G.B. Thomas and R.L. Finney, "Calculus and Analytic Geometry", 9th Edition, Pearson, Reprint, 2002.
- **T2:** Erwin kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
- **T3:** Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2010.

### **REFERENCE BOOKS:**

- **R1:** N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2008.
- **R2:** B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

### **OTHER LEARNING RESOURCES:**

**O1:** https://archive.nptel.ac.in/courses/111/105/111105121/

**O2:** https://www.geeksforgeeks.org/engineering-mathematics-tutorials/

**O3:** https://www.udemy.com/course/mathematics-for-engineering/

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand definite integrals and computation of surface areas and volumes, demonstrating proficiency in integration techniques.	1,2, 3, 4, 5, 10, 12						
2	Utilize Rolle's Theorem and mean value theorems to analyze functions, ensuring conceptual mastery.	1,2, 3, 4, 5, 10, 12						
3	Evaluate convergence of sequences and series, applying tests and constructing power series for functions.	1,2, 3, 4, 5, 10, 12						
4	Analyze multivariable functions, determining limits, continuity, and extrema using partial derivatives and Lagrange multipliers.	1,2, 3, 4, 5, 10, 12						
5	Demonstrate competence in matrix operations, eigenvalue computations, and orthogonal transformations, applying linear algebra principles.	1,2, 3, 4, 5, 10, 12						

Course code	Course Name	CO s	PO 1	PO 2	P O	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	1 (0.2220				3									
		CO 1	3	2	3	3	3					3		2
22BTCS11	Engineeri	CO 2	2	2	2	2	2					3		2
1R	ng Mathemat ics I	CO 3	2	2	2	2	2					3		2
		CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

		SEMES'	ΓER	- I						
Course Title	Int	roduction to Bas	ic M	athem	atics	, Logi	ic and	d Cod	ing	
Course code	22BTCS112R	Total credits: 4		L	T	P	S	R	O/F	С
		Total hours:		2	1	2	0	0	0	4
		45T+30P								
Pre-requisite	NIL	Co-requisite	;					Nil		
Programme	Bachel	or of Technolog	y in (	Comp	uter S	Scienc	e & 1	Engin	eering	
Semester				1						
Course	To understand and		_	_						atics
Objectives	To develop the abil	•	_				_	•		
(Minimum 3)	To become confide	~	matic	es, logi	ic, rea	sonin	g and	codir	ng to analy	ze and
	solve problems in re									
CO1	The students will	be able to demo	onstr	ate the	e abil	lity to	und	lerstar	nd the co	ncepts of
	mathematics, logic,									
CO2	Students will be ab		-		of co	oncept	s in	other	discipline	s such as
	engineering, compu									
CO3	Solve and devise so	olutions to a range	e of	elemer	ntary 1	real-w	orld	proble	ems in ma	thematics
	and programming									
CO4	Explore and apply l		-							
CO5	Enable students to		se in	nforma	tion i	in orc	der to	eval	luate evid	ence and
	construct reasoned									
Unit-No.	Con	tent	(	Contac Hour		Lea	rnin	g Out	come	BL
I	Basics of Set	Theory and	d	10		Inders	stand		sets,	2, 3
	<b>Functions:</b>				c	ardina	ılity,	O	perations	
					(ι	ınion,	inte	ersecti	ion), De	
	Sets: Basic defin	itions, cardinalit	y		N	Iorgai	n	laws,	Venn	
	of a set, principle	of exclusion an	d		d	iagrar	ns,		relations,	
	inclusion, combi	nation of sets	s:		fı	ınctio	ns,		number	
	union, intersect	ion, difference	e,		S	ystem	s,	and	basic	
	complement etc.,	De Morgan laws	S,		O	perati	ons.			
	Venn Diagram									
	Cartesian Produc	cts and Relations	s:							
	Basic Definitions,	binary relations								
	- composition an	d inverse, binar	y							
	relation on a s		-							
	reflexive, irrefle	· •								
	anti-symmetric,	transitive	´							
	equivalence relati	ons, partial orde	er							
	relations									
	Functions: Basic	•								
	and co-domain, i									
	identity function,									
	onto function									
	characteristic fund	-								
	of functions, inve									
	operations on sets:									
	idempotence, bir	• •	-							
	associativity, com	mutativity								

I	<b>Number systems:</b> Natural numbers,			
	1			
	whole numbers, integers, rational numbers, real numbers, operations			
	on numbers: addition, subtraction,			
II	multiplication and division  Introduction to Mathematical	8	Loam touth values logical	2, 3
11	Logic and Induction:	o	Learn truth values, logical operators, De Morgan	2, 3
	Logic and induction.		laws, propositional logic	
	Mathematical Logic: Truth values		concepts (constants,	
			*	
	,		variables, tautology), and	
	formulas in mathematical logic,		principles of mathematical	
	logical operators - AND, OR, NOT		induction.	
	etc, De Morgan Laws, Truth values			
	of formulas, Truth tables			
	Propositional Logic: Constants,			
	variables, assignment of variables in			
	a formula, tautology, contradiction			
	and satisfiability, truth table of a			
	formula, equivalence of formulas,			
	proving formulas and equivalences			
	by truth table method			
	<b>Mathematical Induction:</b> Principle			
	of mathematical induction –			
	induction basis and induction step,			
	examples			
III	Introduction to Logic and	10	Master alphanumeric	3, 4
III	Reasoning:	10	series, direction sense,	3, 4
III	9	10	•	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data	10	series, direction sense,	3, 4
III	Reasoning: Alphanumeric series, Direction,	10	series, direction sense, logical reasoning, data	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data	10	series, direction sense, logical reasoning, data sufficiency, ranking,	3, 4
III	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order ,	10	series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations,	3, 4
IV	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy,	10	series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming	2, 3
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types,	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch),	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order , Puzzle, Blood Relations , Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C'		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control	ĺ
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch),	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions.		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements:		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement, Types of ifelse block, Switch case		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	Í
	Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding Introduction to Coding:  C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement,		series, direction sense, logical reasoning, data sufficiency, ranking, puzzles, blood relations, analogies, cubes and dice, and coding-decoding.  Learn C programming basics: language types, program structure, debugging, tokens, data types, operators, control statements (if, switch), loops (for, while, do-	,

	Concept of Loop, For loop, While			
	loop, Do- while loop, jumping in			
<b>T</b> 7	Loop, break and continue statement	_	XX 1 (17)	
V	Introduction to Arrays, Strings and Functions  Arrays: One Dimensional Arrays, Two-Dimensional Arrays, Multidimensional Arrays, Dynamic Arrays. Strings: Implementing String Variables, String handling Functions. Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.	7	Understand arrays (1D, 2D, multidimensional, dynamic), string implementation and functions (user-defined, system-defined, function parameters and passing mechanisms).	2
	Practical Con	mponent		
		-		
Practical 1	Write a C program to find sum and average of three numbers. Write a C program to find the sum of individual digits of a given positive Write a C program to generate the first n terms of the Fibonacci sequence	3	Develop proficiency in C programming: calculate sums/averages, manipulate digits, generate Fibonacci sequence, using variables, loops, and arithmetic for problem-solving.	3
Practical 2	Write a C program to generate prime numbers between 1 to n. Write a C program to Check whether given number is Armstrong Number or Not.	3	Master C programming skills: generate prime numbers and verify Armstrong numbers, demonstrating proficiency in loops, conditionals, and mathematical operations.	3
Practical 3	Write a C program to evaluate algebraic expression (ax)/ (ax-b). Write a C program to check whether given number is perfect number or Not Write a C program to check whether given number is strong number or not.	3	Master C programming: evaluate algebraic expressions, verify perfect numbers, and determine strong numbers, applying arithmetic, loops, and conditional statements effectively.	3, 4
Practical 4	<ul><li>a) Write a C program to find the roots of a quadratic equation.</li><li>b) Write a C program perform arithmetic operations using switch statement.</li></ul>	3	Achieve proficiency in C programming by solving quadratic equations for roots and performing arithmetic operations with switch statements	3

			effectively.	
Practical 5	Write a C program to find factorial of a given integer using non-recursive Function. Write a C program to find factorial of a given integer using recursive function.	3	Master factorial computation in C: implement non-recursive and recursive functions, demonstrating understanding of functions, loops, and recursion for problem-solving.	6
Practical 6	Write C program to find GCD of two integers by using recursive function. Write C program to find GCD of two integers using non-recursive function.	3	Achieve proficiency in C programming: compute GCD of integers using recursive and non-recursive functions, applying logical and iterative problem-solving techniques efficiently.	3
Practical 7	Write a C program to find both the largest and smallest number in a list of Integers  Write a C Program to Sort the Array in an Ascending Order.  Write a C Program to find whether given matrix is symmetric or not.	3	Master C programming: find largest/smallest numbers in a list, sort arrays in ascending order, and determine matrix symmetry accurately using logical operations.	3, 4
Practical 8	Write a C program to perform addition of two matrices. Write a C program that uses functions to perform Multiplication of Two Matrices.	3	Achieve proficiency in C programming: add two matrices and multiply matrices using functions, demonstrating mastery of matrix operations and function usage.	3
Practical 9	Write a C program to use function to insert a sub-string in to given main string from a given position. Write a C program that uses functions to delete n Characters from a give position in a given string.	3	Master C programming: insert a substring into a main string and delete characters from a specified position using functions effectively and accurately.	6
Practical 10	Write a C program using user defined functions to determine whether the given string is palindrome or not. Write a C program that displays the position or index in the main string S where the sub string T begins, or -	3	Achieve proficiency in C programming: determine palindrome strings and locate substring positions using user-defined functions effectively and accurately.	3

	1 if S doesn't contain T.		
			İ

- **T1:** Byron Gottfried, "Schaum's Outline of Programming with C", Third Edition.
- T2: E. Balaguruswamy, "Programming in ANSI C", Eight Edition.
- T3: Lipschitz, Lipsonand and Patil, "Discrete Mathematics", Revised Third Edition
- T4: Sastry and Nayak, "A Textbook on Discrete Mathematics"

### **REFERENCE BOOKS:**

- R1: R S Agarwal, "A Modern Approach To Verbal & Non Verbal Reasoning", Revised Edition.
- **R2:**Sijwali B S, "Analytical and Logical Reasoning", Revised Edition.
- **R3:** Brian W. Kernighan and Dennis M. Ritchie, "The C Programming Language", Second Edition.
- R4:Lipschutz and Lipson, "2000 Solved Problems in Discrete Mathematics".

### **OTHER LEARNING RESOURCES:**

O1: https://www.javatpoint.com/discrete-mathematics-tutorial

**O2:** https://www.khanacademy.org/test-prep/lsat/lsat-lessons/logical-reasoning/a/logical-reasoning-article

getting-started

O3:https://www.javatpoint.com/c-programming-language-tutorial

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding	1,2, 3, 4, 5, 10, 12						
2	Students will be able to apply of applications of concepts in other disciplines such as engineering, computer science, physics, etc.	1,2, 3, 4, 5, 10, 12						
3	Solve and devise solutions to a range of elementary real- world problems in mathematics and programming	1,2, 3, 4, 5, 10, 12						
4	Explore and apply key concepts in logical thinking to business problems.	1,2, 3, 4, 5, 10, 12						
5	Enable students to critically analyse information in order to evaluate evidence and construct reasoned arguments.	1,2, 3, 4, 5, 10, 12						

Course	Course	CO	PO	PO	РО	РО	РО	РО	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Introducti	CO 1	2	3	3	2	2					2		2
	on to Basic Mathemati cs, Logic	CO 2	3	3	3	2	2					2		2
2BTCS11 2R	and Coding	CO 3	3	3	2	2	1					2		2
		CO 4	3	3	3	3	3					2		2
		CO 5	3	3	3	3	3					2		2

		SEMESTE	ER – I											
Course Title		Engi	neering	Physi	ics									
Course code	22BTCS113R	Total credits: 4	L	T	P	S	R	O/F	C					
		Total hours:	2	1	2	0	0	0	4					
		40T+30P												
Pre-requisite	Basic knowledge Co-requisite Mathematics													
	of Physics													
Programme	Bachelor of Technology in Computer Science & Engineering													
Semester	Duche	ior or reemfology r	1	utti i	Jeren		Liigii	eci ing						
Course	To understand the t	heories of physics												
<b>Objectives</b>		pts in practical probl	lems											
(Minimum 3)	1 1	physics of any proce												
CO1	_	eld and potential		ons	Com	nute	the v	ectors a	nd scalar					
661		rces and nature of for		ons,	com	pare		cotors a	ac scarar					
CO2	•	tics in dielectric m		nserv	ative	and	non-c	onservativ	ze forces					
CO2				nger ,		una	non c	onser vaci	101005,					
CO3	angular momentum and energy equations.  Compute basics of non-inertial frames, harmonic oscillator and forced oscillations.													
CO4	•	standing of magneto												
604		measuring instrume		111110	ar iiia	Silver	o moa	ia, and the	dsuge of					
CO5		ic characteristics of		ners a	nd ele	ectric	al mac	hines						
605	Chacistana the bas	ie characteristics of	transform	iicis t	ina civ	cetile	ai iiiac	mics.						
Unit-No.	Cor	itent	Contac	rt .	Les	come	BL							
CIII 110.	Con	item	Hour		LC	41 11111	s Out	come						
I	Electrostatics in va	acııım	8		tudy		ele	electrostatic 2						
1	Licetrostaties in vi	acuum			•	mena		vacuum:						
				_				electric						
								Gauss's						
						•		viour of						
					,		fields							
II	Magnetostatics		8		earn	2								
11	Magnetostatics		0		carn rincip									
				_	•			field of						
						-		e's law,						
							nateri:							
					nagne pplica			ais, and in						
							etism							
III	Faradov's love		8						2					
111	Faraday's law		8					ay's law:	4					
					iectro iduce	_		nduction,						
								romotive						
			force (emf), Lenz's applications in generations											
							-	cherators						
<b>TX</b> 7	Dianteres	and transformers.  8 Explore displ					1	4						
IV	Displacement co	8		•		_	lacement	4						
		dependent electric			urrent	•	nagnet							
	field and Maxwell	s equations						g electric						
					ields,	an	a N	Maxwell's						
					quatio			linking						
							-	tism, and						
l			[	e	iectro	magn	etic w	aves.	1					

V	Electromagnetic waves	8	Study electromagnetic	2
			waves: properties, wave	
			equations, propagation in	
			vacuum and media,	
			polarization, and	
			applications in	
			communication and	
			technology.	
	Practical Con	mnonent	teemology.	
	Tractical Col	шропен		
Practical 1	To verify the ohm's law and hence		Demonstrate	
	determine the unknown resistance of		understanding and	
	the given material of the wire.		application of Ohm's Law	
			to determine unknown	
		6	resistance of wire material	3
			through experimental	
			verification and	
			calculation.	
Practical 2	To find the value of a given	3		
Practical 2	To find the value of a given	3	1	
	resistance by using meter bridge.		using a meter bridge to	
			accurately measure the	2
			resistance of a given	3
			material through	
			experimental observation	
			and calculation.	
Practical 3	To convert the galvanometer in to	6	Master the process of	
	voltmeter and hence calibrate it with		converting a galvanometer	
	a standard resistance and ammeter.		into a voltmeter,	
			calibrating it using a	6
			standard resistance, and	
			verifying accuracy with an	
			ammeter.	
Practical 4	To determine the internal resistance	6	Achieve proficiency in	
	of a cell by using potentiometer.		determining the internal	
	, C1		resistance of a cell using a	
			potentiometer through	3
			accurate experimental	-
			measurements and	
			calculation techniques.	
Practical 5	To determine the frequency of a	3	Achieve proficiency in	
i ractical 3	tuning fork by Melde's apparatus.	3	determining the frequency	
	tuning fork by inclue's apparatus.		of a tuning fork using	
				2
			Melde's apparatus through	3
			precise experimental setup	
			and frequency	
			measurement techniques.	
Practical 6	To determine the moment of inertia	3	Achieve proficiency in	
	of a body about an axis passing		determining the moment	3
	through its center of gravity and		of inertia of a body by	

	perpendicular to its length.		accurately measuring its mass distribution and rotational properties experimentally.	
Practical 7	To determine the ECE of copper by using copper voltmeter and ammeter.	3	Achieve proficiency in determining the Electrical Conductivity (ECE) of copper using a copper voltmeter and ammeter through precise experimental measurements and calculations.	3

**T1:** K G Mazumdar and B.Ghosh, "A Textbook on Practical Physics", Sreedhar Publishers, 209B, Kolkata.

**T2:** David Griffiths, "Introduction to Electrodynamics", Prentice Hall, Upper Saddle River, New Jersey, 07458

T3: IE IRODOV, "Basic Laws of Electromagnetism".

**T4:** C L Arora, "BSc Practical Physics", S. Chand Publishing, 2001.

### **REFERENCE BOOKS:**

R1: P R Sasi Kumar, "Practical Physics", Phi Learning Private Ltd,2011.

R2: Sijwali B S, "Analytical and Logical Reasoning", Revised Edition.

R3: G. L. Squires, "Practical Physics", Cambridge. University Press, 30 Aug 2001.

R4: Resnick Halliday, "Principles of physics".

### OTHER LEARNING RESOURCES:

**O1:**https://www.sciencedirect.com/science/article/pii/S0951832022005142

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply electric field and potential calculations, Compute the vectors and scalar representation of forces and nature of forces.	1,2, 3, 4, 5, 10, 12
2	Analyze electrostatics in dielectric media, conservative and non-conservative forces, angular momentum and energy equations.	1,2, 3, 4, 5, 10, 12
3	Compute basics of non-inertial frames, harmonic oscillator and forced oscillations.	1,2, 3, 4, 5, 10, 12
4	Demonstrate understanding of magnetostatics in linear magnetic media, and the usage of common electrical measuring instruments.	1,2, 3, 4, 5, 10, 12

5	Understand the basic characteristics of transformers and	1,2, 3, 4, 5, 10, 12
	electrical machines.	

Course	Course	CO	PO	PO1	PO1									
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS11 3R		CO 1	3	3	3	2	1					2		3
	Engineeri ng Physics	CO 2	3	3	3	2	2					2		3
		CO 3	3	3	3	2	1					2		3
		CO 4	3	3	3	2	2					2		3
		CO 5	3	3	3	2	2					2		3

		SEMESTE	ER – I									
Course Title		Basic Ele	ctrical <b>E</b>	Engin	eering	g						
Course code	22BTCS114R	Total credits: 4	L	T	P	S	R	O/F	C			
		Total hours:	2	1	2	0	0	0	4			
Due ne suisite	NIL	30T+30P					 Nil					
Pre-requisite		Co-requisite		40 6	Tai are							
Programme Semester	Dacile	ior of Technology i	in Computer Science & Engineering									
Course			1									
	Explain operative p	orinciple of transforn	mer with background of magnetic circuits.									
Objectives (Minimum 3)	Classify and compa	are different types of	Electric	al ma	chines	S.						
CO1		basic electric and m										
CO2		rking principles of el				nd no	wor o	onvertors				
CO ₂		nponents of low-vol						onverters.				
CO3		ge of common electr										
CO5		vorking and basic						are and	alactrical			
COS	machines.	vorking and basic	Charact	CHSH	28 01	uan	5101111	icis and	Ciccuicai			
Unit-No.		ntent	Contac	• <b>t</b>	I es	rnin	o Out	come	BL			
Cint 140.		iteiit	Hour		Let	••••••	5 Out	come				
I	DC Circuits:		22002		earn	I	OC .	circuit	2			
II	voltage and Kirchoff's current analysis of	elements (R,L,C), current source, t and voltage law, simple circuit, Norton and orem	5	in v K a a ('S	undan nducto oltage Lirchh nalysi Theve uperp earn	ors, e/curro off's s nin, ositio	ent laws	resistors, apacitors, sources, circuit methods Norton, circuit inusoidal	2			
	phasor representative power, power factor, A phase accircuits R,L,C.RL,RC,RL combination(series voltage and currents)	Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single phase accircuits consisting of R,L,C.RL,RC,RLC combination(series and parallel), voltage and current relationship in star and delta connection				orms, entations nt), a	on, (real, nd an	phasor power reactive, alysis of nents in				
III	-	rmer, equivalent in transformer, efficiency, auto three phase	6	n v lo e tr	nagnet s. j osses, fficier	tic m practi ncy, rmers con	nateria cal re , and	sformers: als, ideal models, egulation, auto d three- ons for stribution	2			

IV	Electrical Machines:		Study electrical machines:	2
	Generation of rotating magnetic fields, construction and working of three phase induction motor, torque-slip characteristics, losses and efficiency, Single phase induction motor, working of synchronous Generator	6	rotating magnetic field generation, three-phase induction motors, torque-slip characteristics, losses, efficiency, single-phase induction motors, and synchronous generator operation.	
V	Power converter and electrical installation: DC-DC buck and boost converter, single phase and three phase voltage source inverter, Fuse, MCB, ELCB, MCCB  Earthing, wires and cables, types of batteries	6	Learn power converters: DC-DC buck and boost converters, single-phase and three-phase voltage source inverters, electrical installations including fuses, breakers, earthing, cables, and batteries.	2
	Practical Co	mponent		
Practical 1	To Study specification and uses of instruments	3	Understand and apply knowledge of instrument specifications and uses, ensuring accurate selection and utilization for various technical applications.	2
Practical 2	To Study Ohm's Law for DC Circuits	3	Understand and apply Ohm's Law to analyze and solve problems in DC circuits through experimental verification and calculations.	2
Practical 3	To verify KCL and KVL Circuits	3	Verify Kirchhoff's Current and Voltage Laws (KCL and KVL) through practical circuit analysis, enhancing understanding of electrical network behaviour.	4
Practical 4	To verify The venin's Theorem	3	Verify Thevenin's Theorem through circuit experiments, demonstrating the ability to simplify complex circuits into equivalent single-source representations.	4
Practical 5	To verify Norton's Theorem	3	Verify Norton's Theorem by conducting circuit	4

			experiments,	
			demonstrating proficiency	
			in converting complex	
			circuits into equivalent	
			current-source models.	
Practical 6	To verify Maximum Power Transfer	3	Verify Maximum Power	
	Theorem		Transfer Theorem through	
			circuit experiments,	
			ensuring maximum power	4
			delivery from source to	
			load under optimal	
			resistance conditions.	
Practical 7	To verify super position Theorem	3	Verify Superposition	
			Theorem by analyzing	
			circuits with multiple	
			sources, demonstrating the	4
			ability to determine	
			individual effects on	
			overall circuit behaviour.	
Practical 8	To Study transformation ratio of	3	Understand and determine	
Tractical	single-phase transformer	3	the transformation ratio of	
	single-phase transformer		a single-phase transformer	
			through experimental	2
			analysis and accurate	
			measurement techniques.	
Practical 9	Mini project	6	At the end of the mini-	
Fractical 9	Mini-project	0		
			project, students will	
			demonstrate fundamental	2, 3
			knowledge and practical	
			skills in Basic Electrical	
			Engineering concepts.	

T5: D. P. Kothari and I. J.Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.

### **REFERENCE BOOKS:**

R1:D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill,2009.

R2:E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

### OTHER LEARNING RESOURCES:

O1: https://nptel.ac.in

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Analyze and apply basic electric and magnetic circuits.	1, 2, 3, 4, 5, 6, 9,10, 11, 12									
2	Understand the working principles of electrical machines and power converters.	1, 2, 3, 4, 5, 6, 9,10, 11, 12									
3	Understand the components of low-voltage electrical installations.	1, 2, 3, 4, 5, 6, 9,10, 11, 12									
4	Understand the usage of common electrical measuring instruments.	1, 2, 3, 4, 5, 6, 9,10, 11, 12									
5	Understand the working and basic characteristics of transformers and electrical machines.	1, 2, 3, 4, 5, 6, 9,10, 11, 12									

Course	Course	CO	PO	PO1	PO1									
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	3	2	2	1			1	2	1	3
22BTCS1		CO 2	3	3	3	2	2	1			1	2	1	3
		CO 3	3	3	3	2	2	1			1	2	1	3
		CO 4	3	3	3	2	2	1			1	2	1	3
		CO 5	3	3	3	2	2	1			1	2	1	3

	I	SEMESTER – I											
Course Title		Vorkshop Manufacturing l					0.75						
Course code	22BTCS115R	Total credits: 3 Total hours: 10T+30P	L 1	T 0	4	8 R 0 0	0/F 0	C 3					
Pre-	NIL	Co-requisite	1	U	7	Nil	U						
requisite													
Programme	Bachelor of T	echnology in Computer Sc	ience &	En	gin	eerin	<u> </u>						
Semester	_ ***	1			<del></del>		<del>-</del>						
Course													
Objectives	Learning this course will lea	vork	shop	and									
(Minimum	manufacturing.												
3)		dge of workshop and manufa	acturing	in d	ay-	to-day	life.						
	Recognize components usin	-											
CO1		ufacturing methods like cast		min	g, n	nachii	ning et	c.					
CO2	Application of computer co	ding in automation of Machi	ines.										
CO3		fitting operations and its ap	plication	ı in	ind	ustrie	s.						
CO4	Different machining operati												
CO5	Learning the different types	of welding and its field of a	pplication	on.									
Unit-No.	Con	tent	Contac	et	Ι	_earn	ing	BL					
			Hour		(	Outco	me						
I	<b>Manufacturing Methods</b>		3		Stu	dy		4					
	Casting, forming, machin	ining, joining, advanced			mai	nufact	uring						
	manufacturing methods				met	thods:							
					cas	ting,							
					fori	ming,							
					ma	chinir	ıg,						
					-	ning							
						nniqu							
							anced						
							uring						
					•		s for						
					_	ducin	-						
						ustria							
						npone							
							y and						
	0210	7.5				ective	•						
II	CNC machining, Additive	•	2			ırn Cl		3					
		ning process, overview of				chinir	ıg:						
	additive manufacturing				_	cess							
						rview							
						luding gramı	•						
					and	-	iiiig						
						ratior	ne						
					•	dersta							
						litive	110						
							uring						
							es for						
						ducin							
					_	ects la	-						
					ouj	ccis la	iyei						

			by layer.	
III	Carpentry & Fitting operations Carpentry tools, carpentry operations, fitting tools, fitting operations	1	Learn carpentry: tools and operations for woodwork. Understand fitting: tools and operations for assembling components accurately in manufacturing and construction.	2
IV	Machining operations Turning, milling, turning processes, milling processes	2	Study machining operations: learn turning and milling processes, including techniques, tools, and applications in manufacturing precision components.	4
V	Welding Arcwelding & gas welding, brazing	2	Learn welding techniques: arc welding, gas welding, and brazing methods, covering processes, safety measures, and applications in metal fabrication and	2

Practical 1	Abriefintroductionofworkshop		Students gain	
Fractical I	_			
	Machineshop,Fittingshop,carpentryshop,weldingshop		introductory	
			knowledge of	
			workshop	
			areas:	
			Machine	
			shop, Fitting	
		5	shop,	2
		J	Carpentry	2
			shop, Welding	
			shop,	
			emphasizing	
			basic	
			operations	
			and safety	
			protocols.	
Practical 2	Machine shop	10	Students will	
	Plainturning, Taperturning, Stepturning		demonstrate	
	Traintenant, raportenant, stoptuming		proficiency in	
			plain turning,	
			taper turning,	3
			_	3
			1	
			turning	
			techniques in	
D // 10		_	machine shop.	
Practical 3	Carpentry shop	5	At the end of	
	Dovetailjoint,T-lapjoint,Cross-lapjoint,Corner-		the session,	
	lapjoint		students will	
			demonstrate	
			proficiency in	
			constructing	3
			dovetail, T-	
			lap, cross-lap,	
			and corner-lap	
			joints in	
			carpentry	
			shop.	
Practical 4	Welding shop	5	Students will	
	Arcwelding(Buttjoint,T-joint,Lapjoint,Cornerjoint)		demonstrate	
			proficiency in	
			arc welding	3
			techniques for	3
			butt, T-joint,	
			lap, and	
			corner joints.	
Practical 5	Fitting shop	5	Students will	1
	Angle fitting, square fitting, corner fitting	_	demonstrate	
	6 /6,		proficiency in	3
			angle fitting,	
			angio maing,	

	square fitting,	
	and corner	
	fitting	
	techniques in	
	fitting shop.	

**TI:** Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K, "Elements of Workshop Technology", Vol I 2008 and Vol II 2010, Media promoters and publishers private limited, Mumbai.

### **REFERENCE BOOKS:**

**R1:**Manufacturing Technology – I, Pearson Education, 2008.

R2:Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

### OTHER LEARNING RESOURCES:

**O1:** https://easyengineering.net/introduction-to-basic-manufacturing-process-workshop-technology

### **O2**:

https://www.academia.edu/30316555/Introduction_to_Basic_Manufacturing_Processes_and_Workshop_Technology

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Introduction to various manufacturing methods like casting, Forming, machining etc.	1, 2, 3, 4, 5, 6, 10, 12
2	Application of computer coding in automation of Machines.	1, 2, 3, 4, 5, 6, 10, 12
3	Introduction to Carpentry & fitting operations and its application in industries.	1, 2, 3, 4, 5, 6, 10, 12
4	Different machining operations like turning, milling.	1, 2, 3, 4, 5, 6, 10, 12
5	Learning the different types of welding and its field of application.	1, 2, 3, 4, 5, 6, 10, 12

Course	Course	CO	РО	РО	РО	РО	РО	PO	РО	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		СО												
		1	3	2	2	2	3	2				1		2
	Workshop Manufactur	CO 2	3	3	3	3	3	3				3		3
22BTCS11	ing	СО	3	3	3	3	3	3				3		3
5R	Practices	3	3	2	2	2	3	2				1		2
		CO												
		4	3	2	2	2	3	2				1		2
		СО												
		5	3	3	2	2	3	2				1		2

	SEMES	TER – I											
Course Title	Introduct	ory English	for	Engi	neers								
	(Communi	cative Englis	sh &	Soft	Skills)								
Course code	22UBPD114R Total credits: 2	L	T	P	S	R	O/F		C				
	Total hours: 30	P 0	0	4	0	0	0		2				
Pre-requisite	NIL Co-requisite Nil												
Programme	Bachelor of Technolog	y in Compu	iter S	Scien	ce & I	Engin	eering						
Semester		1											
Course	To capacitate the students with mast	ery over Bas	ic Er	nglish	gram	mar.							
Objectives	To enable the students to communication	cate confider	ntly v	with a	a focu	s on l	istening	g ar	nd speaki				
(Minimum 3)	skills.												
	With the help of the basics of Pho	onetics, the	stude	ents v	will be	able	to pro	onou	ince wor				
	correctly.												
	To interact successfully and with de-	corum.											
CO1	Analyze and apply the rules of P	arts of Spec	ech i	in co	nstruc	ting g	gramma	atica	ally corre				
	sentences.												
CO2	Evaluate sentence structures, emplo	y varied se	ntenc	ce typ	pes, ar	nd der	nonstra	ate	effective				
	comprehension skills.												
CO3	Assess listening skills, identify factor	rs influencir	ig lis	tenin	g, and	imple	ement s	trat	egies for				
~ ~ .	improved listening.			10.		•							
CO4	Demonstrate effective speaking sk	ills, includii	ng se	elf-ini	troduc	tion,	pronun	cıat	ion, and				
007	extempore speech delivery.	. 1			1 1		1 '11	C	1'				
CO5	Apply communication theories, re	ecognize ba	rriers	s, an	d enh	ance	SK1IIS	tor	diverse				
	communication situations.												
Timit Nic	Comtont	Comtoo	4	Τ.	~ <b>:</b>	- 04			DI				
Unit-No.	Content	Contac	t	Le	arning	g Out	come		BL				
	Content	Contac Hour						.c.					
Unit-No.	Content		L	earn	gran	nmar	basic		BL 2				
	Grammar		L	earn arts	gran of s	nmar peech	basic (nou	n,					
	Grammar Parts of Speech	Hour	L p	earn arts erb,	gran of s	nmar peech	basic (nour	n, .),					
	Grammar		L p	earn arts erb,	gran of s adje s (a	nmar peech	basic (noun etc.	n, .), e),					
	Grammar Parts of Speech	Hour	L p	earn arts erb, rticles	gran of s adje s (a.	nmar peech ective,	basic (noun etc. , the	n, .), e),					
	Grammar Parts of Speech Articles	Hour 5	L p v an an an an an	earn arts erb, rticle uxilia	gran of s adje s (a.	nmar peech ective, , an	basic (noun etc. , the verb	n, .), e),					
	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence	Hour 5	L p v a: a: a: se	earn arts erb, rticle uxilia ffirm	gran of s adje s (a ary ative	nmar peech ective, and and	basic (nour etc. , the verb negativ	n, .), e), os, ve					
I	Grammar Parts of Speech Articles Auxiliary Verbs	Hour 5	L p v an	earn arts erb, rticle uxilia ffirm enten	gran of s adje s (a ary ative	nmar peech ective, and and actures	basic (noun etc. , the verb	n, .), e), os, ve	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence Grammar	Hour 5	L p v an	earn arts erb, rticle uxilia ffirm enten earn eterm	gran of s adje s (a ary ative ce stru gramr	nmar peech ective, and and actures	basic (nour etc.), the verb negatives.	n, .), e), os, ve	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence Grammar  Determiners	Hour 5	L p v an	earn arts erb, rticle uxilia ffirm enten earn eterm onstru	gran of s adje s (a ary ative ce stru gramminers, uction ces	nmar peech ective, and actures mar es	basic (nour etc.), the verb negatives.	n, .), e), os, ve	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence Grammar  Determiners Sentence Construction	Hour 5	L P V aa aa aa aa see L dd co	earn arts erb, rticle uxilia ffirm enten earn eterm onstruenten mpera	gran of s adje s (a arry attive ce stru gramm niners, uction ces attive),	nmar peech ective, and and ectures mar es , ty (a deg	basic (nour etc.), the verb negatives. ssential sentence pes conservive conservity conse	nn, le), le), les, les: cee of ree, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence Grammar  Determiners Sentence Construction Types of Sentences (Assertive,	Hour 5	L pp vv aa aa aa see L d d cc see iii cc	earn arts erb, rticle uxilia ffirm enten earn eterm onstruenten mpera	grandof some adjects (analystive centrul grammaniners, auctionative), arison,	nmar peech ective, and actures nar es ty (a deg and	basic (nour etc.), the verb negatives.	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.)	Hour 5	L P V V aa aa aa see L dd co see iii co co	earn arts erb, rticle uxilia ffirm enten earn eterm onstre enten mpera ompa	gran of s adje s (a. ary ative ce stru gramm inners, uction ces ative), arison, ehensi	nmar peech ective, and actures nar es , ty deg and on e	basic (nour etc.), the verb negatives. ssential sentence pes (assertive gree (assertive exercise)	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison	Hour 5	L P V V aa aa aa see L dd co see iii co co	earn arts erb, rticle uxilia ffirm enten earn eterm onstre enten mpera ompa	grandof some adjects (analystive centrul grammaniners, auctionative), arison,	nmar peech ective, and actures nar es , ty deg and on e	basic (nour etc.), the verb negatives. ssential sentence pes (assertive gree (assertive exercise)	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.)	Hour 5	L pp vv aa aa aa see L d cc see iii cc cc fee	earn arts erb, rticle uxilia ffirm enten earn onstru enten mpera ompa ompr	grandof some adjective struction active), arison, ehensill deven	nmar peech petive, and actures nar es deg and on eelopme	basic (nour etc.), the verb negatives. sential sentence pes conservive gree of practice exercise ent.	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises	Hour 5	L P V V aa aa aa see L dd co see iii co co fee fee E	earn arts erb, rticle uxilia ffirm enten earn eterm onstre ompa ompa ompr or ski	grandof so adjects (a. arry attive ce struction, arrison,	nmar peech ective, and actures mar es deg and on elopme	basic (nour etc.), the verb negatives. ssential sentence pes (assertive practice exercise ent.	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises  Listening Skills	Hour 5	L P V aa aa aa aa see L d ccc see iii ccc ccc fo	earn arts erb, rticle uxilia ffirm enten earn eterm onstrue ompra ompr or ski	grandof some adjection of some adjection of some adjection of the stand line of the stand line of st	nmar peech ective, and actures nar es ty (a deg and on eelopmeening istening	basic (nour etc.), the verb negatives.  ssential sentence pes conservive exercise exercise ent.	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises	5 s	L pp vv aa aa aa see see see see see see see se	earn arts erb, rticle uxilia ffirm enten earn eterm onstrue ompra	grand of signature of signature of signature of struction of signature	nmar peech ective, and actures are deg and on elopme	basic (nour etc. ), the verb negativ ssential sentence pes ( practic exercise ent.  skills: ng vs. actors	nn, .), e), os, ve ds: ce of re, of	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises  Listening Skills	Hour 5	L L P V V aa aa aa aa see L d c c c c c c c c c c t c L u h aa	earn arts erb, rticle uxilia ffirm enten earn eterm onstruenten mpera ompr or ski Develo nders earin ffecti	grandof so adjects (and adjects and adject	nmar peech ective, and actures nar es deg and on eelopmeening istenir cess, f	basic (nour etc.), the verb negatives.  ssential sentence pes (assertive practice exercise ent.  skills: ag vs. actors tance,	n, .), .), ss, ve ls: ce of re, of ce	2				
I	Grammar  Parts of Speech Articles Auxiliary Verbs Affirmative and Negative Sentence  Grammar  Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises  Listening Skills  What is listening?	5 s	L pp vv are are seen	earn arts erb, rticle uxilia ffirm enten earn eterm onstrue ompra ompra ompr or ski earin ffecti urpos	grandof so adjects (and adjects and adject	nmar peech cctive, and actures nar es ty (a deg and on elopmening istenir cess, f mport meth	basic (nour etc.), the verb negatives. Seen the conservive of the conservive ent.	n, .), .), ss, ve ls: ce of re, of ce	2				

	Listening Difference between Listening and Hearing, Purpose and Importance of Effective Listening How to Improve Listening Process		listening abilities.	
V	Speaking Skills Introducing yourself Self-discovery Basics of Phonetics, pronunciation Extempore speech Video Recording for Self reflection  Communication Skills Introduction to Communication, Importance of Communication Skills, Purpose of Communication, Types of Communication, Formal and informal communication Importance of Communication, Barriers to Communication,	6	Enhance speaking skills: self-introduction, phonetics, pronunciation basics, extempore speaking, and self-reflection through video recording for improvement.  Learn communication fundamentals: introduction, importance, types, formal vs. informal, barriers, tips for improvement, and effective responses in different contexts.	2
	How to improve/ tips to improve Communication skills. Responding to different questions in various situations(formal/informal)			

**T6:** Chaturvedi, P.D., Chaturvedi Mukesh, "Business Communication: Concepts, Cases and Applications", Second edition, Pearson, Noida, 2011.

**T7:** Alex K., Chand, S, "Soft Skills: Know Yourself and Know the World", first edition, S. Chand and Company Ltd., New Delhi, 2009.

#### **REFERENCE BOOKS:**

**R1:**Quirk, Randolp, "A Comprehensive Grammar of the English Language", Randolph Quirk, Sidney Greenbaum, Pearson Education India, 2010..

**R2:**Marks, Jonathan, "IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score". Book + CD-ROM, Delta Publishing, 2017.

### OTHER LEARNING RESOURCES:

O1: https://youtu.be/bEB8-SWMYhI

O2:https://youtu.be/-zZau_dttRY

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze and apply the rules of Parts of Speech in constructing grammatically correct sentences.	1, 2, 3, 4, 5, 10, 12
2	Evaluate sentence structures, employ varied sentence types, and demonstrate effective comprehension skills.	1, 2, 3, 4, 5, 10, 12
3	Assess listening skills, identify factors influencing listening, and implement strategies for improved listening.	1, 2, 3, 4, 5, 10, 12
4	Demonstrate effective speaking skills, including self-introduction, pronunciation, and extempore speech delivery.	1, 2, 3, 4, 5, 10, 12
5	Apply communication theories, recognize barriers, and enhance skills for diverse communication situations.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO1	PO1									
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Introduct ory	CO 1	1	1	1	1	1					3		2
	English for	CO 2	1	1	1	1	1					3		2
22UBPD11 4R	Engineers	CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTER – I												
Course Title		Extra-Curricular A	Activities	s										
Course code	22UBEC111	Total credits: 1	L	T	P	S	R	0/	С					
		Total hours: 15S						F						
			0	0	0	4	0	0	1					
Pre-requisite	NIL	Co-requisite				Nil								
Programme	Bachelor of T	echnology in Compute	er Scien	ce 8	Engi	ineer	ing							
Semester	1													
Course	o develop the social and soft skills													
Objectives	promote a holistic development of the learners													
(Minimum 3)	•	•												
CO1	Learn to a plan so that they		l contribi	utio	ns, ma	intai	n a c	comm	itment,					
21 -	and manage their time and p													
CO2	Transform passionate stude	ents who demonstrate	leadershi	ip a	nd pu	rsue	inter	ests	beyond					
002	their academics.	, , ,	,	1	1.	, ,4		1.1	C . 1					
CO3	Learn to participate in v	arious co-curricular a	ctivities	lea	ding	to th	eır	multı	faceted					
604	personality development.	T., 4., 41.,1., 42.,	. 1 1		-11-		1	•	- C (1 1-					
CO4	Express their ideas, views,	In-depth evaluation at	nd anaiy	S1S (	cieariy	/ in t	ne to	opic (	of their					
CO.5	interest.	different activities le			~ 1~~	:								
CO5	Demonstrate and practices		by Integi	ratin	ig iea	rnıng	exp	erien	ices by					
	demonstrating transferable s								DI					
Unit No	Contor	s#	Conto	<b>.</b> +	1	Ann	aina							
Unit-No.	Conte	nt	Contac			Leari Outc	_		BL					
			Hour		(	Outco	ome	eters	BL					
Unit-No.	AdtU encourages a range	of activities outside			ADT	Outco U	ome	sters	BL					
	AdtU encourages a range the regular curriculum	of activities outside intended to meet	Hour		ADT holis	Outco 'U tic	fos	sters	BL					
	AdtU encourages a range the regular curriculum learner's interest, These ad	of activities outside intended to meet ctivities are aimed to	Hour		ADT holis deve	Outco U tic lopm	fos		BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft	of activities outside intended to meet ctivities are aimed to skills and promote a	Hour		ADT holis deve	Outco U tic lopmo	fos ent lubs	like	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the	of activities outside intended to meet ctivities are aimed to skills and promote a elearners, Keeping in	Hour		ADT holis development through Dance	Outco U tic lopmond igh cl	fos ent lubs		BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn	of activities outside intended to meet ctivities are aimed to skills and promote a elearners, Keeping in ing methodology the	Hour		ADT holis dever through Dance Photo	Outco TU tic lopmoniant clarks and clarks an	fos ent lubs Mu	like isic,	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in	of activities outside intended to meet ctivities are aimed to skills and promote a learners, Keeping in ing methodology the different activities	Hour		ADT holis development through Dance Photo Dran	Outco U tic lopmongh class, ograp na,	fos ent lubs Mu	like	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in headed under different clui	of activities outside intended to meet ctivities are aimed to skills and promote a elearners, Keeping in ing methodology the different activities by viz. Dance, music,	Hour		ADT holis deve throu Danc Photo Dran Liter	Outco TU tic lopmonts igh class, ograp na, ature	fos ent lubs Mu	like isic,	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in	of activities outside intended to meet ctivities are aimed to skills and promote a learners, Keeping in ing methodology the different activities by viz. Dance, music, ary etc., The students	Hour		ADT holis development through Dance Photo Dran	Outco TU tic lopmont igh classes, ograp na, ature uragin	fos fos ent lubs Mu ohy,	like isic,	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in headed under different clui photography, drama, litera	of activities outside intended to meet ctivities are aimed to skills and promote a elearners, Keeping in ing methodology the different activities by viz. Dance, music, ary etc., The students pate in regular club	Hour		ADT holis deve throu Danc Photo Dran Liter enco	Outco TU tic lopmond igh change ee, ograp na, ature uragin	ent lubs Mushy,	like isic, and	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in headed under different cluiphotography, drama, literal are encouraged to partici	of activities outside intended to meet ctivities are aimed to skills and promote a learners, Keeping in ing methodology the different activities by viz. Dance, music, ary etc., The students pate in regular club apetitions as per their	Hour		ADT holis deve throu Danc Photo Dran Liter enco partio	Outco TU tic lopmond igh classes, ograpma, ature, uragination	ent lubs Mu ohy, , , , on s	like isic, and	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in headed under different clui photography, drama, litera are encouraged to partici activities, workshops, com	of activities outside intended to meet ctivities are aimed to skills and promote a elearners, Keeping in ing methodology the different activities by viz. Dance, music, ary etc., The students pate in regular club petitions as per their student members of	Hour		ADT holis deve throu Danc Photo Dran Liter enco partic	Outco TU tic lopmond igh classes, ograpma, ature, uragination	ent lubs Mu ohy, , , , on s	like isic, and	BL					
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the mind the 360 degree learn students are engaged in headed under different clui photography, drama, literal are encouraged to particil activities, workshops, cominterest and hobbies, The	of activities outside intended to meet ctivities are aimed to a skills and promote a elearners, Keeping in ing methodology the different activities be viz. Dance, music, ary etc., The students pate in regular club petitions as per their student members of sent AdtU in various	Hour		ADT holis deve throu Danc Photo Dran Liter enco partic	Outco TU tic lopmond igh classes, ograpma, ature, uragination	ent lubs Mu ohy, , , , on s	like isic, and	BL					
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## **REFERENCE BOOKS:**

## OTHER LEARNING RESOURCES:

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1, 2, 3, 4, 5, 6, 10, 12							
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1, 2, 3, 4, 5, 6, 10, 12							
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1, 2, 3, 4, 5, 6, 10, 12							
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1, 2, 3, 4, 5, 6, 10, 12							
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1, 2, 3, 4, 5, 6, 10, 12							

Course	Course	CO	PO	PO1	PO1									
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	E-4	CO												
	Extra-	CO	2	2	2	1	2	2				2		2
	Curricul	1												
	ar	CO	2	2	2	1	2	3				2		2
221IDEC1	Activitie	2												
22UBEC1	S	CO	1	1	2	1	2	2				3		3
11		3	1	1	2	1	2	2				3		,
		CO	2	2	2	1	2	2				2		2
		4	2	2		1		2				2		4
		CO	1	1	1	1	2	1				1		3
		5	1	1	1	1		1				1		3

I Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices.  Boolean and pseudo Boolean lattices.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Grasp the concept of relations, including properties like reflexivity, symmetry, and transitivity, and be able to represent relations using ordered pairs, matrices, and graphs. Need to differentiate between injective, surjective, and bijective mappings, understand function composition and inverses, and work with various types of functions, such as linear and exponential.  Construct and interpret validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		SEMESTE	R – II						
Pre-requisite Mathematics Co-requisite Programme Bachelor of Technology in Computer Science & Engineering  Semester Winter/ II semester of the first year of the program  Describe the concept of algebraic structures including Boolean algebra and Boolean and apply them in understanding complex problems.  (Minimum 3) Apply the concept of graphs. Understand and apply concepts of multivariable calculus including partial derivation multiple integrals, and vector calculus  Apply solutions of ordinary differential equations of various order.  CO2 Apply solutions of partial differential equations of various order.  CO3 Analyse the complex analysis and solutions.  CO4 Understand the concept of basic probability and its application.  CO5 Understand the concept of basic and applied statistics.  Unit-No.  Content Contact Hour  I Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices.  Boolean and pseudo Boolean lattices. Boolean and pseudo Boolean lattices.  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  TI Propositional logic Introduction to first order logic and first order theory.  Total the program  Nil Proposition and Boolean algebra and Boole	Course Title	Engineer	ing Mat	hema	tics I	Ι			
Pre-requisite Mathematics Co-requisite Nil  Programme Bachelor of Technology in Computer Science & Engineering Semester Winter/ II semester of the first year of the program  Describe the concept of algebraic structures including Boolean algebra and Boolean and apply them in understanding complex problems.  Apply the concept of graphs.  Understand and apply concepts of multivariable calculus including partial derivation multiple integrals, and vector calculus  CO1 Apply solutions of ordinary differential equations of various order.  CO2 Apply solutions of partial differentiation equation of higher order.  CO3 Analyse the complex analysis and solutions.  CO4 Understand the concept of basic probability and its application.  CO5 Understand the concept of basic and applied statistics.  Unit-No.  Content Contact Hour  I Sets, relations and functions:  Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, including properties like reflexivity, symmetry, and transitivity, and be able to represent relations using ordered pairs, matrices, and inverses. Different types of functions, their compositions and inverses. Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices.  Boolean and pseudo Boolean lattices.  Boolean and pseudo Boolean lattices.  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  To Construct and interpret and bijective mappings, understand function compositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by	Course code	22BTCS121R Total credits: 4	L	T	P	S	R	O/F	C
Pre-requisite Programme Bachelor of Technology in Computer Science & Engineering  Semester  Winter/ II semester of the first year of the program  Describe the concept of algebraic structures including Boolean algebra and Boolean and apply them in understanding complex problems.  Understand and apply concepts of multivariable calculus including partial derivation multiple integrals, and vector calculus  CO1 Apply solutions of ordinary differential equations of various order.  CO2 Apply solutions of partial differentiation equation of higher order.  CO3 Analyse the comept of basic probability and its application.  CO4 Understand the concept of basic and applied statistics.  Unit-No.  Content  Co5 Understand the concept of basic and applied statistics.  Unit-No.  Content  Contact Hour  I Sets, relations and functions:  Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses. Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices.  Boolean and pseudo Boolean lattices.  Boolean and pseudo Boolean lattices.  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Ti Dropositional controlled and inverse and differentiate between valid and invalid arguments and compositions, and differentiate between valid and invalid arguments troubled and invalid arguments a			3	1	0	0	0	0	4
Semseter   Winter/ II semester of the first year of the program	Pre-requisite						Nil		
Semester   Winter/ II semester of the first year of the program			in Comn	uter	Scien			neering	
Course Objectives (Minimum 3)  Describe the concept of algebraic structures including Boolean algebra and Boolean adapply them in understanding complex problems.  Apply the concept of graphs. Understand and apply concepts of multivariable calculus including partial derivation multiple integrals, and vector calculus  CO1 Apply solutions of ordinary differential equations of various order.  CO2 Apply solutions of partial differentiation equation of higher order.  Analyse the complex analysis and solutions.  CO4 Understand the concept of basic probability and its application.  CO5 Understand the concept of basic probability and its application.  CO6 Understand the concept of basic probability and its application.  CO7 Understand the concept of basic probability and its application.  CO8 Co8 Analyse the complex analysis and solutions.  CO9 Understand the concept of basic probability and its application.  CO9 Understand the concept of basic probability and its application.  CO9 Understand the concept of basic probability and its application.  CO9 Understand the concept of basic probability and its application.  CO9 Understand the concept of basic probability and its application.  CO9 Understand the concept of basic probability and its application.  CO9 Understand functions:  Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, including properties like reflexivity, symmetry, and transitivity, and be able to represent relations using ordered pairs, matrices, and graphs. Need to differentiate between aliquetive modular and complemented lattices.  Boolean and pseudo Boolean lattices.  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  To 12 Construct and interpret truth tables to evaluate the validity, satisfiability, and itautological nature of propositions, and differentiate between valid and inval									
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chain, lattice, complete, distributive, modular and complemented lattices.  Boolean and pseudo Boolean lattices.  Boolean and pseudo Boolean lattices.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Significantly differentiate between injective, surjective, and bijective mappings, understand function composition and inverses, and work with various types of functions, such as linear and exponential.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		functions, their compositions and		p	airs,	m	atrices	s, and	
modular and complemented lattices.  Boolean and pseudo Boolean lattices.  Boolean and pseudo Boolean lattices.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Time the proposition and pseudo Boolean bijective, surjective, and bijective mappings, understand function composition and inverses, and work with various types of functions, such as linear and exponential.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		inverses. Complete partial ordering,		g	raphs		Nee	d to	
modular and complemented lattices. Boolean and pseudo Boolean lattices.  Boolean and pseudo Boolean lattices.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Time the propositional lattices.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Syntax and semantics, proof systems, satisfiability, validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		chain, lattice, complete, distributive,	5	d	iffere	ntiate		between	
lattices.  understand function composition and inverses, and work with various types of functions, such as linear and exponential.  Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Understand function composition and inverses, and work with various types of functions, such as linear and exponential.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		modular and complemented lattices.	3	i	njecti	ve, s	urject	ive, and	
composition and inverses, and work with various types of functions, such as linear and exponential.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		Boolean and pseudo Boolean		b	ijecti	ve	n	nappings,	
and work with various types of functions, such as linear and exponential.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  and work with various types of functions, such as linear and exponential.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by		lattices.		u	nders	tand		function	
types of functions, such as linear and exponential.  II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Types of functions, such as linear and exponential.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				c	ompo	sition	and	inverses,	
II Propositional Logic:  Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				a	nd v	vork	with	various	
Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Construct and interpret truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				t	ypes o	of fun	ctions	s, such as	
Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  truth tables to evaluate the validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				li	near a	and ex	xpone	ntial.	
Syntax and semantics, proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by	II	Propositional Logic:		C	Constr	uct	and	interpret	3,4
systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  validity, satisfiability, and tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				tı	ruth ta	ables	to eva	luate the	
soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Tautological nature of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				v	alidit	y, sat	isfiab	ility, and	
theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.  Theorem, etc. Decision problems of propositions, and differentiate between valid and invalid arguments through direct and indirect proofs, including proof by				ta	autolo	gical	na	ture of	
propositional logic. Introduction to first order logic and first order theory.  7 and invalid arguments through direct and indirect proofs, including proof by		_		p	ropos	itions	5,	and	
first order logic and first order theory.  7 data invalid arguments through direct and indirect proofs, including proof by		_		d	iffere	ntiate	betw	een valid	
theory. proofs, including proof by		1		a	nd	invali	id a	rguments	
proofs, including proof by		_	7	tl	nroug	h dire	ect and	d indirect	
		theory.		p	roofs	, incl	uding	proof by	
contradiction.				c	ontra	dictio	n.		

III	Algebraic Structures:		Perform operations within	3,4
			these structures, verify	,
	Algebraic structures with one binary		axioms, and apply	
	operation – semigroup, monoid and		homomorphisms and	
	group. Cosets, Lagrange's theorem,		isomorphisms to explore	
	normal subgroup, homomorphic		structural similarities.	
	subgroup. Congruence relation and		Additionally, students	
	quotient structures. Error correcting code. Algebraic structures with two		should comprehend the	
	binary operations ring, integral	6	significance of	
	domain, and field. Boolean algebra		substructures like	
	and boolean ring (Definitions and		subgroups, subrings, and	
	simple examples only).		subfields, and use	
	simple examples omy).		theorems such as	
			Lagrange's theorem and	
			the Fundamental Theorem	
			of Algebra to solve related	
			problems. Developing	
			proficiency in proving	
			properties and relationships within	
			*	
			algebraic structures, students will be equipped	
			to apply these concepts to	
			more advanced	
			mathematical contexts and	
			real-world scenarios.	
IV	Introduction to Counting:		Solve problems involving	4
	g		counting without	-
	Basic counting techniques –		replacement, use the	
	inclusion and exclusion, pigeon-hole		binomial theorem for	
	principle, permutation, combination,		expansion, and apply	
	summations. Introduction to	6	Pascal's triangle in	
	recurrence relation and generating		combinatorial contexts.	
	functions.		Additionally, students	
			should grasp more	
			advanced topics such as	
			the inclusion-exclusion	
			principle, Pigeonhole	
			Principle, and solving	
			problems involving	
			partitions of sets.	
V	Introduction to Graphs: Graphs and	6	Learn to represent graphs	4
	their basic properties – degree,		using adjacency matrices	
	path, cycle, subgraph, isomorphism,		and lists, and apply	
	Eulerian and Hamiltonian		fundamental algorithms	
	walk, trees.		for traversing graphs,	
			Understand and apply	
			concepts of graph	
			coloring, planarity, and	
1			isomorphism, and solve	

	Practical Co	mnonent	problems involving Eulerian and Hamiltonian paths and circuits. Mastery of these concepts will enable students to apply graph theory to real-world problems in computer science, network analysis, and other fields.	
	Tractical Co.	шропен		
Practical 1	Expert no 1	30	LO	1,2,3,4
Practical 2	Expert no 2			
•••••				
Practical 15				

T1: C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.

T2: K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, a.2007.

#### **REFERENCE BOOKS:**

**R1:** R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.

#### OTHER LEARNING RESOURCES:

**O1:** Coursera: Platforms like Coursera offer courses such as "Mathematics for Engineers" which cover topics ranging from calculus to differential equations and linear algebra.

**O2:** edX: Courses like "Engineering Mathematics" provide an in-depth study of mathematical techniques important in engineering disciplines

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply solutions of ordinary differential equations of various order.	1,2,3,4,5,10,12					
2	Apply solutions of partial differentiation equation of higher order.	1,2,3,4,5,10,12					
3	Analyse the complex analysis and solutions.	1,2,3,4,5,10,12					
4	Understand the concept of basic probability and its application.	1,2,3,4,5,10,12					
5	Understand the concept of basic and applied statistics.	1,2,3,4,5,10,12					

Course	Course	CO	PO	PO	PO	PO	PO	РО	PO	PO	PO	PO1	PO1	PO1
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	2	3	3	3					3		2
22BTCS12	Engineeri ng	CO 2	2	2	2	2	2					3		2
1R	Mathema tics II	CO 3	2	2	2	2	2					3		2
		CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

		SEMESTER -	- II									
Course Title		Engineeri	ing Cho	emis	try							
Course code	22BTCS122R	Total credits: 4	L	T	P	S	R	O/F	С			
		Total hours:	2	1	2	0	0	0	4			
Due ne suisite	NT21	45T+30P					NT21					
Pre-requisite	Nil	Co-requisite	7	40m C	a <b>.</b> a. a.		Nil					
Programme		or of Technology in C										
Semester		nter/ II semester of t		•	r oi tn	e pro	ogran	n				
Course	7	asoning and quantitative	•		· arriati			1 ahamia				
Objectives	_	ontent, and pedagogy	101 01	16 01	exist	ing g	enera	ii chemisi	ry course			
(Minimum 3)	sequences  Produce the content of chemistry set in a current and relevant context for engineers											
CO1	Produce the content of chemistry set in a current and relevant context for engineers.  Analyse microscopic chemistry in terms of atomic and molecular orbitals and											
CO1	intermolecular force		atomic	ana	moiec	cuiar	Orbita	ais and				
CO2			tio ano	.+	haad	for o		a differen	.4			
CO2		es of the electromagne vels in various spectro	-			ior e	xcitiii	ig differen	ll			
CO3	••	perties and processes i			•	mia a	onsid	arations				
CO3		properties such as ion	•		•							
CO4	oxidation states and		ization	pote	mai, e	necu	onega	mvity,				
CO5		ical reactions that are	ucad in	tha	wntha	cic of	mole	oules				
									DI			
Unit-No.	Cor	ntent	Conta		Lea	ırnın	g Ou	tcome	BL			
I	Atomia and mala	cular structure (12	Hou		Comp				122			
ı ı		cular structure (12			Comp			of the	1,2,3			
	lectures)				unders		-	atoms,				
	Schrodinger equation	on. Particle in a box						roles of				
	solutions and the	ir applications for						ons, and				
	conjugated r	nolecules and			electro		with					
	nanoparticles. Form	ns of the hydrogen			nucleu		and	their				
	atom wave function	ns and the plots of						electron				
	these functions to	explore their spatial			orbital		They					
	variations .Molec	cular orbitals of			grasp	th	•	rinciples				
	diatomic molecule	s and plots of the	5		goveri		· P	atomic				
	multicentre orbita	ls .Equations for			spectr	_		electron				
	atomic and molecu	lar orbitals. Energy			config		ons.	and				
	level diagrams o	f diatomics. Pi-			period							
	molecular orbitals	of butadiene and			1							
		aticity. Crystal field										
	· ·	ergy level diagrams										
		tal ions and their										
		s. Band structure of										
		of doping on band										
	structure.											
II		techniques and			Comp			a -	3,4			
	applications (8 lec	tures)			unders		-	of the				
	Principles of	spectroscopy and	7			-		methods				
	-	les. Electronic			used		•	yze the				
		orescence and its			interac			between				
		dicine. Vibrational			matter			and				
	applications in the	dicine. Toranonar										

	and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging. Surface characterization techniques. Diffraction and scattering.		electromagnetic radiation across different wavelengths. They should be able to describe and apply techniques such as UV-Vis spectroscopy, infrared spectroscopy (IR), nuclear magnetic resonance spectroscopy (NMR), and mass spectrometry (MS) for qualitative and quantitative analysis of compounds.	
III	Intermolecular forces and potential energy surfaces  Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces oh H ₃ , H ₂ F and HCN and trajectories on these surfaces  Use of free energy in chemical equilibria (6 lectures)  Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energies and emf. Cell potentials, the Nernst equations and applications. Acid	6	grasp the fundamental interactions between molecules and their implications in physical properties and chemical behavior. Intermolecular forces, including van der Waals forces, hydrogen bonding, and dipoledipole interactions, dictate the stability of molecular aggregates and influence phenomena such as boiling points, solubility, and viscosity.	3,4
	base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham Diagrams		Understanding the concept of free energy in chemical equilibria is essential for students to comprehend the spontaneity and directionality of chemical reactions. Free energy (G) represents the energy available to do work under constant temperature and pressure conditions	
IV	Periodic Properties (4 lectures)  Effective nuclear charge. Penetration of	6	Grasp the underlying principles governing	4
	Effective nuclear charge. I chetration of		these trends, such as	

	orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes. Ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries		effective nuclear charge and shielding effects, and how these influence the reactivity, chemical bonding, and physical properties of elements. Additionally, students should be able to predict and interpret periodic trends using periodic tables, understand the factors that affect these trends, and apply this knowledge to explain phenomena such as the formation of ions, trends in chemical reactivity, and the periodic classification of elements according to their properties.	
V	Representations of 3 dimensional structures, structural isomers and stereo isomers. Configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.  Organic reactions and synthesis of a drug molecule (4 lectures)  Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule	6	understand the fundamental concepts of chirality, stereoisomerism, and geometric isomerism, and be able to distinguish between different types of stereoisomers such as enantiomers and diastereomers. They should comprehend how stereochemistry influences molecular interactions, including biological recognition processes and drug efficacy. Moreover, students should apply stereochemical principles to predict the outcomes of reactions, particularly in organic chemistry, and recognize the importance of spatial arrangement in shaping the physical and chemical properties of molecules. Mastery of	4

	T		1 1 1 1 1 1 1	
			stereochemistry enables	
			students to understand	
			complex molecular	
			structures and their	
			behaviors, essential for	
			fields such as	
			pharmaceuticals,	
			materials science, and	
			biochemistry.	
	Practical Comp	onent	biochemistry.	
	Tucucar comp	onene		
Practical 1	QualitativeOrganicAnalysis(Minimum5		Learn to identify	1,2,3
	numberofsamples)		unknown organic	
	_		compounds using a	
			systematic approach	
			involving several key	
			techniques. They should	
			be able to perform tests	
			such as solubility tests,	
		_		
		5	functional group tests	
			(e.g., bromine water test	
			for alkenes, silver nitrate	
			test for halides), and	
			spectroscopic methods	
			including infrared (IR)	
			and nuclear magnetic	
			resonance (NMR)	
			spectroscopy.	
Practical 2	Estimationof	5	Estimating iron using a	3,4
	IronUsingstandardKMnO ₄ solution		standard potassium	ŕ
	8		permanganate (KMnO4)	
			solution involves a	
			titration method that	
			students should master	
			for analytical chemistry.	
			Initially, students	
			prepare an acidic	
			solution containing iron	
			ions, then titrate it with	
			KMnO4 solution until a	
			color change occurs,	
			typically from purple to	
			colorless.	
Practical 3	DeterminationofTotalHardnessof	5	Determining the total	3,4
	waterandEstimationofCa		hardness of water and	,
			estimating the calcium	
			ion concentration	
			involves titration	
			techniques essential in	

			environmental and	
			analytical chemistry.	
Practical 4	Determinationofsurface	5	Determining the surface	4
Tructicui I	tensionofgivenliquid		tension of a liquid	•
	tensionorgiveninquia		involves several	
			experimental methods	
			that students should	
			master in physical	
			chemistry and fluid	
			mechanics. One	
			common method is the	
			capillary rise method,	
			where students measure	
			the height to which the	
			liquid rises in a capillary	
			tube due to capillary	
			action.	
Practical 5	Determinationofviscosityof givenliquid	5	Determining the	4
	7 2 1		viscosity of a liquid	
			involves several	
			experimental techniques	
			that are fundamental in	
			fluid mechanics and	
			physical chemistry. One	
			common method is the	
			capillary viscometer	
			technique, where	
			students measure the	
			time it takes for a liquid	
			to flow through a narrow	
			capillary tube under	
			gravity.	
Practical 6	Synthesisof apolymer/drug	5	Synthesizing a polymer	
			or drug involves a series	
			of chemical reactions	
			and processes aimed at	
			creating a specific	
			molecular structure with	
			desired properties. For	
			polymers, students	4
			typically learn methods	
			such as polymerization	
			such as polymerization reactions (e.g.,	
			such as polymerization	
			such as polymerization reactions (e.g.,	
			such as polymerization reactions (e.g., condensation	
			such as polymerization reactions (e.g., condensation polymerization, addition	

**T1:** University chemistry, by B. H. Mahan

T2: University chemistry, by B. H. Mahan

T3: Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

**T4:** Fundamentals of Molecular Spectroscopy, by C. N. Banwell

**T5:** Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

#### **REFERENCE BOOKS:**

R1: Physical Chemistry, by P. W. Atkins

**R2:** Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

#### OTHER LEARNING RESOURCES:

**O1:Coursera**: Offers courses on engineering chemistry topics such as materials science, environmental chemistry, and chemical engineering principles.

**O2:** edX: Provides courses from universities worldwide covering topics like nanotechnology, renewable energy, and chemical process design.

**O3: MIT Open Course Ware**: Offers free lecture notes, exams, and videos from actual MIT courses in chemistry and chemical engineering.

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping									
SN	N Course Outcome (CO) Mapped Program Outcome									
1	Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.	1,2,3,4,5,10,12								
2	Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques	1,2,3,4,5,10,12								
3	Understand bulk properties and processes using thermodynamic considerations	1,2,3,4,5,10,12								
4	Understand periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity	1,2,3,4,5,10,12								
5	Analyse major chemical reactions that are used in the synthesis of molecules.	1,2,3,4,5,10,12								

Course	Course	CO	РО	PO	PO	PO1	PO1	PO1						
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	2	1	3	1					1		3
22BTCS12	Engineeri ng	CO 2	3	2	2	2	2					2		2
2R	Chemistr y	CO 3	3	2	1	3	1					1		3
		CO 4	3	2	2	2	2					2		2
		CO 5	3	2	2	2	2					2		2

SEMESTER – II													
Course Title		Programmir	ng for Pr	oble	m Sol	ving							
Course code	22BTCS123R	Total credits: 4	L	T	P	S	R	O/F	C				
		Total hours:	3	0	2	0	0	0	4				
		45T+30P											
Pre-requisite	Nil	Co-requisite					Nil						
Programme		elor of Technology i											
Semester		Vinter/ II semester						m					
Course	•	e algorithms for arit			•								
Objectives		the programs and co	•			_							
(Minimum 3)		orithms, data structu		_				-	g them to				
		ogically and develop					_						
CO1	Understand computer system elements and a foundational comprehension of algorithms and programming.  Utilize branching and looping statements to address decision-making programming problems.  Apply homogeneous derived data types, heterogeneous data types, strings, and functions												
CO2													
CO3													
	effectively for programming tasks.												
CO4		Demonstrate understanding of pointers and applying their concepts skillfully in											
G 0 =	programming scena			•	•.•				CC				
CO5		g concepts in C pr	_	ing w	vith co	ompet	tence,	ensuring	effective				
<b>T</b> T • 4 <b>N</b> T	_	nd storage solutions					0 1						
Unit-No.	Con	ntent	Contac		Lea	arnın	g Out	come	BL				
I	Intuaduation to	D	Hour 8		Inders	ton di		of	122				
1	Introduction to	components of a	0		rogra	concepts,	1,2,3						
	computer system	-		_	•		_	es, data					
		e a program is				-		tructures					
	_	cuted, operating			such	as	loo ₁						
		rs etc.) Idea of		,	onditi			unctions,					
	-	to solve logical						tructures					
	and numeric												
		*				•		sts. They					
	Representation Flowchart/Pseudo	•					_	proficient					
						_		ng, and					
	_	algorithms to				-		using a					
		code, variables		_	rogra		_	language					
		s) variables and				is Py	tnon,	Java, or					
	memory location				C++.								
	Logical Errors in	compilation,											
	object and executa	able code											
II		pressions and	12	Ţ	Jnders	stand	ho	w to	3,4				
	precedence	Conditional			onstru		and	evaluate					
	Branching and L				rithm			pressions					
		1			vith	corr		operator					
	Writing and	evaluation of			reced		•	and					
	conditionals a	nd consequent		P									
	<u>.</u>		1						62				

	branching, Iteration and loops		associativity rules to	
	Arrays: Arrays (1-D, 2-D),		ensure accurate	
	Character arrays and Strings Basic		calculations. They should	
	Algorithms: Searching, Basic		master using conditional	
	Sorting Algorithms (Bubble,		branching (if, else-if, else	
			<del>-</del> .	
	Insertion and Selection), Finding		/	
	roots of equations, notion of order		program flow based on	
	of complexity through example		Boolean conditions,	
	programs (no formaldefinition		enabling the execution of	
			different code blocks	
	required)		based on varying input	
			scenarios.	
III	Function: Functions (including	8	Understand the concepts	3,4
	using built in libraries), Parameter		of parameters, return	
	passing in functions, call by value,		values, and scope,	
	passing arrays to functions: idea of		ensuring proper data flow	
	call by reference Recursion:		and variable accessibility	
	Recursion, as a different way of		within and outside	
	solving problems. Example		functions.	
	programs, such as Finding Factorial,		runctions.	
	Fibonacci series, Ackerman function			
IV	etc. Quick sort or Mergesort.  Structure: Structures, Defining	6	Understand how to define	4
1 V		O		4
	structures and Array of Structures		and use structures to create	
	<b>Pointers:</b> Idea of pointers, Defining		complex data types that	
	pointers, Use of Pointers in self-		group different variables	
	referential structures, notion of		under a single name,	
	linked list (no implementation)		enhancing data	
	iniked list (no implementation)		organization and	
			manipulation. They should	
			learn how to declare and	
			access structure members,	
			and understand memory	
			layout and alignment.	
V	File handling (only if time is		Learn how to open, read,	4
			write, and close files using	
	available, otherwise should be done		programming languages	
	as part of the lab)		such as Python, Java, or	
			C++. They should	
		5	understand the importance	
			of file modes (e.g., read,	
			write, append) and be able	
			to handle different file	
			types, such as text and	
			binary files.	
	Practical Con	mnonent	omary mes.	
	i racucal Col	шропен		
Practical 1	Write a C program to find sum and		These programs cover	1,2
	average of three numbers.	2	basic arithmetic	-,-
	avorage of times numbers.		casic aritimetic	

	Waite Comment of Contract		1::14	1
Practical 2	Write a C program to find the sum of individual digits of a given positive Write a C program to generate the first n terms of the Fibonacci sequence  Write a C program to generate prime	2	operations, digit manipulation, and sequence generation in C, demonstrating fundamental programming concepts such as loops, conditionals, and input/output operations  These programs	1,2
	numbers between 1 to n. Write a C program to Check whether given number is Armstrong Number or Not.		demonstrate how to generate prime numbers within a specified range and how to check if a given number is an Armstrong number, illustrating fundamental concepts such as loops, conditionals, and basic mathematical operations in C.	
Practical 3	Write a C program to evaluate algebraic expression (ax)/ (ax-b). Write a C program to check whether given number is perfect number or Not Write a C program to check whether given number is strong number or not.	3	These programs illustrate the evaluation of an algebraic expression, checking for perfect numbers, and identifying strong numbers, employing concepts such as mathematical operations, loops, conditionals, and functions in C.	1,2
Practical 4	<ul><li>a) Write a C program to find the roots of a quadratic equation.</li><li>b) Write a C program perform arithmetic operations using switch statement.</li></ul>	2	These programs illustrate how to find the roots of a quadratic equation using mathematical formulas and handle various cases based on the discriminant, and how to perform basic arithmetic operations using a switch statement to select the operation based on user input, employing control structures, and mathematical operations in C.	1,2
Practical 5	Write a C program to find factorial of a given integer using non-recursive Function. Write a C program to find factorial	2	These programs demonstrate how to calculate the factorial of a given integer using both	1,2

	of a given integer using recursive		non-recursive and	1
	function.		recursive approaches. The non-recursive approach employs a simple loop to multiply the integers up to the given number, while the recursive approach calls the function itself with a decremented value until it reaches the base case, illustrating fundamental concepts of iteration and recursion in C.	
Practical 6	Write C program to find GCD of two integers by using recursive function.  Write C program to find GCD of two integers using non-recursive function.	2	These programs illustrate how to find the Greatest Common Divisor (GCD) of two integers using both recursive and non-recursive approaches. The recursive approach uses Euclid's algorithm, calling the function with the remainder until the base case of zero is reached. The non-recursive approach implements the same algorithm using a loop, demonstrating fundamental concepts of recursion and iteration in C.	1,2
Practical 7	Write a C program to find both the largest and smallest number in a list of Integers  Write a C Program to Sort the Array in an Ascending Order.  Write a C Program to find whether given matrix is symmetric or not.	2	These programs demonstrate how to find the largest and smallest numbers in a list of integers, sort an array in ascending order using the bubble sort algorithm, and check whether a given matrix is symmetric by comparing elements across the main diagonal, illustrating fundamental concepts of arrays, sorting, and matrix operations in C	3,4
Practical 8	Write a C program to perform addition of two matrices. Write a C program that uses functions to perform Multiplication	2	These programs demonstrate matrix operations in C. The first program performs the	3,4

	of Trye Metrices	<u> </u>	addition of two matrices	
Practical 9	Write a C program to use function to insert a sub-string in to given main	2	addition of two matrices by iterating through each element and summing corresponding elements. The second program defines a function to multiply two matrices, adhering to matrix multiplication rules, and then uses this function to compute the product, illustrating modular programming and array manipulation in C  These programs demonstrate string	3,4
	string from a given position.  Write a C program that uses functions to delete n Characters from a give position in a given string.		manipulation in C. The first program inserts a substring into a main string at a specified position using a function, while the second program deletes a specified number of characters from a given position in a string using a function. These tasks illustrate the handling of character arrays, string operations, and function use in C	
Practical 10	Write a C program using user defined functions to determine whether the given string is palindrome or not. Write a C program that displays the position or index in the main string S where the sub string T begins, or -1 if S doesn't contain T	3	These programs illustrate string operations in C using user-defined functions. The first program checks if a given string is a palindrome by comparing characters from both ends toward the center. The second program finds the starting index of a sub-string within a main string or returns -1 if the sub-string is not found, demonstrating the implementation of string search algorithms.	3,4
Practical 11	Write C program to count the number of lines, words and characters in a given text.	2	These programs demonstrate string and	3,4

	Write a C program to find the length		character manipulation in	
	of the string using Pointer.		C. The first program	
	of the string using 1 officer.		counts the number of	
			lines, words, and	
			characters in a given text	
			by iterating through the	
			characters and detecting	
			spaces, tabs, and newline	
			characters to determine	
			word boundaries and lines.	
			The second program	
			calculates the length of a	
			string using a pointer,	
			iterating through the	
			characters until it reaches	
			the null terminator,	
			showcasing the use of	
			pointers in C for string	
			operations. These tasks	
			highlight foundational	
			concepts in C	
			programming related to	
			strings, pointers, and	
			character handling.	
			character handning.	
Practical 12	Write a C program to Display array	2	These programs	3,4
	elements usingcalloc ( ) function		demonstrate practical uses	
	Write a C Program to Calculate		of calloc() for dynamic	
	Total and Percentage marks of a		memory allocation and	
	student using structure.		structures for organizing	
	<u> </u>		data related to students'	
			academic information,	
			showcasing core concepts	
			in C programming such as	
			memory management and	
			structured data handling.	
Practical 13	Write a C program that uses	2	These programs illustrate	3,4
	functions and structures to perform	_	practical applications of	~ y =
	the following operations:		structures, functions, file	
	Reading a complex number		handling, and basic	
	Writing a complex number		operations with complex	
	Addition of two complex numbers		numbers in C, showcasing	
	Multiplication of two complex		fundamental concepts in	
	numbers		programming and data	
	Write a C program to display the		handling.	
	contents of a file		nanumg.	
Practical 14		2	Those programs illustrate	2.4
Fracucal 14	Write a C program to copy the	<u> </u>	These programs illustrate	3,4
	contents of one file to another.		file handling operations in	
	White of Company to the		C : 1: 1'	
	Write a C program to merge two files into a third file.		C, including reading, writing, and manipulating	

Write a C program to reverse the	file contents based on user	
first n characters in a file	input, showcasing	
	fundamental concepts in	
	file handling and C	
	programming.	

T1:E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill.

**T2:** Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, PrenticeHallof India.

#### **REFERENCE BOOKS:**

R1:Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

## **OTHER LEARNING RESOURCES:**

**O1:Coursera**: Courses such as "Programming for Everybody (Getting Started with C).

**O2:** edX: Introduction to C Programming" by Dartmouth College.

**O3:**Udemy: Various courses on C programming, including "C Programming For Beginners - Master the C Language".

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Understand computer system elements and a foundational comprehension of algorithms and programming.	1,2,3,5,11,12								
2	Utilize branching and looping statements to address decision-making programming problems.	1,2,3,4,5,9,11,12								
3	Apply homogeneous derived data types, heterogeneous data types, strings, and functions effectively for programming tasks.	1,2,3,4,5,9,11,12								
4	Demonstrate understanding of pointers and applying their concepts skillfully in programming scenarios.	1,2,3,4,5,11,12								
5	Apply file handling concepts in C programming with competence, ensuring effective data management and storage solutions.	1,2,3,4,5,9,11,12								

Course	Course	CO	РО	РО	PO	PO	PO	PO	PO	PO	РО	PO1	PO1	PO1
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	3	2	2	1				2		3
22BTCS1	Programm ing for	CO 2	3	2	2	2	2	1				2		2
23R	Problem Solving	CO 3	3	2	2	2	2	1				2		2
		CO 4	3	3	3	2	2	1				2		3
		CO 5	3	3	3	2	2	1				2		3

		Semester	r II												
Course Title		Engineering	Graphi	ics an	d Des	sign			_						
Course code	22BTCS124R	Total credits: 3	L	T	P	S	R	O/F	C						
		Total hours: 45T+30P	1	0	4	0	0	0	3						
Pre-requisite	Nil	Co-requisite	Nil												
Programme	Bache	elor of Technology i	n Comp	uter S	Scien	ce &	Engir	eering							
Semester		Vinter/ II semester o													
Course	To enable the str	udents with various	conce	ots li	ke di	mens	ioning	g, conven	tions and						
Objectives		Engineering Drawin	•												
(Minimum 3)	•	ge on the projection	•			•									
	_	ualization skills for b			_	_	-								
	_	aginative skills of the	e student	s requ	uired	to un	dersta	nd Section	n of solids						
	_	nd Developments of surfaces  To make the students understand the viewing perception of a solid object in Isometric and													
	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections														
0.01	erspective projections  Inderstand drawing principles accurately for conic sections eveloid enjoycloid														
CO1		nderstand drawing principles accurately for conic sections, cycloid, epicycloid, pocycloid, and involute.  reate solid orthographic projections, auxiliary views, annotations, dimensions, and floor ans with windows, doors, and fixtures.  pply isometric principles and convert views, showing understanding of scale and													
602	• 1														
CO2															
CO2	•														
CO3	conventions.	orinciples and conve	ert view	s, sno	owing	g una	erstan	ung of s	scale and						
CO4		graphics in CAD of	drawina	dom	onstr	otina	lmorr	ladge of	coftwore						
CO4	_	g settings, applying I	_			-		-							
		rdinate input method					, and j	noducing	drawings						
CO5	_	ded geometric design		os una	CITCI	<b>C</b> B.									
Unit-No.	11 7	ntent	Contac	·t	Les	rnin	g Out	come	BL						
			Hour	I	200	•••••	5 0 4.0	COLLE							
I	Introduction	to Engineering		L	earn	the	fun	damental	1,2,3						
	Graphics and	<b>curves</b> : Drawing		p	rincip	les a	nd te	chniques							
		accessories, BIS -					drav	ving and							
	^	ne scales, Diagonal			raftin	_	They	should							
	_	sentative Fraction.		I	ecom	•	orofici								
		d application of				-		erpreting							
	-	es, Construction of		I	arious		type								
		Curves, Involutes			ngine	_		lrawings,							
	•	g with normal and	5		ıcludi	_		ographic							
	tangent to each cu	rve		1 ^	roject			sometric							
				I	iews,			sectional							
					iews.		dents								
				I	nders		the	use of							
				I	andar		and a	drawing							
					istrum ided		ana c sign	omputer-							
				I			•	(CAD) sion and							
					fficie		preci	Sion and							
				e	inciel	ıcy.									

II	Projections of Points and Lines:		Understand the principles	3,4
	Introduction to principal planes of		of orthographic projection,	
	projections, Projections of the points		including the projection of	
	located in same quadrant and		points and lines onto	
	different quadrants, Projections of		various planes. They	
	line with its inclination to one		should learn to accurately	
	reference plane and with two		depict the position of	
	reference planes. True length and	7	points in different	
	inclination with the reference planes		quadrants and the true length and inclination of	
	Projections of Planes: Projections of		lines relative to the	
	planes (polygons, circle and ellipse)		projection planes.	
	with its inclination to one reference		projection planes.	
	plane and with two reference planes,			
	Concept of auxiliary plane method			
	for projections of the plane			
III	Projections of Solids and Section		Learn to accurately draw	3,4
	<b>of Solids</b> : Classification of solids.		various solids such as	,
	Projections of solids (Cylinder,		prisms, cylinders,	
	Cone, Pyramid and Prism) along		pyramids, and cones in	
	with frustum with its inclination to		different orientations and	
	one reference plane and with two		positions relative to the	
	reference planes. Section of such		projection planes.	
	solids and the true shape of the	6	Additionally, students	
	section		should understand how to	
			create sectional views by	
			cutting through solids to	
			reveal internal features,	
			using cutting planes and	
			identifying sectional	
			shapes.	
IV	Orthographic Projections:		Understand how to create	4
1,	Fundamental of projection along		multiple views (front, top,	•
	with classification, Projections from		side) of objects using	
	the pictorial - 35% view of the		orthographic projection	
	object on the principal planes for		methods, ensuring	
	view from front, top and sides using		accurate depiction of	
	first angle projection method and		object dimensions, shapes,	
	third angle projection method, full		and spatial relationships.	
	sectional view		Students should master the	
	Sociolai 12 W	6	conventions of first-angle	
			and third-angle projection	
			systems, apply projection	
			rules to generate	
			orthogonal views from	
			isometric or perspective	
			drawings, and interpret	
			engineering drawings to	
			extract geometric	

			information for	
			manufacturing and	
			construction purposes.	
V	Isometric Projections and		Understand the principles	4
•	Isometric View or Drawing:		of isometric projection,	7
	Isometric Scale, Conversion of		which involves projecting	
	orthographic views into isometric		object edges onto three	
	<u> </u>			
	projection, isometric view or		mutually perpendicular	
	drawing		axes at equal angles of 120	
			degrees. Students learn to	
		6	create isometric views that	
			accurately depict the	
			shape, size, and	
			orientation of objects,	
			providing a realistic and	
			intuitive representation	
			useful in fields such as	
			engineering, architecture,	
			and design.	
	Practical Con	mponent		
Practical 1	Introduction to Engineering		Learn the fundamental	1,2
	<b>Drawing</b> , Principles of Engineering		principles and techniques	
	Graphics and their significance,		essential for creating	
	usage of Drawing instruments,		precise and standardized	
	lettering, Conic sections including		technical drawings used in	
	the Rectangular Hyperbola (General		engineering disciplines.	
	method only); Cycloid, Epicycloid,		They acquire skills in	
	Hypocycloid and Involute; Scales –	6	producing orthographic	
	Plain, Diagonal and Vernier Scales.	•	projections, isometric	
	Principles of Orthographic		views, and sectional views	
	Projections-Conventions -		of objects, ensuring	
	Projections of Points and lines		accurate representation of	
	inclined to both planes; Projections		dimensions, shapes, and	
	of planes inclined Planes - Auxiliary		relationships in two-	
	Planes;		dimensional formats	
Dugatical 2	·	-		1.2
Practical 2	Projections of Regular Solids	6	Grasp how to create	1,2
	Covering those inclined to both the		sectional views to reveal	
	Planes- Auxiliary Views; Draw		internal structures of	
	simple annotation, dimensioning		regular solids, employing	
	and scale. Floor plans that include:		cutting planes to illustrate	
	windows, doors, and fixtures such		cross-sections and	
	as WC, bath, sink, shower, etc.		understand spatial	
			relationships within the	
	Sections and Sectional Views of		objects. Mastery of these	
	Right Angular Solids Covering		skills in engineering	
	Prism, Cylinder, Pyramid, Cone-		drawing and technical	
	Auxiliary Views; Development of		illustration allows students	
	surfaces of Right Regular Solids -		to communicate design	

	Prism, Pyramid, Cylinder and		concepts effectively,	
	Cone; Draw the sectional		aiding in manufacturing,	
	orthographic views of geometrical		architectural planning, and	
	solids, objects. From industry and		spatial analysis in various	
	dwellings (foundation to slab only)		engineering disciplines.	
Practical 3	<b>Isometric Projections</b> Covering,	6	Learn how to create	1,2,3
	Principles of Isometric projection –		accurate and visually	1,2,0
	Isometric Scale, Isometric Views,		appealing representations	
	Conventions; Isometric Views of		of objects by projecting	
	lines, Planes, Simple and compound		their edges onto three	
	Solids; Conversion of Isometric		mutually perpendicular	
	Views to Orthographic Views and		axes at equal angles of 120	
	Vice-versa, Conventions		degrees. This technique	
	vice-versa, conventions		allows for the	
			visualization of objects	
			from different	
			perspectives, enhancing	
			spatial understanding and	
			design communication in	
			fields such as engineering,	
			architecture, and product	
D 41 14			design.	2.4
Practical 4	Overview of Computer Graphics	6	Learn about the basic	3,4
	Covering listing the computer		principles of rasterization,	
	technologies that impact on		vector graphics, and	
	graphical communication,		rendering techniques such	
	Demonstrating knowledge of the		as ray tracing and	
	theory of CAD software,		rasterization. They explore	
			topics like geometric	
			transformations, 3D	
			modeling, shading, and	
			texture mapping, essential	
			for creating realistic and	
			interactive virtual	
			environments in fields like	
			gaming, animation,	
			simulation, and virtual	
D			reality.	2.4
Practical 5	Customization & CAD Drawing	6	Learn to customize	3,4
	consisting of set up of the drawing		designs by manipulating	
	page and the printer, including scale		geometric shapes,	
	settings, Setting up of units and		dimensions, and materials	
	drawing limits; ISO and ANSI		to meet specific project	
	standards for coordinate		requirements. Students	
	dimensioning and to learning;		gain proficiency in CAD	
	Orthographic constraints, Snap to		tools to draft 2D and 3D	
	objects manually and automatically;		models, apply engineering	
	Producing drawings by using		principles, and simulate	
	various coordinate input entry		real-world conditions for	
	methods to		design validation.	
				74

Draw straight lines, Applying		
various ways of drawing circles		

**T1:** Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House **T2:** Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

#### **REFERENCE BOOKS:**

R1: Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

R2: Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

R3: Corresponding set of) CAD Software Theory and User Manuals

#### OTHER LEARNING RESOURCES:

O1:https://nptel.ac.in

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing	1,2,3,4,5,6,10,12
2	To impart knowledge on the projection of points, lines and plane surfaces	1,2,3,4,5,6,10,12
3	To improve the visualization skills for better understanding of projection of solids	1,2,3,4,5,6,10,12
4	To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces	1,2,3,4,5,6,10,12
5	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections	1,2,3,4,5,6,10,12

Course	Course	CO	PO	PO1	PO1									
code	Name	's	1	2	3	4	5	6	7	8	9	0	1	2
	Engineeri	CO												
22BTCS12	ng	1	3	3	3	2	2.	1				2		3
4R	Graphics		5	5	5	_		1				_		J
410	and													
	Design	CO	3	2	2	2	2	1				2		2
		2		_	_	_	_	1				_		_

CO 3	3	2	2	2	2	1		2	2
CO 4	3	3	3	2	2	1		2	3
CO 5	3	3	3	2	2	1		2	3

		SEMESTE	R – II									
Course Title		Techno P	Profession	nal S	Skills	I						
Course code	22BTCS125R Tota	l credits: 1	L	T	P	S	R	O/F	C			
	Tota	l hours: 30P	0	0	2	0	0	0	1			
Pre-requisite	Nil	Co-requisite					Nil					
Programme			in Computer Science & Engineering									
Semester		/ II semester o										
Course	To become confident in	•	atics, log	ic, r	eason	ing a	nd co	ding to a	nalyze and			
Objectives	solve problems in real-li											
(Minimum 3)	To acquire elementary k		-	-	-							
	Problem-solving skills a	7	-	ical	thinki	ng ar	nd pra	ctical app	lication of			
	technical knowledge to i		-									
CO1	Develop highly skilled a		able mana	igen	nent p	rofes	sional	who can	deal with			
	various areas and aspect											
CO2	Develop analytical and	· ·	as man	agen	nent p	rofes	sional	who car	be more			
	efficient and innovative	•										
CO3	Gather knowledge about	various develo	pment co	nce	pts an	d the	theori	ies of dev	elopment.			
CO4	Encourage the students t	owards Non-tra	ditional t	hink	ing.							
CO5	Effectively communicat				_	lge i	n a pi	ofessiona	1 manner.			
						C	•					
Unit-No.	Content		Contact Learning Ou					come	BL			
		Hour										
I	C Programming const	6		Inders		_	of	1,2,3				
	Types of Programmin			_	rograi		_	concepts,				
	Evolution of 'C' Langua	_						les, data				
	of a 'C' Program, E	_		1 -	•			structures				
	Debugging a 'C' Progra	<i>'</i>		`	such	as	loo	-				
	1	words and			onditi			unctions,				
	Identifiers, Operators							structures				
	Variables, Data Types					•		sts. They				
	of Operators, Scope and						_	proficient				
	Variables, Arithmetic	_				_		ng, and				
	Evaluation of Expression	ons.				_		using a				
TT	Control Statements		-	_	Inders			guage.	2.4			
II	Control Statements:  Decision Making using	if statement	6		onaers onstru		and	ow to evaluate	3,4			
					onsu u rithme							
	Types of ifelse block Block, GOTO statemer				riunne ⁄ith	corr		pressions operator				
	Looping:				recede		CCi	and				
	Looping.				ssocia		7 <b>1</b> *1	iles to				
	Concept of Loop, For			nsure	u vity	11	accurate					
	loop, Do- while loop	, jumping in				tione	The	y should				
	Loop, break and contir	ue statement,						nditional				
	Introduction to Arrays	, Strings and					-	e-if, else				
	Functions.				tateme	_	to	direct				
				3		)		- GIICCI				

program flow based on	
Boolean conditions,	
enabling the execution of	
different code blocks	
based.	
	3,4
	3,4
One Dimensional Arrays, Two-	
dimensional Arrays, sorting, searching, and	
Multidimensional Arrays, Dynamic iterating through elements,	
Arrays. which are fundamental for	
implementing algorithms	
and solving computational	
problems. Mastery of	
arrays enables students to	
manage large datasets,	
optimize memory usage,	
and enhance the	
performance of software	
applications across diverse	
domains such as data	
analysis, image	
processing, and simulation	
modeling.	
IV Strings: 6 Learn how to declare,	4
Implementing String Variables, initialize, and access	7
String handling Functions. Individual characters or	
substrings within strings	
using indexing and slicing	
techniques. Students also	
explore various operations	
and functions available for	
and functions available for manipulating strings,	
and functions available for manipulating strings, including concatenation,	
and functions available for manipulating strings, including concatenation, comparison, and	
and functions available for manipulating strings, including concatenation, comparison, and modification.	
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions:  6 Understand the concepts	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined  and functions available for manipulating strings, including concatenation, comparison, and modification.  6 Understand the concepts of parameters, return	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined Functions, System-defined Functions, System-defined values, and scope,	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined  and functions available for manipulating strings, including concatenation, comparison, and modification.  6 Understand the concepts of parameters, return	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined Functions, System-defined Functions, System-defined values, and scope,	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.  and functions available for manipulating strings, including concatenation, comparison, and modification.  6 Understand the concepts of parameters, return values, and scope, ensuring proper data flow	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.  System-defined values, and scope, ensuring proper data flow and variable accessibility	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.  6 Understand the concepts of parameters, return values, and scope, ensuring proper data flow and variable accessibility within and outside	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions:  Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.  By Eurocions of Dinderstand the concepts of parameters, return values, and scope, ensuring proper data flow and variable accessibility within and outside functions.  Practical Component	4
and functions available for manipulating strings, including concatenation, comparison, and modification.  V Functions:  Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.  6 Understand the concepts of parameters, return values, and scope, ensuring proper data flow and variable accessibility within and outside functions.	4

T1: E. Balaguruswamy, Programming in ANSI C, TataMcGraw-Hill.

#### **REFERENCE BOOKS:**

**R1:** Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

**R2:** Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

R3: Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978-93-8728-449-4.

**R4:** Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education.

ISBN: 978-93-325-3800-9.

R5: Dr. Guruprasad Nagraj, "C Programming for Problem Solving", Himalaya Publishing

House, ISBN-978-93-5299-361-1

#### OTHER LEARNING RESOURCES:

O1:https://nptel.ac.in

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10,12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,10,12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,10,12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10,12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10,12

Course	Course	CO'	РО	PO1	PO1	PO1								
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2

	Techno	CO 1	2	1	1	1	1			3	2
22BTCS12	Professio nal Skills	CO 2	2	1	3	1	1			3	2
5R	I	CO 3	2	3	1	1	1			3	2
		CO 4	2	2	2	2	2			3	2
		CO 5	2	2	2	2	2			3	2

		SEMESTE	R – II										
Course Title		EFFECTIVE EN	IGLISH :	FOR	ENG	SINE	ERS						
Course code	22UBPD124R	Total credits: 2	L	T	P	S	R	O/F	С				
		Total hours: 30P	0	0	4	0	0	0	2				
Pre-requisite	Nil	Co-requisite					Nil						
Programme		vil Engineering/B.T						U					
	Computer Science and Engineering/B.Tech in Computer Science and Engineering (B)/B Tech in Mechanical Engineering (B)/B Tech in Civil Engineering (B)/B Tech												
	(B)/ B.Tech in Mechanical Engineering (B)/ B.Tech in Civil Engineering (B)/ B.7 in Computer Science and Engineering on Cloud												
		<del>-</del>		_		_		Į.					
Semester	Technology and Information Security Fall/I or Winter/II Semester of First Year of the Programme												
Course		able the students to							mmar like				
Objectives	the formation of ser		1		1			0 0					
(Minimum 3)	To enable the stude	nts to use vocabular	y meanin	gfull	y for	a succ	cessfu	l conversa	ation.				
	_	tion and Rapport, a											
	`	g, Prioritizing, and F	Performin	g) of	Time	Man	agem	ent will b	e taught to				
0.01	the students.												
CO1		ntify common errors	s in Engli	sh w	riting.	•							
CO2	Acquire skill of report writing.												
CO3	Develop the ability as critical readers and writers.  Improve speaking ability in English both in terms of fluency and comprehensibility.												
CO4	improve speaking	ability in Eligibii	oom m t	CHIIS	01 11	uenc	y and	Complen	ensionity.				
CO5	Understand the corr	ect usage of English	h gramma	ır in v	writin	g and	speak	king.					
Unit-No.	Con	tent	Contac Hour	t	Lea	arnin	g Out	come	BL				
I	Interchange of Interchange of Exc Assertive Sentence Interchange of Exc Assertive Sentence Analysis of Senter Types of Tenses E	es clamatory and es nces	6	a tll a p S c c s n s tll fo	Indersond strange trange truden ompouch morpholes e corm north action of the corm of the c	1,2,3							
II	Vocabulary Synonyms Antonyms Homonyms	6	understanding the meanings, usage, and contexts of words within language. Students focution expanding their vocabulary by learning				within a tocus their						

_		•		
			expressions, and	
			specialized terminology	
			relevant to their fields of	
			study or interests. They	
			develop skills in	
			recognizing word forms,	
			meanings, and	
			relationships through	
			activities such as reading,	
			listening, and practice	
			exercises.	
III		6	Learn to apply strategies	3,4
	Reading Skills		such as skimming and	-,-
			scanning to locate specific	
	Techniques of Effective Reading		information quickly, while	
	Gathering ideas and information		also improving their	
	from a text		ability to infer meaning	
	The SQ3RTechnique		from context and draw	
	Interpret the text		conclusions. Mastery of	
	1		reading skills enhances	
			C	
			students' capacity to	
			synthesize information,	
			evaluate arguments, and	
			critically assess sources	
			across various disciplines	
			and genres.	_
IV	Dress Code Ethics	6	Learn the importance of	4
	Dress Code Ethics		presenting themselves	
	Introduction to Dress Code Ethics,		professionally and	
	Purpose and Importance,		respectfully through their	
	How to Make FIRSTIMPRESSION		clothing choices. They	
	What to Wear During Interviews or		understand the impact of	
	Any Other Formal Meetings – Male		attire on first impressions,	
	&		professionalism, and	
			cultural sensitivity. By	
			adhering to dress code	
			policies, students	
			demonstrate their	
			understanding of	
			workplace norms and	
			expectations, preparing	
			them for future careers and	
			professional interactions.	
V	Time_Management Skills	6	Learn to identify and set	4
	Time-Management Skills		realistic objectives, break	
	Introduction To Time Management,		tasks into manageable	
	Purpose And Importance of Time		steps, and create schedules	
	Management,		or timelines to organize	
	Basic Tips to Maintain Time.		their workload. They	
	Dasic Tips to Manitani Tillie.		develop strategies such as	
			· · · · · · · · · · · · · · · · · · ·	82

			setting priorities, avoiding procrastination, and using tools like calendars or task management apps to optimize productivity.							
	Practical Component									
Practical 1										
Practical 5										

**T1:** Wren,P.C and Martin,H. 1995. High School English Grammar and Composition, S Chand Publishing. **T1:** Barrett,Grant.2016.PerfectEnglishGrammar:TheIndispensibleGuidetoExcellent Writing and Speaking, ZephyrosPress

#### **REFERENCE BOOKS:**

**R1:** Carthy. (2008) English Vocabulary in Use Upper - Intermediate with CD-ROM, Cambridge University Press

R1: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

#### OTHER LEARNING RESOURCES:

O1: https://youtu.be/rl85jxktfms

**O2:**<a href="https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt">https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt</a>

#### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10,12						
2	Develop analytical and research ability as management professional who can be more efficient and innovative in	1,2,3,4,5,10,12						

	practice.	
3	Gather knowledge about various development concepts and	1,2,3,4,5,10,12
	the theories of development.	
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10,12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10,12

Course	Course	CO'	PO	РО	РО	PO	РО	PO	РО	PO	PO	PO1	PO1	PO1
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
22UBPD12 4R		CO 1	1	1	1	1	1					3		2
	EFFECTIV													
	E ENGLISH	CO 2	1	1	1	1	1					3		2
	FOR ENGINEE	CO 3	1	1	1	1	1					3		2
	RS	CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

SEMESTER – II												
Course Title		MOOCS I: E	nhanci	ng St	udy S	kills						
Course code	22MOSY124R	Total credits: 2	L	T	P	S	R	O/F	С			
		Total hours:	0	0	0	0	0	0	1			
		45T+30P										
Pre-requisite	Nil	Co-requisite				]	Nil					
Programme	B.Tech in Computer Science Engineering											
Semester	Winter/II Semester of First Year of the Programme											
Course	Develop critical thinking and problem-solving abilities to approach academic challenges											
Objectives	systematically. To enable the students to use vocabulary meaningfully for a successful											
(Minimum 3)	conversation.											
	~	ement skills to help	studer	nts pr	ioritiz	e tas	ks, se	et goals, a	and create			
	effective study sche											
	_	comprehension and	note-ta	aking	techr	niques	s for	better in	formation			
	retention and under	•							_			
	_	strategies, including	prepara	ation,	anxie	ty ma	nager	nent, and	answering			
0.01	techniques											
CO1		to analyze your le	_	•			stic g	oals, and	create a			
602		that maximizes your		<u> </u>				1111	Ľ 1			
CO2		management techni	_	_		zatioi	ı, tas	k schedu	ling, and			
602		rcoming procrastinati				.1	1	· 1 -				
CO3	~ ~ ~	literacy skills to		•					•			
	scholarly articles.	arious sources, inclu	unig ac	auem	ic data	abase	s, cie	dible web	sites, and			
CO4	· · · · · · · · · · · · · · · · · · ·	gies for analyzing	compla	v inf	Cormat	ion	idanti	fying ma	in ideas			
C04	_	ts, and drawing insig	•					•				
CO5		ore various test-tak						~				
		ng test anxiety, and d		_			_	_	-			
	confidence and per	•	o ( Clop		or spe		,	5100 01100 0	0050 7 0 011			
Unit-No.	_		Contac	ct	Lea	rnin	g Out	come	BL			
			Hour			•	<b>.</b>					
I	Introduction: De	fining effective	8		earn	to	asses	ss their	1,2,3			
	studying and its	•		iı	ndivid	ual le	earnin	g styles,				
	academic success.			Si	trengtl	hs, a	nd a	reas for				
	Learning Styles:	Identifying your		iı	nprov	emen	t to	create an				
	preferred learnin	g style (visual,		e	ffectiv	e i	and	tailored				
	auditory, kinesthe	tic) and tailoring		a	pproac	ch to	their	studies.				
	your study strategi	es accordingly.		T	`hey	shoul	d ur	nderstand				
	Goal Setting: S	Setting SMART		h	ow to	set	reali	istic and				
	goals (Specific				chieva			academic				
	· ·	elevant, Time-		_		-		asks, and				
	bound) for your st						_	ate time				
	Developing a Pe	-				each	sub	ject or				
	Plan: Creating			a	ctivity	<b>'.</b>						
	incorporates class	*										
	sessions, breaks	and personal										

	commitments.			
	commitments.  Self-Assessment Tools: Introduction to self-assessment exercises to evaluate your current study habits and identify areas for improvement.			
II	Time Management Techniques: Exploring various time management strategies like the Eisenhower Matrix, the Pomodoro Technique, and time tracking tools. Prioritization: Learning to prioritize tasks based on urgency and importance and allocate study time accordingly. Identifying Time Wasters: Recognizing and eliminating distractions like social media, multitasking, and disorganized study areas. Combating Procrastination: Understanding the root causes of procrastination and developing strategies to overcome it (e.g., breaking down tasks, reward systems).	12	Learn to effectively organize their tasks and responsibilities to maximize productivity and achieve their goals. They should understand and apply strategies such as prioritizing tasks using methods like the Eisenhower Matrix, setting SMART goals (Specific, Measurable, Achievable, Relevant, Time-bound), and breaking down larger projects into manageable steps.	3,4
	Creating a Sustainable Study Routine: Establishing a consistent study schedule that integrates well with your overall lifestyle			
III	Research Strategies: Developing effective research techniques including using library resources, academic databases, and credible online sources.  Evaluating Information: Learning to assess the credibility of sources, identify biases, and distinguish between fact and opinion.  Citation Styles: Understanding different citation styles (APA, MLA, Chicago) and practicing proper citation methods.  Note-taking Techniques: Exploring various note-taking methods (e.g., outlining, mind mapping) and choosing a method that suits your learning style.  Information Organization:	8	Learn to systematically gather, analyze, and interpret information to address specific questions or problems effectively. They should understand how to define a clear research question or hypothesis, conduct comprehensive literature reviews, and utilize various sources, including academic journals, books, and credible online resources. Students should become proficient in employing different research methodologies, such as qualitative,	3,4

	Developing strategies for organizing		quantitative, or mixed	
	research findings, including using		methods, and in using	
	reference management tools		tools for data collection	
			and analysis.	
IV	Active Reading Strategies: Learning	6	Learn techniques to	4
	to read actively by highlighting key		enhance their	
	points, annotating text, and		comprehension, retention,	
	summarizing information in your		and critical engagement	
	own words.		with texts. They should	
	Critical Analysis: Developing skills		understand how to set	
	to analyze arguments, identify		reading goals and preview	
	assumptions and biases, and		materials to identify key	
	evaluate evidence presented in		themes and structure.	
	reading materials.		Students should practice	
	Comprehension Strategies: Building		annotating texts by	
	comprehension skills through		highlighting important	
	techniques like SQ3R (Survey,		points, making notes in the	
	Question, Read, Recite, Review)		margins, and summarizing	
	and identifying main ideas and		sections in their own	
	supporting details.		words. They should also	
	Information Synthesis: Learning to		develop the ability to ask	
	synthesize information from		critical questions, make	
	1 *		-	
	•		inferences, and connect	
	connections, and draw well-		new information to prior	
	supported conclusions.		knowledge.	
	Critical Thinking Exercises:			
	Practicing critical thinking skills			
	through analyzing case studies,			
	engaging in debates, and			
	formulating persuasive arguments			
V	Test Preparation Techniques:	5	Learn strategies to	4
	Creating a study plan specifically		enhance their	
	for exams, including reviewing class		understanding and recall	
	materials, practicing with past		of material, reduce	
	exams, and forming study groups.		anxiety, and perform	
	Test Anxiety Management:		effectively during exams.	
	Understanding and combating test		They should understand	
	anxiety through relaxation		how to create a study	
	techniques, positive self-talk, and		schedule that allocates	
	visualization exercises.		sufficient time for	
	Test-Taking Strategies: Learning		reviewing each subject,	
	different test-taking approaches for		utilizing techniques such	
	various question formats (multiple		as spaced repetition and	
	choice, essay, short answer) and		active recall. Students	
	maximizing your exam		should practice	
	performance.		summarizing notes,	
	Time Management During Exams:		creating mind maps, and	
	Developing strategies for allocating		using flashcards for key	
	time effectively during exams and		concepts. They should also	
	prioritizing responses.		engage in self-testing	
	prioritizing responses.		The series of the series	

Self-Evaluation and Reflection:		through practice exams	
Learning from exam experiences by		and quizzes to identify	
reviewing results, identifying areas		areas needing	
for improvement, and setting goals		improvement.	
for future exams			
Practical Cor	mponent		
	Learning from exam experiences by reviewing results, identifying areas for improvement, and setting goals for future exams	Learning from exam experiences by reviewing results, identifying areas for improvement, and setting goals	Learning from exam experiences by reviewing results, identifying areas for improvement, and setting goals for future exams  and quizzes to identify areas needing improvement.

**T1:** Brown, Peter C., Henry L. Roediger III, and Mark A. McDaniel. Make it stick: The science of successful learning. Harvard University Press, 2014..

### **REFERENCE BOOKS:**

**R1:** Newport, Cal. How to become a straight-A student: The unconventional strategies real college students use to score high while studying less. Crown, 2006.

### OTHER LEARNING RESOURCES:

O1: https://youtu.be/rl85jxktfms

**O2:**<a href="https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt">https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt</a>

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students will learn to analyze your learning style, set realistic goals, and create a structured schedule that maximizes your learning potential.	1,2,3,4,5,10,12
2	To discover time management techniques like prioritization, task scheduling, and identifying and overcoming procrastination tendencies.	1,2,3,4,5,10,12
3	Apply information literacy skills to effectively research, evaluate, and synthesize information from various sources, including academic databases, credible websites, and scholarly articles.	1,2,3,4,5,10,12
4	To develop strategies for analyzing complex information, identifying main ideas, evaluating arguments, and drawing insightful conclusions from reading materials.	1,2,3,4,5,10,12
5	To explore Explore various test-taking approaches, including exam preparation techniques, managing test anxiety, and developing test-specific strategies that boost your confidence and performance.	1,2,3,4,5,10,12

Course	Course	CO'	PO	РО	PO	PO1	PO1	PO1						
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1												
	MOOCS		2	2	2	2	3					2		2
	I:	CO												
22MOSY12	Enhanci	2	2	3	3	2	3					2		2
4R	ng Study	CO												
	Skills	3	2	2	2	2	3					2		2
		CO												
		4	2	2	2	3	3					2		2
		CO												
		5	3	3	3	3	3					2		2

	SEMESTER – II											
Course Title	1	Universal Human V	alues ar	d Pr	ofessio	nal	Ethic	S				
Course code	22UUHV101R	Total credits: 2	L	T	P	S	R	O/F	С			
		Total hours: 30P	1	0	2	0	0	0	2			
Pre-requisite	Nil	Co-requisite				]	Nil	1	1			
Programme		B.Tech in Comp	outer Sci	ience	Engin	eerii	ng					
Semester	V	Vinter/II Semester o						ne				
Course		listinguish between							eed, basic			
Objectives	_	and process of value			,				,			
(Minimum 3)	~	nitiate a process of d			nemsel	ves t	o kno	w what th	nev 'really			
	•	life and profession	υ									
		nderstand the meanin	ng of hap	pines	s and p	rosp	erity f	for a huma	an being.			
	_	idents to understand		_	_	_			_			
	accordingly.		,						5,			
		udents in applying th	he under	stand	ing of	harn	nonv	in existen	ce in their			
	profession and lead				U		J					
CO1	1	ortance and process	s of Val	ue E	ducation	on.	aligni	ng it wit	h human			
	aspirations.	1				,	υ	C				
CO2	*	pt of harmony within	n oneself	emi	hasizi	ng th	ne con	nection b	etween 'I'			
	and the body.	. ,				U						
CO3	<u> </u>	foundational values	in famil	v and	socie	ty fo	r con	nprehensiv	e human			
	goals.		•			•		•				
CO4		rconnectedness and	mutual	fulfil	lment	in r	nature	, emphas	izing co-			
	existence principle							, 1	C			
CO5		petence in profession	nal ethics	s, inc	orpora	ting	a hol	istic unde	rstanding			
	for eco-friendly pro	-		,	1	U			8			
Unit-No.		ntent	Contac	et	Lear	ning	2 Out	come	BL			
			Hour			•	3					
I	Course Introduc	tion - Need, Basic		U	Inderst	and	the	need for	1,2,3			
		tent and Process			alue		lucatio		, ,			
	for Value			fe	ostering	g ei	thical	, moral,				
	Understanding	the need, basic						sponsible				
	•	nt and process for			ehavio		The	basic				
	_	Self-Exploration—		g	uidelin	es		include				
		ontent and process;		_	romoti		core	values				
	'Natural Ac	ceptance' and		S	uch as	integ	grity,	empathy,				
		lidation- as the				_		nsibility.				
	mechanism for	self-exploration,	3		_		_	nt covers				
	Continuous 1	Happiness and	3	v	arious	di	mensi	ions of				
	Prosperity- A loc	ok at basic Human		h	uman	va	lues,	ethical				
		tht understanding,		tl	neories	, ;	and	real-life				
	_	Physical Facilities-				-	in	personal				
	_	equirements for						contexts.				
		pirations of every	The process invo					involves				
		with their correct	^					teaching				
	~	anding Happiness			nethods		i	including				
		orrectly- A critical				-		studies,				
		current scenario,			eflectiv							
			1	1	- '			,	90			

	Method to fulfill the above human		community service	
	aspirations: understanding and living in harmony at various levels.		activities, to engage students in deep thinking and practical application	
II			of values.  Learn to identify and align	3,4
	Understanding Harmony in the Human Being - Harmony in Myself Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Swasthya	3	their thoughts, emotions, and actions through self-awareness and self-regulation techniques. The course emphasizes the integration of the body, mind, and spirit, promoting practices such as mindfulness, meditation, and reflective journaling to achieve internal balance. Students are encouraged to recognize their intrinsic values and aspirations, fostering a sense of purpose and contentment.	
III	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship Understanding harmony in the Family- the basic unit of human interaction, Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious	3	Learn about the importance of empathy, effective communication, mutual respect, and cooperation in fostering strong and positive human connections. The course emphasizes the roles and responsibilities of individuals in contributing to the well-being of their families and communities, encouraging practices that promote trust, understanding, and support. Students are taught conflict resolution strategies and the value of compassion and ethical behavior in interpersonal interactions.	3,4

IV	order in societyUndivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha )- from family to world family!.  Understanding Harmony in the Nature and Existence - Whole existence as Co-existence Understanding the harmony in the Nature, Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature, Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.	3	Learn to recognize the intrinsic balance and mutual dependence that sustain ecosystems and the broader environment. The course emphasizes the concept of co-existence, where harmony arises from understanding and respecting the natural world's interdependent relationships. Students are encouraged to adopt sustainable practices and an ethical attitude towards nature, recognizing their role in maintaining	4
V	Implications of the above Holistic Understanding of Harmony on Professional Ethics Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics:  a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.	3	ecological balance.  It fosters values such as integrity, empathy, and sustainability, guiding professionals to consider the broader impact of their decisions and actions. Professionals are encouraged to cultivate a balanced approach that respects diverse perspectives, promotes collaboration, and prioritizes ethical conduct in business practices. This holistic perspective also emphasizes accountability and responsibility towards stakeholders, communities, and the environment, encouraging ethical leadership and long-term sustainability in organizational strategies and operations.	4

	Practical Cor	nponent	
Practical 1			
Practical 5			

**T1:** Business Ethics: Ethical Decision Making & Cases by O.C. Ferrell and John Fraedrich.

T2: Professional Ethics and Human Values by Jayakumar.

#### **REFERENCE BOOKS:**

**R1:** The Oxford Companion to Philosophy edited by Ted Honderich.

**R2:** The Cambridge Encyclopedia of Language edited by David Crystal.

#### **OTHER LEARNING RESOURCES:**

O1: https://youtu.be/rl85jxktfms

**O2:**https://www.betterteam.com/dress-code-policy#:~:text=Everyone%20is%20expected%20to%20be,religion%20or%20ethnicity%20are%20exempt

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Evaluate the importance and process of Value Education, aligning it with human aspirations.	1,2,3,4,6,7,10,12
2	Analyze the concept of harmony within oneself, emphasizing the connection between 'I' and the body.	1,2,3,4,6,7,10,12
3	Assess and apply foundational values in family and society for comprehensive human goals.	1,2,3,4,6,7,10,12
4	Examine the interconnectedness and mutual fulfillment in nature, emphasizing co-existence principles.	1,2,3,4,6,7,10,12
5	Demonstrate competence in professional ethics, incorporating a holistic understanding for eco-friendly production systems.	1,2,3,4,6,7,10,12

Course	Course	CO'	PO	PO	PO	РО	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		СО												
		1												
	Universal		1	1	1	2		2	2			1		2
22UUHV10	Human Values	CO 2	1	2	1	2		3	3			1		2
1R	and Professio nal Ethics	CO 3	1	1	1	2		2	3			1		2
	nai Etines	CO 4	1	2	1	2		3	3			1		2
		CO 5	1	1	1	2		3	3			1		2

	SEMESTER – II										
Course Title	COMPUTATIONAL SYSTEM	MS AND DIGITA	LV	VC	R	L <b>D</b>					
Course code		Total credits: 1 Total hours: 30P	L	Т	P	S F	2	O/ F	С		
			0	0	2	0 0		0	1		
-		Co-requisite				N	Nil	l			
Pre-requisite PROGRAMME S (All Degree / Diploma programme of Engineering, Computer Technology, Management, Humanities, Science, and Agricultural Sciences)	Nil BachelorofArtsinPerformingArts BachelorofScienceinActuarialScience BachelorofScienceinForensicScience BachelorofBusinessAdministration BachelorofHotelManagement andCateringT Bachelor ofBusinessAdministration BachelorofSocialWork BachelorofArtsinSociology BachelorofArtsinPsychology BachelorofScienceinBiotechnology B.Sc.(Hons)Agriculture BachelorofScienceinMicrobiology BachelorofScienceinFoodNutritionandDiete BachelorofComputer Application B.TechinCivilEngineering B.TechinComputerScienceandEngineering B.TechinComputerScienceandEngineering MasterofBusinessAdministration MasterofBusiness AdministrationinHealthcathasterofSocialWork MasterofArtsinAppliedPsychology MasterofArtsinAppliedPsychology MasterofScienceinClinicalPsychology MasterofScienceinBiotechnology	tics				N	Nil	<u> </u>			

	Master of Science in Zoology									
	MasterofComputerTechnology									
Semester	Winter/II Semester of First Year of the Programme									
Course	Students will be able to understand the fundamentals of computer systems and Internet									
Objectives	search along with advanced features of MS-Office.									
(Minimum 3)	Students will be able to understand about the introduction to Social Media and E-									
	Commerce and utility software									
	Students will develop a solid foundation in computational thinking, which includes									
	roblem- solving, algorithmic design, and logical reasoning.									
CO1	FundamentalsofComputerSystems,OfficeAutomatic	onandInter	netSearch.							
CO2										
	KnowmoreabouttheInternet&CyberWorld									
CO3	Know Social Media, E-Commerce, and apply the s									
CO4	Knowtousethedigitalpaymentsanddigitaltransaction									
Unit-No.	Content	Contac	Learning	BL						
		t Hour	Outcome							
I	Fundamentals of Computer Systems, Office		Learn about	1,2,						
	Automation and Internet Search		computer	3						
			hardware							
			components,							
			operating systems, and							
			software							
		7	applications that							
		,	facilitate office							
			automation							
			tasks such as							
			word							
			processing,							
			spreadsheets,							
			and							
			presentations.							
			Additionally,							
			students delve							
			into internet							
			search							
			strategies, mastering							
			techniques to							
			efficiently							
			locate and							
			evaluate							
			information							
			using search							
			engines,							
			databases, and							
			online							
			resources.							

II	Internet&CyberWorld		Encompasses	3,4
11	internette System world		exploring the	٥, ١
			interconnected	
			global network	
			of computers	
			and digital	
			systems that	
			facilitate	
			communication,	
			information	
			sharing, and	
			collaboration on	
			a massive scale.	
			Students delve	
			into the	
			technical	
			infrastructure of	
			the internet,	
			including	
		8	protocols,	
			servers, and data	
			transmission	
			methods, as well	
			as the evolution	
			and impact of	
			cyberspace on	
			society. They	
			learn about	
			cybersecurity	
			principles and	
			practices to	
			safeguard data,	
			systems, and	
			personal	
			information	
			from cyber	
			threats such as	
			hacking,	
			phishing, and	
			malware.	
III	SocialMedia,E-		Understanding	3,4
	Commerce, and digital branding		their	
			interconnected	
			roles in modern	
		7	digital	
			marketing and	
			communication	
			strategies.	
			Students explore	
			how social	
<u> </u>	<u> </u>		1	97

			madia =124°	
			media platforms	
			such as	
			Facebook,	
			Instagram, and	
			Twitter are	
			utilized for	
			brand	
			promotion,	
			customer	
			engagement,	
			and community	
			building. They	
			learn about e-	
			commerce	
			principles,	
			including online	
			retail strategies,	
			payment	
			systems, and	
			logistics	
			management,	
			essential for	
			conducting	
			business in the	
			digital age.	
IV	Digitalpaymentsanddigitaltransactions, ando		Learn about	4
IV	Digitalpaymentsanddigitaltransactions,ando ther utilitysoftware			4
IV			Learn about digital payment methods such as	4
IV			digital payment	4
IV			digital payment methods such as mobile wallets,	4
IV			digital payment methods such as	4
IV			digital payment methods such as mobile wallets, online banking, and	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols,	4
IV			digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols, transaction	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies , understanding their security protocols, transaction processes, and	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management,	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management, scheduling, and	4
IV		8	digital payment methods such as mobile wallets, online banking, and cryptocurrencies, understanding their security protocols, transaction processes, and integration with e-commerce platforms. They also explore utility software applications that streamline tasks such as document management,	4

			productivity in personal and professional environments.	
	Practical Component			
Practical 1	Experiment 1: Disassemble and reassemble a desktop computer, identifying and explaining the function of each component. Discuss the importance of hardware compatibility.  Experiment 2: Install an operating system (e.g., Windows or Linux) on a virtual machine.  Configure essential settings, such as user accounts, network connections, and system updates.  Experiment 3: Use office software (e.g., Microsoft Office or Google Workspace) to create documents, spreadsheets, and presentations. Teach formatting, inserting images, and collaboration features.  Experiment 4: Instruct students on effective internet searching, including the use of search engines, keywords, and advanced search operators.  Experiment 5: Set up email accounts, compose and send emails, attach files, and organize emails into folders. Discuss email etiquette and best practices.  Experiment 6: Use cloud storage services (e.g., Google Drive or Dropbox) to store and synchronize files. Create a backup of important data and discuss data recovery options.	8	Familiarize students with computer hardware components.	1,2,
Practical 2	Experiment 1: Set up a small local network with routers and computers. Configure network settings, assign IP addresses, and establish connectivity. Explore basic network diagnostics. Experiment 2: Guide students in creating a simple website using HTML and CSS. They should design webpages, add text and images, and format their content using CSS. Discuss web hosting and domain registration.  Experiment 3: Use email clients that support encryption (e.g., Thunderbird) to send and receive encrypted emails. Practice creating and verifying digital signatures for email authenticity.	7	Introduce students to the fundamentals of the internet and network configuration.	3,4
Practical 3	<b>Experiment 1:</b> Instruct students to create	8	Familiarize	3,4

	accounts on nonvious social modic plotforms		students with	1
	accounts on popular social media platforms		students with	
	(e.g., Facebook, Twitter, Instagram). Guide them		social media	
	through profile setup, privacy settings, and		platforms and	
	content posting.		digital branding	
	<b>Experiment 2:</b> Have students create a content			
	calendar for a fictional business or brand. Plan			
	posts, including text, images, and hashtags, and			
	use social media management tools to schedule			
	posts.			
	<b>Experiment 3:</b> Guide students in building a			
	basic e-commerce website using platforms like			
	Shopify or WooCommerce. They should add			
	products, set up payment gateways, and			
	configure the online store.			
	<b>Experiment 4:</b> Set up a payment gateway for			
	the e-commerce website created in Experiment			
	3. Test payment transactions and discuss			
	security protocols such as SSL encryption.			
	<b>Experiment 5</b> : Create and manage paid			
	social media advertising campaigns using			
	platforms like Facebook Ads or Google Ads.			
	Monitor campaign performance and adjust			
	ad targeting.			
	Experiment 6: Simulate an influencer			
	marketing campaign. Students should identify			
	potential influencers, negotiate partnerships, and			
	track the impact of influencer promotions.			
	<b>Experiment 7:</b> Analyze online reviews and			
	social media mentions related to a fictional			
	brand. Develop strategies to manage and			
	improve the brand's online reputation.			
Practical 4	<b>Experiment 1:</b> Instruct students to create	7	Familiarize	4
	accounts on popular digital payment platforms		students with	
	(e.g., PayPal, Venmo, or a mobile payment app).		digital payment	
	Guide them through account verification, linking		methods and	
	bank accounts or cards, and adding funds.		their setup.	
	<b>Experiment 2</b> : Provide a list of online shopping			
	websites. Students should select products, add			
	them to the cart, and complete transactions using			
	the digital payment methods they set up in			
	Experiment 1.			
	<b>Experiment 3:</b> Make digital purchases and			
	collect digital receipts. Discuss the			
	advantages of digital receipts, such as			
	organization and ease of tracking expenses.			
	<b>Experiment 4:</b> Provide a list of utility software			
	applications (e.g., antivirus, system optimization			
	tools). Have students select one, download it,			
	and install it on their computers.			
		•		

**T1:** Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems Applications. 3rd ed. New Delhi: BPB Publications.

T2: Goel, A, 2010. Computer Fundamentals, Pearson India.

#### **REFERENCE BOOKS:**

R1: Balaguruswamy, E. 2009 Fundamentals of Computers, Tata McGraw-Hill Education.

**R2:** Balaguruswamy, 2014. E. Fund Of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-Hill Education.

R3: Lawson, C. 2022. Introduction to Social Media, Oklahoma State University.

#### OTHER LEARNING RESOURCES:

O1:https://www.w3schools.com

O2: https://edu.gcfglobal.org

O3: https://www.tutorialspoint.com

O4: https://www.javatpoint.com/

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Fundamentals of Computer Systems, Of fice Automation and Internet Search.	1,2,3,4,5,10,12					
2	Know more about the Internet & Cyber World	1,2,3,4,5,10,12					
3	Know Social Media, E-Commerce, and apply the same for digital branding	1,2,3,4,5,10,12					
4	Know to use the digital payments and digital transactions, and other utility software	1,2,3,4,5,10,12					

Course	Course Name	CO	РО	PO	РО	PO								
code		's	1	2	3	4	5	6	7	8	9	10	11	12
		CO												
		1												
	COMPUTATI													
2211001 1	ONAL		3	3	3	2	3					2		3
22UCDL1	SYSTEMS	CO												
03R	AND DIGITAL	2	3	3	1	3	3					2		3
	WORLD	CO												
		3	2	3	1	2	3					2		3
		CO												
		4	2	3	1	3	3					2		3

### **Evaluation Criteria:**

SlNo	Evaluation Type	Total Marks
1	In-Semester Examination	70
2	End Semester Examination	30
Т	Cotal	100

# a. In-Semester Examination Details(70)

SlNo	Components	Count	Individual Components Marks	Total Marks	Remarks
1	Skill Test	2	20	40	
2	Quizzes	2	10	20	
3	Lab Experiments (Eachexperiments16inno'swi llcarry20marks,later reducedtooverall20)		20	20	The student's score out of 100willbe
4	Home Assignments (Eachassignments5inno'swill carry20marks,later reducedtooverall10)		10	10	Converted to a eoutof70.
5	Participation in Class		10	10	
	Grand Total			100	

# b. End Semester Examination Details (30)

SlNo	Components	al Components Marks	Total Marks	Remarks
1	Theory(MCQ based)	20	20	The student's
2	Practical Experiments	60		scoreoutof100 will be Converted to a
3	Viva	20	20	e out of 30.
	Grand Total		100	

		SEMESTER	– II									
Course Title		CO CURRIC	ULAR	AC'	TIVIT	TES						
Course code	22UBCC121	Total credits: 1	L	T	P	S	R	O/F	C			
		Total hours: 15S	0	0	0	4	0	0	1			
Pre-requisite	Nil	Co-requisite					Nil					
Programmes	All UG Programmes											
Semester	Winter/II Semester of First Year of the Programme											
Course	It is to develop the	social and soft skil	ls and to	o pro	omote	a ho	listic	developm	ent of the			
Objectives	learners							_				
(Minimum 3)												
CO1	The students will	be engaged in dif	ferent a	ctiv	ities h	eade	d unc	ler differe	ent clubs			
	namely dance, mus	ic, photography, dra	ma, lite	racy	, etc.							
CO2												
	_	articipate in regular	club ac	tivit	ies lik	e woı	kshoj	os, compe	titions as			
	per their interest an											
CO3		be trained to represe	ent ADT	'U iı	n vario	ous in	iter u	niversity,	state and			
G0.4	national level comp			C								
CO4		be given a platform	to earn	tron	n invit	ed ex	perts	in their r	espective			
CO5	fields.	at an arma arma af 20	O da ana	. 1	:	41-	مامام		- 4l			
COS	_	et an exposure of 36 ag with the academic	•	e iea	arming	meun	odore	gy consid	ering the			
Unit-No.	-	itent	Contac	of	Loo	rnin	α <b>Ω</b> υί	come	BL			
Ome-No.	Con	itent	Hour		Lea	11 11111	g Ou	Come				
I	AdtU encourage	es a range of	10		ADTU	J fo	sters	holistic				
_	activities outside	-	10		develo			through				
		nded to meet				•		tion in				
	learner's interest	These activities			worksl	_	•	and				
	are aimed to deve	elop the social and				•	s. Th	is course				
		romote a holistic			promo							
	development of	f the learners,			holisti	c de	velop	ment of				
	Keeping in mind	the 360 degree		1	the lea	rners						
	learning methodo	logy the students										
	are engaged in	different activities										
	headed under di	fferent clubs viz.										
	_	otography, drama,										
		he students are										
		rticipate in regular										
	club activitie	* '										
	-	per their interest										
		student members										
		trained represent										
		inter University										
	student and	national level										
	competitions,	Renewed										
	personanties are	invited to conduct										

	workshops that benefit the members		
	and students by giving them the		
	platform to learn from experts in the		
	respective fields.		
	Practical Comp	onent	
Practical 1			
Practical 2			
Practical 3			
Practical 4			

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**T1:** 

**REFERENCE BOOKS:** 

**R1:** 

OTHER LEARNING RESOURCES:

01:

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The students will be engaged in different activities headed under different clubs namely dance, music, photography, drama, literacy, etc.	1,2,3,4,5,6,10,12
2	The students will participate in regular club activities like workshops, competitions as per their interest and hobbies	1,2,3,4,5,6,10,12
3	The students will be trained to represent ADTU in various inter university, state and national level competitions	1,2,3,4,5,6,10,12
4	The students will be given a platform to earn from invited experts in their respective fields.	1,2,3,4,5,6,10,12
5	The students will get an exposure of 360 degree learning methodology considering the overall growth along with the academics.	1,2,3,4,5,6,10,12

Course	Course	CO'	PO	PO1	PO1									
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO												
	СО	1	2	2	2	1	2	2				2		2
22UBCC1 21	CURRICUL AR	CO 2	2	2	2	1	2	3				2		2
	ACTIVITIES CO	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTER –	· II									
Course Title		EXTRA CURRI	CULAF	R ACTIV	ITIE	S						
Course code	22UBEC121	Total credits: 1	L	T P	S	R	O/F	C				
		Total hours: 15S	0	0 0	4	0	0	1				
Pre-requisite	Nil	Co-requisite				Nil						
Programmes	All UG Programme	S										
Semester	Winter/II Semester of First Year of the Programme											
Course		It is to develop the social and soft skills and to promote a holistic development of the										
Objectives	learners	•										
(Minimum 3)												
CO1	Learn to a plan	so that they can i	make n	neaningfu	ıl co	ntribu	tions, ma	aintain a				
	commitment, and m	nanage their time and	prioriti	es.								
CO2												
	Transform passion	ate students who	demonst	rate lead	lershi	p and	d pursue	interests				
	beyond their acader											
CO3	Learn to participate	e in various co-curr	ricular a	ctivities	leadiı	ng to	their mul	ltifaceted				
	personality develop	ment.										
CO4	Express their ideas,	views, In-depth eval	luation a	nd analy	sis cle	early i	n the topi	c of their				
	interest.											
CO5	Demonstrate and pr	ractices different acti	ivities, ł	y Integr	ating	learni	ng experi	ences by				
	demonstrating trans	ferable skills.										
Unit-No.	Con	tent	Contact	t Le	arnin	g Out	come	BL				
			Hour									
I	AdtU encourage	s a range of	10	ADTU	J fo	sters	holistic					
	activities outsid	e the regular		devel	_		through					
	curriculum inter	nded to meet		clubs	like l	Dance	, Music,					
	learner's interest,	These activities		Photo	graph	y,	Drama,					
	are aimed to devel	lop the social and		and		L	iterature,					
	soft skills and pr	comote a holistic		encou	ragin	g						
	development of	the learners,		partic	ipatio	n	in					
	Keeping in mind	the 360 degree		works	hops		and					
	learning methodol	logy the students		comp	etition	ıs.						
	are engaged in d	ifferent activities										
	headed under dif	ferent clubs viz.										
	Dance, music, pho	otography, drama,										
	literary etc., Th	ne students are										
	encouraged to par											
	club activities	s, workshops,										
	competitions as 1	per their interest										
	and hobbies, The	student members										
	of the club are	_										
	AdtU in various	•										
	student and	national level										
	competitions,	Renewed										
	personalities are i											
	workshops that be											
	and students by	giving them the		1								

	platform to learn from experts in		
	the respective fields.		
	Practical Comp	ponent	
Practical 1			
Practical 2			
Practical 3			
Practical 4			

TEXT	ROC	)KS.

**T1:** 

**REFERENCE BOOKS:** 

**R1:** 

OTHER LEARNING RESOURCES:

01:

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course	Course	CO'	РО	PO	PO	PO	PO	PO	PO	РО	РО	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
22UBEC1	EXTRA CURRICUL AR	CO 1	2	2	2	1	2	2				2		2
		CO 2	2	2	2	1	2	3				2		2
21	ACTIVITIE S	CO 3	1	1	2	1	2	2				3		3
	Co	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – III						
Course Title		Analog 1	Electron	nic C	ircuit	S			
Course code	22BTCS211R	Total credits: 4	L	Т	P	S	R	O/F	С
		Total hours: 45T+30P	3	0	2	0	0	0	4
Pre-requisite	Nil	Co-requisite					Nil	l	
Programme	Bachel	or of Technology i	n Comp	uter	Scien	ce &	Engi	neering	
Semester	3rd se	emester of the secon	nd year	of th	e pro	gram	1		
Course	Design and analy	sis of CE, CB, CC	amplifi	ers u	sing s	small	signa	l h-mode	1 and pi-
Objectives	•	ation of voltage ga	-		_		_		•
(Minimum 3)	impedance.	- <del>-</del>					_		-
(Minimum 3)	Design and analy	sis of common sour	ce FET a	ampli	ifier.				
	Behaviour of operational amplifier.								
CO1	To understand the	To understand the characteristics of transistor							
CO2	Design and analys	e various rectifier c	ircuits						
CO3	Design and analys	e various amplifier	circuits						
CO4	Design sinusoidal	and non-sinusoidal	oscillato	ors					
CO5	Understand the fu	nction an op amp ar	nd design	op a	amp b	ased	circuit	ts	
Unit-No.	Co	ntent	Contac Hour		Lea	arnin	g Outo	come	KL
I	of half-wave	f a diode; review and full-wave diodes, clamping	7	f c c r	operation or conver liodes egular	ion; AC rsion; ftion; ing/cl	to appl for ipping	y Zener voltage design	1,2,3

II	Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model, biasing circuits, current mirror; common-emitter, common-base and common-collector amplifiers; Small signal equivalent circuits, high-frequency equivalent circuits	10	Understand BJT structure, I-V characteristics; use as switch, amplifier (small-signal model, biasing circuits); analyze common-emitter, common-base, common-collector configurations; grasp small-signal and high-frequency equivalent circuits.	3
III	MOSFET structure and I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers; small signal equivalent circuits- gain, input and output impedances, trans-conductance, high frequency equivalent circuit.	10	Understand MOSFET structure, I-V characteristics; utilize as switch, amplifier (small-signal model, biasing circuits); analyze common-source, common-gate, commondrain configurations; grasp small-signal parameters, high-frequency behavior.	3,4
IV	Differential amplifier; power amplifier; direct coupled multistage amplifier; internal structure of an operational amplifier, ideal op-amp, non-idealities in an op-amp (Output offset voltage, input bias current, input offset current, slew rate, gain bandwidth product	8	Understand differential amplifier operation; design power amplifiers and direct-coupled multistage amplifiers; analyze operational amplifier internals, ideal behavior, and non-idealities (offsets, bias currents, slew rate, gain-bandwidth product).	3,4

V	Idealized analysis of op-amp circuits. Inverting and non-inverting amplifier, differential amplifier, instrumentation amplifier, integrator, active filter, P, PI and PID controllers and lead/lag compensator using an op-amp, voltage regulator, oscillators (Wein bridge and phase shift). Analog to Digital Conversion. ) Hysteretic Comparator, Zero Crossing Detector, Square-wave and triangular-wave generators. Precision rectifier, peak detector. Monoshot.	10	Analyze op-amp circuits: inverting/non-inverting amplifiers, differential amp, integrator, active filters, controllers, oscillators, analog-to-digital conversion, comparators, detectors, generators, rectifiers, and monostable multivibrators.	3,4					
PRACTICAL COMPONENT									
1	To Study the V-I characteristics of Forward Biased	2	Students will be able to describe the V-I characteristics of a forward-biased diode, and analyze and interpret the experimental data to explain the behavior of the diode under different voltage conditions.	2,3					
2	To Study the Reverse characteristics of Zener diode.	2	Understand and explain the reverse characteristics of a Zener diode, identifying key concepts such as breakdown voltage and reverse current.  Analyze and interpret the behavior of Zener diodes in reverse bias conditions through experimental data.	2,4					

3	To Study the working of a diode as half wave rectifier with and without filter.	3	Explain the basic operation of a diode in a half-wave rectifier circuit, both with and without a filter.Compare the performance and output characteristics of a half-wave rectifier circuit with and without a filter using practical observations.	2,4
4	To study the input and output characteristic of BJT in CE configuration.	3	Students will be able to analyze and interpret the input and output characteristics of a BJT in CE configuration.  Students will be able to evaluate performance parameters of a BJT based on its characteristic curves.	4,5
5	To design an Inverting Amplifier for the given specifications using Op-Amp IC 741.	3	Upon completing this task, students will be able to design an inverting amplifier circuit using the Op-Amp IC 741 to meet specified requirements and they will analyze the circuit's performance to ensure it meets the given specifications.	3,4
6	To design and setup a non-inverting amplifier circuit with OPAMP 741 for a fixed gain, plot the waveforms, observe the phase reversal.	3	By the end of this task, students will be able to design and set up a non-inverting amplifier circuit using OPAMP 741 for a fixed gain and plot and analyze the resulting waveforms to observe phase reversal.	3,4

7	To study a low pass and a high pass filter with a given cut off frequency.	3	Describe the functioning and applications of low pass and high pass filters, including their cut off frequencies.  Students will be able to design and implement low pass and high pass	2,3
			filters with specified cut off frequencies in practical circuits. (Bloom's Level 3: Applying)	
8	To study a low pass and a high pass filter with a given cut off frequency.	3	Understand the fundamental principles and applications of low pass and high pass filters with given cut off frequencies.	2,3
			Apply their knowledge to analyze and design basic low pass and high pass filter circuits.	
9	To design a differentiator and integrator using OPAMP IC741.	3	Design both a differentiator and an integrator circuit using the OPAMP IC741 and analyzetheir performance in various applications.	6,4
10	To design and setup a summing amplifier circuit with OPAMP 741 for a fixed gain and verify the output.		Understand and apply the principles of summing amplifier circuits using OPAMP 741 to achieve a fixed gain.	
		3	Analyze and verify the output of the designed summing amplifier circuit to ensure it meets the specified requirements.	3,4

T1:Micro Electronics by Millman And Grabel , McGRAW HILL

T2: Integrated Electronics by Millman & Halkias , McGRAW HILL

T3: Electronic Devices and Circuits by Boylstead&Nashelsky, Pearson

### **REFERENCE BOOKS:**

- R1: Micro electronics circuit by Sedra and Smith, Oxford University;
- R2: Microelectronics circuit analysis and design, by Rashid, PWS publication house;
- R3: Electronic devices and integrated circuit- BP Singh and Rekha Singh, Pearson.
- R4: Electronic Prith Ed. by Albert Malvino

### OTHER LEARNING RESOURCES:

- 1. Analog Devices Op-Amp Circuits
- 2. All About Circuits Operational Amplifier Circuits

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	To understand the characteristics of transistor.	1,2,3,5,10 and 12
2	Design and analyse various rectifier circuits	1,2,3,5,9,10 and 12
3	Design and analyse various amplifier circuits	1,2,3,4,5,6,10 and 12
4	Design sinusoidal and non-sinusoidal oscillators	1,2,3,4,5,6,10 and 12
5	Understand the function an op amp and design op amp based circuits	1,2,3,4,5,6,10 and 12

Course code	Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO1	3	3	2		2					2		2
		CO2	3	3	2		2				2	2		3
		СОЗ	3	2	1	2	2	2				2		2
	Analog	CO4	2	3	2	2	2	2				2		2
22BTCS211R	Electronic Circuits	CO5	3	3	3	3	3	3				2		3

		SEMESTE	CR – III								
Course Title	Digital Electron	ic Circuits									
Course code	22BTCS212R	Total credits: 4	L	Т	P	S	R	O/F	С		
		Total hours: 45T+30P	2	0	2	0	0	0	3		
Pre-requisite	Nil	Co-requisite					Nil				
Programme	Bac	helor of Technology	in Comp	uter	Scien	ce &	Engin	eering			
Semester	3rd s	emester of the secon	d year of	f the <b>j</b>	progr	am					
Course	To familiarize w	To familiarize with the different number systems, logic gates, and combinational and									
Objectives	sequential circuit	sequential circuits utilized in the different digital circuits and systems.									
	The course will h	elp in design and ana	lysis of th	ne dig	ital ci	rcuit a	and sy	stem.			
(Minimum 3)		gital system integration	-	-			·				
CO1	Apply Boolean a	llgebra and analyze d	ligital log	ic far	milies	, dem	onstra	ting profi	ciency in		
	interfacing and u	nderstanding characte	eristics of	digita	al ICs.	•			Ţ		
CO2	Design and sim	plify logic functions	using K	-map	s, im	pleme	ent co	mbinatori	al digital		
		sing expertise in MS	_	•		•			_		
CO3		ign sequential circuitions of various types			• •		•	n applica	tions and		
CO4		lesign digital-to-ana rious A/D converter t	-	erter	s, un	dersta	anding	g of qua	ntization,		
CO5	Analyze semico	nductor memories a	nd prog	ramm	able	logic	devid	ces, demo	onstrating		
	7	he operation, classif				-			_		
	technologies and	PLDs.									
Unit-No.	C	ontent	Contac	ct	Le	arnin	g Outo	come	KL		
			Hour			•	-				

I	Fundamentals of Digital Systems and logic families:  Digital signals, digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations, Boolean algebra, examples of IC gates, number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one's and two's complements arithmetic, codes, error detecting and correcting codes, characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.	7	Understanding digital signals, circuits, logic operations, Boolean algebra, IC gates, binary number systems, arithmetic, error codes, digital IC characteristics, TTL, Schottky TTL, CMOS logic, and interfacing techniques including tri-state logic.	1,2,3
П	Combinational Digital Circuits:  Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical functions. Don't care conditions, Multiplexer, De-Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, Q-M method of function realization.	10	Understanding combinational digital circuits: logic function representation, K-map simplification, multiplexers, demultiplexers, adders, subtractors, ALU design, MSI chips, comparators, encoders, decoders, display drivers, and function realization methods like Q-M method.	3,4
III	Sequential circuits and systems:  A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.	10	Understanding sequential circuits: 1-bit memory, bistable latch properties, clocked SR flip-flop, JK, T, D flip-flops, applications, shift registers, converters, counters, special ICs, and their applications in digital memory, timing, and sequence control systems.	3,4

IV	A/D and D/A Converters:  Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D	8	Understanding A/D and D/A converters: types (weighted resistor, R-2R ladder), specifications, IC examples, sample-and-hold circuits, A/D conversion techniques (parallel comparator, successive approximation, counting, dual slope), and their applications in digital systems.	4
V	Semiconductor memories and Programmable logic devices:  Memory organization and operation, expanding memory size, classification and characteristics of memories, sequential memory, read only memory (ROM), read and write memory(RAM), content addressable memory (CAM), charge de coupled device memory (CCD), commonly used memory chips, ROM as a PLD, Programmable logic array, Programmable array logic, complex Programmable logic devices (CPLDS), Field Programmable Gate Array (FPGA).	10	Understanding semiconductor memories: organization, expanding size, types (ROM, RAM, CAM, CCD), characteristics, commonly used chips, ROM as PLD, programmable logic devices (PLAs, PALs, CPLDs, FPGAs), and their roles in digital systems.	4
	PRACTICAL CO	MPONEN	Т	
1	To study and verify the truth table of logic gates.	3	Understand and explain the functionality and truth tables of basic logic gates.  Apply knowledge to construct and verify the truth tables of various logic gates through experimentation	2,3

2	To design and implementation using NAND gate & NOR gate as Universal Gate.	3	1. Understand and apply the concept of using NAND and NOR gates as universal gates in digital circuit design  2. Construct and evaluate various digital logic circuits using only NAND and NOR gates to demonstrate their universality.	3,5
3	To study about Ex-OR gates and verify their Truth Table.	3	Understand the fundamental operation and logic of Ex-OR gates. Apply knowledge to verify the truth table of Ex-OR gates through practical experimentation	2,3
4	To study about adder circuits, half adder circuits and verify their truth table.	3	Understand the concepts and functionality of adder and half-adder circuits.  Analyze and verify the truth tables of adder and half-adder circuits to ensure their correct operation.	2,4
5	To study about adder circuits, full adder circuits and verify their truth table.	3	Comprehend the concepts and functionality of adder and full adder circuits.  Apply knowledge to verify the truth tables of adder and full adder circuits through practical implementation	2,3
6	To study half subtractor using basic gates.	3	Understandthe functionality and design of a half subtractor using basic logic gates.  Construct and verify the operation of a half subtractor circuit to demonstrate its subtraction capability	2,3

7	To study full subtractor using basic gates.	3	Understand the operation and logic of a full subtractor circuit using basic gates.  Implement and analyze a full subtractor circuit to verify its functionality	2,4
8	To design and set up a 4:1 and 2:1 Multiplexer.	3	Design and construct 4:1 and 2:1 multiplexer circuits, demonstrating an understanding of their functional principles.  Evaluate and test the performance of the constructed multiplexer circuits to ensure accurate operation	3,4
9	To design and set up a 1:4 Demultiplexer (DE-MUX).	3	Understand the functional principles of a 1:4 Demultiplexer and apply this knowledge to design and set up the circuit.  Evaluate the performance of the 1:4 Demultiplexer to ensure correct signal distribution and functionality	3,5
10	Implementation and verification of decoder and encoder using logic gates.	3	Apply knowledge of digital logic to design and implement encoder and decoder circuits using logic gates.  Evaluate the functionality of the encoder and decoder circuits through systematic verification	3,5

T1:Dr. Sanjay Sharma "Digital Electronics and logic Design", Katson Books, fourth edition 2015

### REFERENCE BOOKS:

R1: R. P. Jain, "Modern Digital Electronics", McGraw Hill Education, 2009

R2: Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.,

# OTHER LEARNING RESOURCES:

www.nptel.ac.in

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply Boolean algebra and analyze digital logic families, demonstrating proficiency in interfacing and understanding characteristics of digital ICs.	1,2,3,10 and 12
2	Design and simplify logic functions using K-maps, implement combinatorial digital circuits, showcasing expertise in MSI chips and function realization using the Q-M method.	1,2,3,4,5,10 and 12
3	Analyze and design sequential circuits, demonstrating proficiency in applications and design considerations of various types of flip-flops and counters.	1,2,3,4,5,10 and 12
4	Evaluate and design digital-to-analog converters, understanding of quantization, encoding, and various A/D converter types.	1,2,3,4,5,10 and 12
5	Analyze semiconductor memories and programmable logic devices, demonstrating proficiency in the operation, classification, and characteristics of different memory technologies and PLDs.	1,2,3,4,5,10 and 12

Course code	Course Name	COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO1	2	2	1							1		1
		CO2	3	3	2	2	1					1		2
	Digital	CO3	3	3	3	1	1					1		2
22BTCS212R	Electronic Circuits	CO4	3	3	2	2	1					1		2

		3	3	2	')	1					1		2
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SEMESTER – III													
Course Title		Data Stru	ucture&	Algo	rithm	ıs							
Course code	22BTCS213R	Total credits: 4	L	T	P	S	R	O/F	С				
		Total hours:	3	0	2	0	0	0	4				
		45T+30P											
Pre-requisite	<b>Fundamentals of</b>	Co-requisite	Nil										
	programming												
	logic												
Programme	Bache	or of Technology is	n Comp	uter S	Scienc	ce & ]	Engin	eering					
Semester			3										
Course	Γο impart the basic concepts of data structures and algorithms.												
Objectives	To understand basic concepts about stacks, queues, lists, trees and graphs.												
(Minimum 3)	To understand concepts about searching and sorting techniques												
CO1	Analyze algorithms using asymptotic notations, demonstrating proficiency in searching												
	echniques like linear search and binary search, and making informed time-space trade- offs.												
CO2	Design and analyze algorithms for stack and queue operations, including expression conversion and evaluation, demonstrating mastery in implementing and evaluating various types of queues.												
CO3	Implement and analyze operations on linked lists and its variations, showcasing competence in memory representation and algorithmic complexities.												
CO4	Apply tree terminologies and operations on different types of trees, with a focus on												
004		s and practical appli		initore	iii ty	pes o	1 1100	3, WILII U	rocus on				
CO5		pare various sorting		ms ar	nd has	shing	techn	iaues: de	monstrate				
		ph terminologies,	_			_		•					
	traversal with comp		1		,		,						
Unit-No.	-	itent	Contac	ct	Lea	arnin	g Out	come	BL				
			Hour				0						
I	Introduction: Ba	sic Terminologies:	8		y	lear	ning	these	1,2,3				
	Elementary Dat	a Organizations,		C	oncep	ts,	studer	nts will					
	Data Structure Op	erations: insertion,			nders			data					
	deletion, traversal	etc.; Analysis of		0:	rganiz	zation	, perf	orm key					
	an Algorithm	n, Asymptotic			perati		on						
	Notations, Time-S	pace trade off.		st	ructu	res,		analyze					
	Searching: Line	_		al	lgoritl	hms		using					
	Binary Search Te	chniques and their		as	sympt	totic	notati	ons, and					
	complexity analys	is.		e	valuat	te sea	rch te	chniques					
				fo	or		ef	ficiency,					
				u	nders	tandiı	ng the	eir time-					
				SJ	pace t	rade-	offs.						
II	Stacks and Queu	es: ADT Stack	8	U	Inders	stand	stac	ck and	3,4				
	and its operations:	Algorithms and		q	ueue	ADT	s, perf	form and					
	their complexity a	nalysis,		a	nalyz	e sta	ck op	erations,					

			1	
	Applications of Stacks: Expression		apply stacks in expression	
	Conversion and evaluation –		conversion and evaluation,	
	corresponding		and explore various queue	
	algorithms and complexity analysis.		types with their operations	
	ADT queue, Types of Queue:		and complexities.	
	Simple Queue, Circular Queue,			
	Priority Queue; Operations on each			
	types of Queues: Algorithms and			
	their analysis.			
III	Linked Lists: Singly linked lists:	10	Comprehend singly,	3,4
	Representation in memory,		doubly, and circular linked	,
	Algorithms of several operations:		lists, perform operations	
	Traversing, Searching, Insertion		like traversal, insertion,	
	into, Deletion from linked list;		deletion, and implement	
	Linked representation of Stack and		linked representations of	
	Queue, Header nodes, Doubly		stack and queue. They will	
	linked list: operations on it and		analyze algorithms and	
	algorithmic analysis; Circular		complexities associated	
	Linked Lists: all operations their		with these data structures	
			with these data structures	
	algorithms and the complexity			
	analysis.	40	**	
IV	Trees: Basic Tree Terminologies,	10	Understand binary trees,	4
	Different types of Trees: Binary		BSTs, AVL trees, B trees,	
	Tree, Threaded Binary Tree, Binary		and B+ trees. They'll	
	Search Tree, AVL Tree; Tree		perform operations,	
	operations on each of the trees and		analyze algorithms, and	
	their algorithms with complexity		explore applications,	
	analysis. Applications of Binary		enhancing skills in data	
	Trees. B Tree, B+ Tree:		organization and	
	definitions, algorithms and analysis.		algorithmic analysis.	
V	Sorting and Hashing: Objective	9	Understand hashing	4
	and properties of different sorting		techniques. In graph	
	algorithms: Selection Sort, Bubble		theory, they'll grasp basic	
	Sort, Insertion Sort, Quick Sort,		terms, representations,	
	Merge Sort, Heap Sort; Performance		search algorithms, and	
	and Comparison among all the		analyze complexities,	
	methods, Hashing.		enhancing problem-	
	Graph: Basic Terminologies and		solving skills in data	
	Representations, Graph search and		manipulation.	
	traversal algorithms and			
	complexity analysis.			
Practical Con				
Tructical Coll				
Practical 1	Array Operations		Gain proficiency in	
			implementing and	
	Program to perform basic array		analyzing basic array	
	operations (insertion, deletion,	3	operations in	4
	search, update).		programming. Understand	
			their implications and	

			efficiency in problem-	
Practical 2	Linked List Operations  Program to implement singly linked list operations (insertion, deletion, traversal).  Program to implement doubly linked list operations (insertion, deletion, traversal).  Circular Linked List  Program to implement circular linked list operations (insertion, deletion, traversal).	3	solving contexts.  Implemented singly, doubly, and circular linked list operations (insertion, deletion, traversal) in Python, fostering understanding, implementation skills, and analytical comparison of dynamic data structures in programming.	5
Practical 3	Stacks and Queues  Stack Using Array  Program to implement stack operations using arrays (push, pop, peek).  Stack Using Linked List  Program to implement stack operations using linked lists.  Infix to Postfix Conversion  Program to convert infix expression to postfix expression using stack.	3	Implement stack operations (push, pop, peek) using arrays in Python, emphasizing stack properties and array-based implementation efficiency.	4
Practical 4	Queue Using Array  Program to implement queue operations using arrays (enqueue, dequeue, front, rear).  Queue Using Linked List  Program to implement queue operations using linked lists.  Circular Queue  Program to implement circular queue using arrays.	3	Implement queue operations (enqueue, dequeue, front, rear) using linked lists in Python, emphasizing dynamic memory management and efficient queue operations.	4
Practical 5	Trees	3	Create a binary tree in Python and perform preorder, inorder, and	5

	Binary Tree Creation  Program to create a binary tree and perform preorder, inorder, and postorder traversals.  Binary Search Tree (BST) Operations  Program to implement BST operations (insertion, deletion, search).		postorder traversals, illustrating tree structure and traversal algorithms.	
Practical 6	AVL Tree Implementation  Program to implement AVL tree operations (insertion with rotations).  Heap Implementation  Program to implement a max-heap or min-heap and perform heap operations (insert, delete, heapify).	3	Implement AVL tree operations (insertion with rotations) in Python, ensuring balance and efficient search, insertion, and deletion operations in self-balancing trees.	4
Practical 7	Sorting Programs  Merge Sort Implementation:  Write a C program to implement the merge sort algorithm to sort an array of integers.  Quick Sort Implementation:  Implement the quick sort algorithm in C to sort an array of integers.  Heap Sort Implementation:  Write a C program to implement the heap sort algorithm to sort an array of integers.	3	Implement merge sort in C for array sorting, emphasizing divide-and-conquer principles and efficient sorting of large datasets. Implement quick sort in C for array sorting, focusing on partitioning and recursion for efficient average-case sorting of arrays. Implement heap sort in C for array sorting, showcasing heap properties and efficient inplace sorting using a maxheap or min-heap structure.	5
Practical 8	Hash Table with Chaining:  Implement a hash table using chaining for collision resolution in C. Include functions to insert, search, and display elements.	3	Implement hash table with chaining in C, handling collisions with linked lists for efficient insert, search, and display operations in hash-based data storage.	5
Practical 9	Hash Table with Linear Probing: Write a C program to implement a	3	Implement hash table with linear probing in C, resolving collisions by	4

	hash table using open addressing with linear probing for collision resolution. Include functions to insert, search, and display elements.		linearly searching for open slots, ensuring efficient key-value storage and retrieval.	
Practical 10	Hash Table with Quadratic Probing:  Implement a hash table using open addressing with quadratic probing for collision resolution in C. Include functions to insert, search, and display elements	3	Implement hash table with quadratic probing in C, resolving collisions using quadratic increments for open slots, ensuring efficient key-value storage and retrieval.	5

**T8:** "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

#### **REFERENCE BOOKS:**

- **R3:** Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company
- **R4:** "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

## OTHER LEARNING RESOURCES:

- 1. <a href="https://books.google.co.in/books/about/Data_Structures_and_Algorithms.html?id=11CHYj5eV-EC&redir_esc=y">https://books.google.co.in/books/about/Data_Structures_and_Algorithms.html?id=11CHYj5eV-EC&redir_esc=y</a>
- 2. <a href="https://techdevguide.withgoogle.com/paths/data-structures-and-algorithms/">https://techdevguide.withgoogle.com/paths/data-structures-and-algorithms/</a>

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze algorithms using asymptotic notations, demonstrating proficiency in searching techniques like linear search and binary search, and making informed time-space trade-offs.	1,2,3,10 and 12
2	Design and analyze algorithms for stack and queue operations, including expression conversion and evaluation, demonstrating mastery in implementing and evaluating various types of queues.	1,2,3,4,5,10 and 12
3	Implement and analyze operations on linked lists and its variations, showcasing competence in memory representation and algorithmic complexities.	1,2,3,4,5,10 and 12
4	Apply tree terminologies and operations on different types of trees, with a focus on algorithmic analysis and practical applications.	1,2,3,4,5,10 and 12

5	Evaluate and compare various sorting algorithms and hashing	1,2,3,4,5,10 and 12
	techniques; demonstrate proficiency in graph terminologies,	
	representations, and algorithms for search and traversal with	
	complexity analysis.	

Course	Course	C	PO											
code	Name	Os	1	2	3	4	5	6	7	8	9	10	11	12
		CO												
		1	2	2	1							1		1
	Data	CO												
	Structur	2	3	3	2	2	1					1		2
22BTCS2	e&	CO												
13R	Algorith	3	3	3	3	1	1					1		2
	ms	CO												
		4	3	3	2	2	1					1		2
		CO												
		5	3	3	2	2	1					1		2

		SEMESTE	R – III									
Course Title		Biolog	gy For E	ngine	eers							
Course code	22BTCS214R	Total credits: 4	L	T	P	S	R	O/F	С			
		Total hours:	2	0	0	0	0	0	2			
		45T+30P										
Pre-requisite	Nil	Co-requisite					ramn					
Programme	Bache	elor of Technology i	n Compi	uter	Scienc	ce & 1	Engin	eering				
Semester			3									
Course	To introduce the st	udents about the bio	logical co	oncep	ots fro	m an	engin	eering per	spective.			
Objectives	To enable the stude	ents to have a strong	knowled	ge of	funct	ionin	g of a	n ecosyste	em and			
(Minimum 3)	identification of or	ganisms.										
	To introduce with	the concepts of generation	tics and r	nech	anism	s rela	ted to	it.				
		the genetic code and			-							
	To explain the stud	o explain the students about different physiological phenomenon occurring in human										
	body.	ody.										
CO1	Analyze and dif	nalyze and differentiate between the fundamental principles of biology and										
	engineering, emph	gineering, emphasizing the significance of biological observations.										
CO2												
	_	valuate the importance of classification in biology, considering criteria such as										
	cellularity, ultrastr	cellularity, ultrastructure, energy utilization, and molecular taxonomy.										
CO3	Implement and a	mplement and analyze operations on linked lists and its variations, showcasing										
03	_	competence in memory representation and algorithmic complexities.										
CO4	-	<u> </u>				_		understa	nding the			
004	Explore the molecular basis of information transfer in genetics, understanding the hierarchy of DNA structure, the universality of the genetic code, and defining genes.											
CO5	·	damental principle										
	•	ecological aspects of			•	-•		ing idei	,			
Unit-No.		ntent	Contac					come	BL			
			Hour									
I	Introduction		8		Under	stand		the	1,2,3			
		cope of Biology as						scope of				
	an important scien				_			ches, and				
	Branches of biolo	-			liffere	-		from				
	Fundamental diff	~		e	engine	ering.		They'll				
	science and engin				compa	_		oiological				
	Comparison betw				_			ision and				
	_	e and camera, Bird		_	light	wit		nan-made				
	flying and aircraf				echno	logies	5,	grasp				
	Biological observ				istori	-		oiological				
	century that lead				bserv			scientific				
	discoveries in the	•			esearc		steps					
	Steps in scientific				Brown			motion's				
	_	on in biological			ignific		3					
	sciences.	2										
II	Classification &	Ecology	8	(	Classif	y or	ganisn	ns based	3,4			
					on	- (		phology,				
		organisms, Basis of		l	oioche	mistr		ecology,				
	classification: Mo	orphological,						llular vs.				
	_1		<u> </u>						1			

	1::-1:-::-1:-:-1:-1:-1:-1:-1:-1:-1:-1:-1		14	
	biochemical or ecological, level of		multicellular, prokaryotic	
	organization, symmetry, germ layer		vs. eukaryotic organisms,	
	organization, segmentation,		habitats, and adaptations.	
	notochord.		They'll grasp ecosystem	
	Concept of unicellular and		structure, energy flow,	
	multicellular organisms; prokaryotes		types of excretion, and	
	and eukaryotes; Habitat &		characteristics of major	
	Adaptations.		animal phyla.	
	Concept of Ecosystem: Structure & Function.			
	Energy flow in an ecosystem:			
	Lindemann ten percent law.			
	Types of excretion: Ammonotelism, Ureotelism and Uricotelism.			
	Animal Kingdom: Characters of			
	phylum with examples.			
	Model organisms for the study of			
	biology come from different groups.			
	E. coli, S.cerevisiae, D.			
	Melanogaster, C. elegance, A. Thaliana, M. musculus.			
III	Genetics & Biomolecules	10	Understand allele	2.4
111	Genetics & Biomolecules	10		3,4
	Concept of Allele; Dominance		concepts, dominance, inheritance patterns,	
	&Recessive Monohybrid, Dihybrid		inheritance patterns, mitosis, meiosis,	
	& Trihybrid cross; Mitosis &			
	Meiosis.		Mendelian laws, co- dominance, incomplete	
	Mendel's laws, Concept of		dominance, meompiete dominance, sex	
	Segregation and Independent		determination, genetic	
	assortment.		disorders, DNA/RNA	
	Concept of co-dominance and		roles, enzyme	
	incomplete dominance with		classification, and	
	illustrations.		mechanisms, enhancing	
	Sex determination in human.		understanding of genetic	
	Genetic disorders in human beings.		principles and	
	DNA & RNA as genetic material.		biomolecules.	
	Enzymes: Classification;		biomorecares.	
	Mechanism of enzyme action.			
IV	Information Transfer &	10	grasp properties of the	4
	Metabolism		genetic code, DNA	
			structure, recombination,	
	Genetic code: Properties		protein structures, the	
	Structure of DNA		central dogma, ATP's role	
	Concept of recombination and		in cellular energy, and	
	crossing over		protein-ligand interactions,	
	Proteins: Primary secondary, tertiary		enhancing understanding	
	and quaternary structure.		of information transfer and	
	Concept of Central dogma		metabolism in biological	
	ATP as an energy currency of cell.		l .	
	Concept of docking: Protein Ligand		systems.	

	interaction			
V	Physiology  Human Circulatory System: Heart and its working mechanism; Blood groups; Erythroblastosisfetalis.  Neuroendocrine system of human: Endocrine glands and their functions.  Human Excretory system: Structure of Kidney and Nephron  Nervous system of human: Structure of neuron; Resting Membrane  Potential; Origin and conduction of nerve impulse.  Human Respiratory System:  Structure of lungs and exchange of gases.  Human digestive enzymes:  Components and enzymes.  Mechanism of muscle contraction.	9	understand the functioning of the human circulatory, neuroendocrine, excretory, respiratory systems, nervous system, and muscle contraction mechanism. They'll grasp blood groups, erythroblastosis, kidney structure, neuron function, digestive enzymes, and gas exchange, enhancing physiological knowledge.	4

- T1: Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S.
- A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- T2: Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- T3: Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

## **REFERENCE BOOKS:**

R1: Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher

R2: Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C. Brown Publishers

#### OTHER LEARNING RESOURCES:

- 1. **IEEE Transactions on Biomedical Engineering**: Research articles and reviews on biomedical engineering topics.
- 2. Nature Biotechnology: Leading journal in biotechnology and biological engineering.

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Analyze and differentiate between the fundamental principles of biology and engineering, emphasizing the significance of biological observations.	2,3,4,6,8,9,10 and 12								

2	Evaluate the importance of classification in biology, considering criteria such as cellularity, ultrastructure, energy utilization, and molecular taxonomy.	2,3,4,6,8,9,10 and 12
3	Implement and analyze operations on linked lists and its variations, showcasing competence in memory representation and algorithmic complexities.	2,3,4,6,8,9,10 and 12
4	Explore the molecular basis of information transfer in genetics, understanding the hierarchy of DNA structure, the universality of the genetic code, and defining genes.	2,3,4,6,8,9,10 and 12
5	Explore the fundamental principles of microbiology, including identification, classification, and ecological aspects of single-celled organisms.	2,3,4,6,8,9,10 and 12

Course	Course	CO	PO	PO1	PO1									
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1		2	2	3		1		3	1	1		2
	Biology	CO 2		3	2	3		1		2	1	1		2
22BTCS21 4R	For Engine ers	CO 3		3	2	2		1		2	1	1		2
		CO 4		2	3	2		1		2	1	1		2
		CO 5		2	3	3		1		3	1	1		2

		SEMESTE	R – III						
Course Title		Mathematics I	II (Diffe	renti	al Cal	culus	s)		
Course code	22BTCS215R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours:	2	0	0	0	0	0	2
		45T+30P							
Pre-requisite	NIL				N	NIL			
Programme	Bache	elor of Technology in		uter S	Scienc	e & 1	Engin	eering	
Semester			3						
Course	Gather, analyze,	evaluate, and synt	thesize	infor	matic	n rel	evan	t to a qu	estion or
Objectives	issue.								
(Minimum 3)	Manipulate and analyze numerical data and arrive at an informed conclusion.								
	Understand appli	cations of derivati	ves in	optin	nizati	on, r	elated	l rates, a	and curve
	sketching.			_					
CO1	Understand the ski	lls of partial derivativ	ves with	their	applic	ation	s.		
CO2		lls of vector calculus			* *				
CO3	Analyse the applic	ation of integral calc	ulus						
CO4		ncept of line integral,		integ	ral and	d volu	ıme in	tegral.	
CO5		ncept of applications		_				-	
Unit-No.	Con	ntent	Contac	ct	Lea	rnin	g Out	come	BL
			Hour			•	3		
I	Sequences, Serie	s and Mean value	8	C	Conve	gence	e	and	1,2,3
	theorems			d	iverge	ence	tes	ts for	
				S	equen	ces	and	series,	
	Sequences	and Series:		iı	ncludi	ng		ratio,	
	_	nd divergence -		c	ompai	rison,		integral,	
		omparison tests –		C	Cauchy	y's	root	, and	
	•	uchy's root test -			lterna	-	serie	s tests.	
		- Leibnitz's rule.			hey'll		dersta		
		heorems (without		a	pply	R			
	proofs): Rolle				agran	_		n value	
	Lagrange's mean	value theorem.			neorer		in	solving	
					nathen		ıl j	problems	
**	D.66 4. 1	4° 0 0° /	0		ffectiv		.:11 :		2.4
II	-	uations of first	8		tuden				3,4
	order and first d	egree			olve Bernou		order- and	·	
	Linear differe	ntial equations-						exact ons, and	
		quations –Exact					_	eal-world	
		nations reducible to			ppry cenari		suc		
	-	cations: Newton's						cooling,	
		- Law of natural						ay laws,	
	growth and de			_	lectric		circui	•	
	trajectories–Elect				rthogo			jectories,	
	-	, D. Melanogaster,			nhanc			problem-	
		,				0	-		133

	C. elegance, A. Thaliana, M.		solving skills in	
	musculus.			
	muscurus.		differential equations.	
III	Linear differential equations of	10	Students will master	3,4
	higher order		solving linear differential	
			equations of higher order	
	Homogeneous and Non-		with constant coefficients,	
	homogeneous differential equations		both homogeneous and	
	of higher order with constant		non-homogeneous, using	
	coefficients – with non-		methods such as variation	
	homogeneous term of the type eax,		of parameters and Cauchy-	
	sin ax, cos ax, polynomials in xn,		Legendre equations.	
	eaxV(x) and $xnV(x)$ – Method of		They'll apply these	
	Variation of parameters, Cauchy and		techniques to diverse	
	Legendre's linear equations.		mathematical and	
			scientific contexts.	
IV		10	Understand partial	4
1 4	Partial differentiation	10	differentiation, including	7
	1 at tial differentiation		homogeneous functions,	
	Introduction Homogonaous			
	Introduction – Homogeneous function – Euler's theorem– Total		Euler's theorem, total	
			derivative, chain rule,	
	derivative— Chain rule— Jacobian —		Jacobian, and	
	Functional dependence –Taylor's		Taylor/MacLaurin series	
	and MacLaurin's series expansion of		for functions of two	
	functions of two variables.		variables. They'll apply	
	Applications: Maxima and Minima		these concepts to find	
	of functions of two variables		extrema using Lagrange's	
	without constraints and		method, enhancing	
	Lagrange'smethod.		problem-solving abilities	
			in multivariable calculus.	
V	Multiple integrals	9	Students will learn double	4
			and triple integrals, change	
	Double and Triple integrals -		of integration order in	
	Change of order of integration in		double integrals, and	
	double integrals – Change of		transformations to polar,	
	variables topolar, cylindrical and		cylindrical, and spherical	
	spherical coordinates		coordinates. They'll apply	
			these techniques to	
			compute volumes and	
			solve practical problems in	
			diverse fields.	
	Practical Co	l mponent	GITOIDO HOIGO.	
	Tuchedi Col	ponent		
Practical 1		<u> </u>	<u> </u>	
1 ractical 1				
	1			

T1: Introduction to Integral Calculus: Systematic Studies with Engineering Applications for Beginners, Ulrich L. Rohde, 2011.

## **REFERENCE BOOKS:**

**R5:** Calculus. Gilbert Strang, 1991.

### OTHER LEARNING RESOURCES:

- 1. **Wolfram Alpha** Computational tool for exploring differential calculus concepts, performing calculations, and visualizing functions.
- 2. **Mathematical Association of America (MAA)** Offers resources, journals, and articles related to calculus and mathematics education.
- **3. MathWorld** Online mathematics encyclopedia that provides detailed explanations and definitions related to differential calculus concepts.

## RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the skills of partial derivatives with their applications.	1,2,3,4,5,10 and 12						
2	Understand the skills of vector calculus	1,2,3,4,5,10 and 12						
3	Analyse the application of integral calculus	1,2,3,4,5,10 and 12						
4	Understand the concept of line integral, surface integral and volume integral.	1,2,3,4,5,10 and 12						
5	Understand the concept of applications of multivariable calculus (Integration).	1,2,3,4,5,10 and 12						

Course	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS21	Mathema tics III (Different	CO 1 CO 2 CO 3	2	2 2	2	2	2					3 3		2 2
5R	ial Calculus)	CO 4	3	3	3	3	3					3		2
		CO 5	3	3	3	3	3					3		2

Course Title		Techno P		ıal Ç	kille 1	ſΤ			
Course code	22BTCS216R	Total credits: 4	L	T	P	S	R	O/F	С
Louise code	22D1C5210K	Total hours:	0	0	2	0	0	0	1
		45T+30P	U	U		U	U	U	1
Pre-requisite	NIL	Co-requisite				N	IL		
Programme		nology in Computer	Science	& E	ngine				
Semester	3	iology in computer	Belefie			<u> </u>			
Course	To become confide	ent in using mathema	tics, logic	c. rea	sonin	g and	codin	g to anal	vze and
Objectives	solve problems in r	•		,		8 4114		.g 00 uniu	. j 20 am
(Minimum 3)	•	ed practical knowleds	ge of pro	oram	ming	code s	style.		
(	_	ctical knowledge and		_	_			e style,	
	•	, efficiency, and mai	-	•	_		_	•	
CO1		· • • • • • • • • • • • • • • • • • • •						1	
	Develop highly ski	lled and knowledgea	ble mana	geme	ent pr	ofessio	onal v	vho can o	deal with
	various areas and a	spects of businesses.							
CO2	Develop analytical	and research ability	as manac	emei	nt nro	fessio	nal เพ	ho can be	e more
	efficient and innova		as manag	,cirici	nt pro	103310	iiai w	no can o	e more
	criterent and mnove	ative in practice.							
CO3									
				ncer	te and	i the tl	heorie	of day	10000000
	Gather knowledge	about various develo	pment co	1	ns and	ı tile ti		s of acvi	горшеш
	Gather knowledge	about various develo	pment co		ns and			es of devi	еюршеш
CO4									егоринени
CO4		about various develo				a the ti		es of devi	егоршеш
	Encourage the stud	ents towards Non-tra	aditional	think	ing.				
CO4	Encourage the stud		aditional	think	ing.				
CO4	Encourage the stud  Effectively commu	ents towards Non-tra	aditional	think	ing. wledg		profe	essional n	
CO4	Encourage the stud  Effectively commu	ents towards Non-tra	aditional technical	think	ing. wledg	ge in a	profe	essional n	nanner.
CO4	Encourage the stud  Effectively commu	ents towards Non-tra	aditional technical	think kno	ing. wledg	ge in a	profe	essional n	nanner.
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming	ents towards Non-tra	technical  Contac  Hour	think kno	ing. wledg Lea	ge in a	profe g <b>Out</b>	essional n	nanner.  BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Prograr	ents towards Non-tra nicate scientific and ntent constructs:	technical  Contac  Hour	think kno	ing. wledg Lea Inders	ge in a	profe g Out	essional n	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program	ents towards Non-tra nicate scientific and ntent constructs: mming Languages, Language,Structure m, Executing and	technical  Contac  Hour	think know	ing. wledg Lea Inders	ge in a  arning  stand  nentals  mming	profe g Out	essional n	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P	nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram,	technical  Contac  Hour	think kno	ing.  Wledg  Lea  Jnders  undan  rogram  angua;  rogram	ge in a arrning stand mentals mming ge	profe  g Oute  s  g, i  e	essional recome  the of Concluding volution, structure,	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens,	ents towards Non-tra nicate scientific and ntent  constructs: mming Languages, Language,Structure m, Executing and crogram, Keywords and	technical  Contac  Hour	think kno	ing.  Wledg  Lea  Inders  Indan  rogram  angua	ge in a arrning stand mentals mming ge	profe  g Out	the of Concluding volution, structure, bugging,	nanner.  BL  1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens, Identifiers, Open	ents towards Non-tra nicate scientific and ntent  constructs: mming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants,	technical  Contac  Hour	think kno	ing.  Wledg  Lea  Jnders  Indan  rogram  rogram  rogram  xecution	ge in a  arning stand nentals mming ge m ion,	profe g Out	the of C ncluding volution, structure, bugging, eywords,	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens, Identifiers, Open Variables, DataT	nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence	technical  Contac  Hour	think know t U fu p la p e to	Ing.  Lea  Undersundan rogram rogram rogram xecutiokens,	stand mentals mming ge m ion, iers, o	profe  g Out	the of Concluding volution, structure, bugging, eywords, ors, data	nanner.  BL  1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Sco	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of	technical  Contac  Hour	think know t  ft  pt la pp ex to ic ty	Ing.  Wledg  Lea  Inders  Indan  rogran  rogran  xecuti  bkens,  dentifi  /pes,	stand nentals mming ge m ion, iers, o	profe  g Oute  g of the second	the of Concluding volution, structure, bugging, eywords, ors, data cope and	nanner.  BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions,	technical  Contac  Hour	think know t U fit p la pe to ic ty li	Ing.  Wledge  Lea  Understandan  rogram  rogram  xecution  bkens,  dentifit  ypes,  fetime	ge in a  arning  stand mentals mming ge m ion, iers, o variab	profe  g Oute  g of the second	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic	nanner.  BL  1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Sco	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions,	technical  Contac  Hour	think know t ft ft p la p e: to ic ty li e:	Ing.  Wledg  Lea  Inders  Inders  Indan  Ingua;  Ingua	ge in a  arning  stand nentals mming ge m ion, iers, o variab e, sions,	g Outo	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic and	nanner.  BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions,	technical  Contac  Hour	think know t  t  ft  p  la  po  ic  ty  li  ex  ex	ing.  Wledg  Lea  Jnders  Indan  rogram  rogram  xecuti  bkens,  dentifi  pes,  fetime  xpress  xpress	ge in a  arning  stand mentals mming ge m ion, iers, o variate e, sions, sion	profe g Out	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic and aluation,	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions,	technical  Contac  Hour	think  know  t  fu  pu la  pu cic  ty li  ex  ex	Ing.  Lea  Juders  Jud	ge in a arrning stand mentals mming ge m ion, siers, o variable, sions, sion sing	profe  g Oute  g Oute  g of the second are every their	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic and aluation, coding	nanner.  BL  1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme	ents towards Non-tra nicate scientific and ntent  constructs: nming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions,	technical  Contac  Hour	think  know  t  ft  p  la  p  e  to  ic  ty  li  e  e  p	Ing.  Wledg  Lea  Inders  Inders  Indan  Ingua;  Ingua	ge in a  arning  stand nentals mming ge m ion, iers, o variable, sions, sion eing ency	profe  g Out  g Out  g of the second are their and profe  g of the second are their and profe  g of the second are the second	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic and aluation,	nanner.  BL  1,2,3
CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme Evaluation of Exp	nicate scientific and ntent  constructs: mming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions, pressions.	technical Contac Hour 8	think  know  t  C  fu  p  la  p  c  to  to  ty  li  e:  e:  p  so	ing.  Wledg  Lea  Unders  undan  rogran  xecuti  bkens, dentifi  ypes, fetime  xpress  nhanc  roficie  olving	ge in a  arning  stand nentals mming ge m ion, ee, sions, sion sing ency g skills	profe  g Out  g Out  g of the second and profes and pro	the of Concluding volution, structure, bugging, ors, data cope and rithmetic and aluation, coding problem-	BL 1,2,3
CO4 CO5 Unit-No.	Encourage the stud  Effectively commu  Cor  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoy Variables,Arithme Evaluation of Exp  Control Statemen	nicate scientific and ntent  constructs: mming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions, pressions.	technical  Contac  Hour	think  know  t  ft  p  la  p  ic  ty  li  e:  er  p  so  M	Ing.  Wledg  Lea  Inders  Inde	ge in a arraing stand mentals mining ge in a variable, sions, sion sing ency g skills control of the control of	profe  g Out  g Out  g of the second are their and profes.  group of the second are the second a	the of Concluding volution, structure, bugging, eywords, ors, data cope and rithmetic and aluation, coding problem-	nanner.  BL  1,2,3
CO5 Unit-No.	Encourage the stud  Effectively commu  Con  C Programming Types of Program Evolution of 'C' I of a 'C' Program Debugging a 'C'P' 'C' Tokens, Identifiers, Open Variables, DataT of Operators, Scoty Variables, Arithme Evaluation of Exp  Control Statement Decision Making	nicate scientific and ntent  constructs: mming Languages, Language,Structure m, Executing and rogram, Keywords and rators, Constants, Types, Precedence pe and Lifetime of etic Expressions, pressions.	technical Contac Hour 8	think  know  t  U  fu  p  la  p  ci  ty  li  e:  er  p  so  M  (i	Ing.  Wledg  Lea  Inders  Inde	ge in a arring stand mentals ming ge mion, sion, sion sing ency g skills control. E-else,	profe g Out	the of Concluding volution, structure, bugging, ors, data cope and rithmetic and aluation, coding problem-	1,2,3 3,4

SEMESTER – III

	Block, GOTO statement.		making, and looping	
	Looping:		structures (for, while, do-	
	Concept of Loop, For loop, While		while) with break,	
	loop,Do- while loop, jumpingin		continue, and jump	
	Loop, break and continue statement,		statements. They'll	
	Introduction to Arrays, Strings and		understand arrays, strings,	
	Functions.		and functions, enhancing	
			their ability to design	
			structured and efficient C	
			programs.	
III	Arrays:	10	Students will proficiently	3,4
	One Dimensional Arrays, Two-		handle one-dimensional,	,
	dimensional		two-dimensional, and	
	Arrays, Multidimensional Arrays,		multidimensional arrays,	
	Dynamic Arrays.		including dynamic arrays.	
	Strings:		They will implement	
	Implementing String Variables,		string variables, utilize	
	String handling Functions.		string handling functions	
	<b>Functions:</b>		effectively, and grasp the	
	Concept of Functions, user-defined		concepts of user-defined	
	Functions, System-		and system-defined	
	definedFunctions, passing in		functions, enhancing their	
	Functions.		ability to develop robust	
			and modular C programs.	
IV		10	Understand pointers in C,	4
			including declaration,	
			initialization, and	
	Pointers in C:		accessing variables	
	Pointers: Introduction, Declaring		through pointers. They	
	Pointer Variables, Initialization of		will manipulate pointer	
	Pointer		expressions, perform	
	variables, accessing a Variable		increments, and	
	through its Pointer, Pointer		comprehend scale factors,	
	Expressions,		enhancing their ability to	
	Pointer Increments and Scale Factor.		manage memory	
			efficiently and solve	
			complex programming	
			tasks.	

V	Structures:	9	Students will grasp	4
	Introduction, Defining a structure,		structures in C: defining,	
	declaring structure variables,		declaring, accessing	
	accessing structure members,		members, initializing, and	
	structure initialization, array of		using arrays of structures.	
	structures.		They'll understand unions,	
	Unions:		differentiate them from	
	Defining a Union, using a Union,		structures, and manage file	
	Difference between Structure and		operations, including	
	Union.		defining, opening, closing	
	File Management in C:		files, and handling	
	Introduction, Defining and opening		input/output and errors	
	a file, closing a file, Input/output		effectively.	
	and Error Handling on Files.			
	Practical Con	mponent		
			<del>,</del>	
Practical 1				
Practical 2				
1 Tactical 2				
Practical 10				

T1: "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

#### **REFERENCE BOOKS:**

R1: PradipDey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

R2: Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

R3: Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.

## OTHER LEARNING RESOURCES:

- 1. Jacqueline A Jones and Keith Harrow, "Problem Solving with C", Pearson Education. ISBN: 978-93-325-3800-9.
- 2. Dr. GuruprasadNagraj, "C Programming for Problem Solving", Himalaya Publishing House. ISBN-978-93-5299-361-1

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome

1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,10 and 12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,10 and 12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,10 and 12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,10 and 12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,10 and 12

Course	Course	CO	PO	PO1	PO1									
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
22BTCS21 6R	Techno Professio	CO 1	2	1	1	1	1					3		2
		CO 2	2	1	3	1	1					3		2
		CO 3	2	3	1	1	1					3		2
	11	CO 4	2	2	2	2	2					3		2
		CO 5	2	2	2	2	2					3		2

		SEMESTER	R – III						
Course Title	BASIC LIFE SAY	VING SKILLS							
Course code	22UULS212R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours: 45T+30P	0	0	2	0	0	0	1
Pre-requisite	NIL	Co-requisite		1	1	ľ	NIL	ı	
Programme	Bache	elor of Technology in	Comp	uter S	Scien	ce & 1	Engin	eering	
Semester			3						
Course	Equip learners with	n essential knowledge	and pr	actica	l skill	s for l	nandli	ng emerg	ency fire
Objectives	situations, includir	g fire safety protocol	s, evacu	ation	proce	dures	, and	fire preve	ntion
(Minimum 3)	measures.								
	_	provide basic manage					-	_	
	emergencies, focus	sing on immediate fir	st aid te	chniq	ues, ii	njury	assess	ment, and	l
	stabilization.								
		capability to respond		-			-	•	phasizing
	practical skills in f	irst aid administration	and en	nergei	ncy re	spons	e prot	ocols	
CO1	Dasia Life Command	(DIC) is the smooths	al-:11a a			1 ~ ~ 41•	المسلمة	ا مادادات	la a u l al
		(BLS) is the specific				-			
	_	strate after completing	_		-				
	1	e who may encounter			_	-	na nee	ea to prov	iae
	illillediate assistan	ce before professiona	ii mearc	ai nei	рапт	ves.			
CO2	Soft skills encomp	ass personal attribute	s and a	bilitie	s enal	oling	effect	ive interp	ersonal
	_	rsonal and profession				_		_	
	_	overall success in		-	-				
		achieving personal a		_				•	
CO3									
	Focuses on equipp	ing healthcare profes	sionals,	first r	espon	ders,	and e	mergency	care
	providers with the	knowledge and skills	to pron	nptly 1	recogi	nize, a	assess	, and effe	ctively
	manage various ty	pes of traumatic injur	ies and	emerg	gencie	s. Thi	s traii	ning is cri	tical for
	ensuring timely an	d appropriate care in	emerge	ncies,	enhai	ncing	overa	ll prepare	dness and
	response capabiliti	es.							
CO4									
C04	The course aims to	educate on the princ	inles an	d nuri	ose o	of the	Triage	e system i	n
		g on prioritizing patie	_				_	-	
		is immediate, delayed				_	•		•
	_	cating resources and			_			-	-
	~	g immediate attention			-		-		
	-	y patient assessment of				-		_	
	settings.	y patient assessment (	iaimg ti	rage (	o opt	mize	Juleo	mes m en	nergency
	settings.								
CO5									
		tify and distinguish							
	myocardial infarc	tion (heart attack), s	stroke,	diabet	ic en	nerge	ncies	(hypogly	cemia and
		anaphylaxis, respirat	-				-		
		and non-epileptic),	and all	ergic	react	ions (	inclu	ding seve	re allergic
	reactions or anaphy	ylactic shock)							

Unit-No.	Content	Contact Hour	Learning Outcome	BL
I	Basic Life Support(BLS)	8	Basic Life Support (BLS)	1,2,3
	Introduction of BLS		teaches lifesaving skills, including the Chain of Survival, ABCs	
	Chain of survival		Assessment, CPR and ventilation techniques,	
	ABCs Assessment		AED usage, and choking management for adults and	
	CPR and Ventilation Technique		children.	
	AED			
	Choking for adult and children			
II	Soft skills	8	Soft skills training	3,4
	Introduction		enhances communication, situational awareness, and teamwork. Learning	
	Communications Skills		outcomes include improved communication	
	Situational Skills		skills, effective situational responses, and	
	Team Work		collaborative teamwork, along with other essential	
	Other Soft Skills		interpersonal skills.	
III	Trauma emergencies	10	Trauma emergency	3,4
	• Introduction		training covers initial pre-	
	Priorities of Initial approach		hospital care priorities:	
	inpre-hospital care		scene safety, primary	
	a) Scene safety		assessment, bleeding	
	b) Primary assessment		control, helmet removal,	
	<ul><li>c) Bleeding control</li><li>d) Helmet removal</li></ul>		amputated body part care, victim extrication, cervical	
	e) Care of amputated body part		spine stabilization, collar	
	f) Extrication of victims and		application, and limb	
	safe transfer		splinting.	
	g) Cervical spine stabilization			
	h) Cervical collar application			
	i) Splinting of broken Limbs			
IV	Triage system	10	Triage system training	4
	• Introduction  Flowshort approach of		includes understanding the	
	• Flowchart approach of Triage		triage flowchart, managing multiple casualties in pre-	
	• Triage of Multiple		hospital settings, and	
	Casualties in Pre-Hospital setting		prioritizing single casualty	
		<u> </u>	1	

	Triage of Single casualty		care, ensuring efficient	
			and effective emergency	
			response.	
V	Medical emergencies  Introduction  Victim centred approach in medical emergency  Management of a)seizures b)heart attack c)asthma Diabetic emergencies d)emergency child birth e)stroke recovery position	9	Medical emergency training covers victim- centered care and management of seizures, heart attacks, asthma, diabetic emergencies, emergency childbirth, and stroke recovery positions, ensuring effective and compassionate emergency response.	4
	Practical Con	mponent	1	<u> </u>
Practical 1				

T1: Nancy Caroline'S Emergency Care in the streets Seventh edition by Jones and Bartlett First Aid book by LC Gupta

### **REFERENCE BOOKS:**

R1: Advance Cardio vascular life support and Basic life support provider manual @ American Heart Association (AHA)

## OTHER LEARNING RESOURCES:

- 1. **Red Cross First Aid App**: Provides step-by-step instructions for responding to emergencies and locating nearby AEDs.
- 2. PulsePoint: Alerts CPR-trained individuals to nearby cardiac arrests and AED locations.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Basic Life Support (BLS) is the specific skills and knowledge that individuals should acquire and demonstrate after completing a BLS training course. These outcomes are essential for anyone who may encounter a medical emergency and need to provide immediate assistance before professional medical help arrives	1,2,3,4,5,9,11 and 12
2	Soft skills encompass personal attributes and abilities enabling effective interpersonal interactions in personal and professional settings. They enhance communication, collaboration, and overall success in diverse aspects of life, emphasizing their significant value in achieving personal and professional goals.	1,2,3,4,5,9,11 and 12
3	Focuses on equipping healthcare professionals, first responders, and emergency care providers with the knowledge and skills to promptly recognize, assess, and effectively manage various types of traumatic injuries and emergencies. This training is critical for ensuring timely and appropriate care in emergencies, enhancing overall preparedness and response capabilities.	1,2,3,4,5,9,11 and 12
4	The course aims to educate on the principles and purpose of the Triage system in healthcare, focusing on prioritizing patient care based on urgency. Learners will explore triage levels such as immediate, delayed, minimal, and expectant, understanding their significance in allocating resources and treatment. They will identify medical conditions and injuries needing immediate attention versus those manageable later. Emphasis is on accurate and timely patient assessment during triage to optimize outcomes in emergency settings.	1,2,3,4,5,9,11 and 12
5	Learners will identify and distinguish common medical emergency conditions such as myocardial infarction (heart attack), stroke, diabetic emergencies (hypoglycemia and hyperglycemia), anaphylaxis, respiratory distress (including asthma exacerbation), seizures (epileptic and non-epileptic), and allergic reactions (including severe allergic reactions or anaphylactic shock)	1,2,3,4,5,9,11 and 12

Course	Course	CO	PO	PO1	PO1									
code	Name	s	1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1	2	2	3	2	2				3		3	3
		СО												
	BASIC	2												
	LIFE		3	2	3	2	2				2		3	3
22UULS212	SAVIN	CO												
R	G	3	_	_		_								
	SKILL		3	2	3	3	3				3		3	2
	S	CO												
		4	3	2	3	1	3				2		3	2
		СО												
		5												
			3	2	3	3	3				2		2	2

		SEMESTE	R – III								
Course Title		PERSONAL I	FINANC	IAL	PLAN	NIN	G				
Course code	22UUFL213R	Total credits: 4	L	Т	P	S	R	O/F	C		
		Total hours: 45T+30P	0	0	2	0	0	0	1		
Pre-requisite	Introduction to Financial Budgeting And Planning	Financial Budgeting And									
Programme	Bache	lor of Technology i	n Comp	uter S	Scien	ce & 1	Engin	eering			
Semester			3								
Course Objectives (Minimum 3)	money, borrowing,  2. Assess the perso methods of goal ac	d offer an inclusive lending, taxes and t nal financial plannir hievement. get, record-keeping	heir appl	ications, the	on to f	inanc ycle (	ial pla of fina	nning. ncial plan	s, and		
CO1	Develop a cash ma buying process.	nagement strategy a	nd a plan	to fa	cilitat	e the	home	or automo	bile		
CO2	Design a diversifie objectives.	d investment portfol	io that ac	ldress	ses sev	veral (	differe	ent investr	nent		
CO3		een open and closed- al estate investment		ıal fu	nds, e	exchai	nge-tra	nded funds	s, and		
CO4	Create a financial pand your estate.	plan that covers your	income	needs	s in re	tiremo	ent an	d helps pr	otect you		
CO5	financial stability a										
Unit-No.	Con	ntent	Contac Hour		Lea	arnin	g Out	come	BL		
I	i. Functions of mo	ning, causes, how it	8	Pu u ff a p v v s iii (	Planning anders unction and could anning alue of the imple anteres (NPV)	ng contanding trol, ng proof more and contant trol, and contant trol, and I	vers ng mon aflation finance pocesse ney in compo	n causes cial s, time cluding und nt Value Value	1,2,3		

П	compound interest; v.Net Present Value and Future value, vi. Power of Compounding; vii. Doubling period and Rule of 72. Income Tax Planning-	8	power, doubling periods, and the Rule of 72 for effective financial decision-making.  Learning Outcome: Gain	3,4
	<ul> <li>i. Meaning of Income,</li> <li>ii. Direct &amp; Indirect Taxes, Taxable Income, various heads of Income for tax Calculation,</li> <li>iii. Non-taxable Income,</li> <li>iv. Tax evasion and tax avoidance,</li> <li>v.GST, Tax Planning Strategies.</li> </ul>		proficiency in understanding income, taxes (direct, indirect), taxable and non-taxable income, tax evasion, avoidance, GST, and effective tax planning strategies.	
III	i. Meaning of Entrepreneurship, prerequisites for becoming an entrepreneur,  ii. Entrepreneurship Support Systems in India,  iii. Institutional support systems for entrepreneurs,  iv. Financial support systems for entrepreneurs;  v. Venture Capital, Business Angels,  vi. Assistant of Government,  vii. Commercial Bank Loans and Overdraft.	10	Understand entrepreneurship fundamentals, support systems in India, institutional and financial support mechanisms (venture capital, business angels, government assistance, commercial bank loans), enabling effective entrepreneurial planning and implementation.	3,4
IV	Planning for investing in securities market -  i. Investment avenues offered by Securities Markets Primary Market and Secondary Market, ii  . Stock market- meaning, features, functions of NSE, BSE DEMAT trading account,	10	Gain knowledge of investment avenues in securities markets, primary and secondary markets, stock market functions (NSE, BSE), DEMAT trading, security repositories, stock brokers, operational aspects (order placement, contract notes,	4

	iii. Security repository, stock brokers. Operational aspects of securities markets: placement of orders, contract note, pay-in and pay-out, trading and settlement cycle, iv. Various risks involved in investing in securities markets; Role of Financial Intermediaries; Stock indices.  v. Mutual Funds- meaning concept, definition, types, importance and drawbacks of mutual funds, mutual funds in India, investing in mutual funds, vi. Systematic Investment Plan (SIP)		trading cycles), risks, financial intermediaries, stock indices, mutual funds (types, importance, drawbacks, investing in India), and advantages of Systematic Investment Plans (SIPs).	
	and its advantages.			
V	Planning for debts and Retirement  i. Consumer credit Introduction to consumer credit; choosing a source of credit, the cost of credit alternatives,  ii. Consumer Legal Protection;  iii. Housing Decision: Factors and Finance: Vehicle Decisions.  iv. Retirement planning Meaning of cost of living; retirement need analysis; development of retirement plan, various retirement schemes.  v. Estate Planning; Pension and Medicare Planning; Wills.  Practical Con	g	Develop skills in consumer credit management, including choosing credit sources and evaluating costs. Understand consumer legal protections and factors influencing housing and vehicle decisions. Master retirement planning, including cost-of-living considerations, retirement needs analysis, retirement scheme evaluation, estate planning, pension, Medicare planning, and wills.	4
	1 factical Col	шропеш		
Practical 1				
Practical 2				
Practical 10				

T1: Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems & The Million-Dollar Financial Advisor: Powerful Lessons and Proven Strategies from Top Producers by David J. Mullen Jr

T2: Personal Finance and Planning by Dr. Rajni

T3: Peaceful Personal Finance: A Short Read on the Basics of Personal Finance and Planning Kindle Edition by Hema Singh

### **REFERENCE BOOKS:**

R1: Be Your Own Financial Advisor: Financial Planning, Investment Options, Risk Management, Tax Management, Succession Planning Kindle Edition y Sushil Bali

R2: The Dumb Things Smart People Do with Their Money: Thirteen Ways to Right Your Financial Wrongs Kindle Edition y Jill Schlesinger

#### OTHER LEARNING RESOURCES:

- 1. **Financial Planning Association (FPA)**:Offers resources, workshops, and events for financial planners and individuals seeking financial advice.
- 2. **Local Community Resources**: Check local libraries, community centers, and universities for workshops or seminars on personal financial planning.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop a cash management strategy and a plan to facilitate the home or automobile buying process.	1,2,4,5,11 and 12
2	Design a diversified investment portfolio that addresses several different investment objectives.	1,2,4,5,11 and 12
3	Differentiate between open and closed-end mutual funds, exchange-traded funds, and direct or indirect real estate investments.	1,2,4,5,11 and 12
4	Create a financial plan that covers your income needs in retirement and helps protect you and your estate.	1,2,4,5,11 and 12
5	Apply financial knowledge and skills to make informed decisions, ensuring long-term financial stability and security.	1,2,4,5,11 and 12

Course	Course	Cos	PO	PO1	P									
code	Name		1	2	3	4	5	6	7	8	9	0	1	O 12
														12
		CO 1	1	2		3	3						3	3
	PERSONA L FINANCI	CO 2	1	2		3	3						3	3
22UUFL20 2R		CO 3	1	3		2	3						3	3
	G	CO 4	1	2		3	3						3	3
		CO 5												

		SEMESTER	- III									
Course Title		GLISH FOR EMPLO										
Course code	22UBPD214R	Total credits: 4	L	T	P	S	R	O/F	C			
		Total hours: 45T+30P	0	0	2	0	0	0	1			
Pre-requisite	NIL	NIL Co-requisite NIL										
Programme	Bache	Bachelor of Technology in Computer Science & Engineering										
Semester		3										
Course	To introduce the ty	To introduce the types of sentences and their significance.										
Objectives	To strengthen the v	ocabulary of the stude	ents to	enhar	ice stu	ıdent'	vocal	oulary to e	enhance			
(Minimum 3)	their speaking and	writing skills it the im	portano	e of	dress o	codes	in va	rious orga	nizations.			
	To overcome fear of	of Public Speaking										
		process of Effective R	eading	techi	niques	and I	Listen	ing skills.				
CO1		•										
		itten communication f	•	essio	nal sc	enario	s, inc	orporating	3			
	engineering termin	ology and conventions	s.									
CO2	Demonstrate profi	cient verbal commu	nication	n sk	ills. a	pplvi	ng er	ngineering				
	_	hnical language appro			,	F F - J -	6	-8				
CO3	,	<u> </u>	1 ,									
		effective teamwork s	trategie	s in e	engine	ering	conte	xts, foster	ing			
	collaboration and in	nnovation.										
CO4												
	Develop and delive	er professional present	ations u	ısing	appro	priate	engi	neering la	nguage			
	and communication	n techniques.										
CO5												
COS	Analyze and adapt	communication strate	gies for	dive	rse en	ginee	ring v	vorkplace	scenarios,			
	-	s-cultural competence	-					•				
Unit-No.	Cox	at ant	Canta	.4	Too		~ Out		DI			
UIIIt-No.	Col	ntent	Contac Hour		Lea	ırımı	ց Ծաւ	come	BL			
I	Module 1: Readi	ng Skills	8		Readin	g Ski	lls enl	nances	1,2,3			
_		erpreting different			bilitie	-			_,_,-			
	texts						_	erstand				
	Exercise 2:	Importance and		p	unctu	ation	signif	icance,				
	significance of Pu	nctuation		r	ead sto	ories	and ne	ews, and				
	Exercise 3: Story	-reading		С	ompre	ehend	diffe	rent				
	Exercise 4: News-	•					_	mproved				
	_	orehending texts of			eading		•	nsion				
	different genres				nd ana							
II	Unit 2: Non-Verl	bal	8		Non-V		. •	, 1	3,4			
	Communication	NY X7 1 1			Comm			teaches				
	i. Understanding				indersi		ıg	and				
	Communication & Types of Body La				nterpro	_	ne im	body portance				
		and Impact of Body			_			on-verbal				
	_	duction to Haptics,			ues,	and		troduces				
	Language Cintrol	accion to maptics,			acs, aptics		inesic					
					roxen			effective				
				1					<u> </u>			

	Kinesics and Proxemics		interpersonal communication.	
III	Unit 3: Grammar (Flipped Classroom)  i. Types of Sentences (using Assertive, Imperative, exclamatory in respective contexts),  ii. Degrees of Comparison	10	Grammar (Flipped Classroom) covers using assertive, imperative, and exclamatory sentences in context, and understanding degrees of comparison, enhancing grammatical accuracy and contextual sentence construction.	3,4
IV	Unit 4: Public Speaking Skills  i. Introduction to public speaking Preparation for Public speaking (scripts, non-verbal cues) ii. Understanding and overcoming Fear of Public Speaking Tips Public Speaking	10	Public Speaking Skills focuses on preparing and delivering speeches, utilizing non-verbal cues, overcoming fear of public speaking, and applying effective tips for confident and engaging public presentations.	4
V	Module 5: Listening Skills  i. Process of listening  ii. Understanding listening barriers  iii. Difference between Listening and Hearing,  iv. Importance of Effective Listening Practice Session: Listening to podcasts, Lectures, Audio Books etc.	9	Listening Skills explores the listening process, identifies barriers, distinguishes between listening and hearing, underscores the importance of effective listening, and includes practical sessions with podcasts, lectures, and audio books to enhance listening proficiency.	4

T1: Wren, P.C and Martin, H. 1995. High School English Grammar and Composition, S Chand Publishing.

T2: Barrett, Grant. 2016. Perfect English Grammar: The indispensable Guide to Excellent Writing and Speaking, Zephyros Press

## **REFERENCE BOOKS:**

R1: Mccarthy. (2008) English Vocabulary in Use Upper - Intermediate with CD ROM, Cambridge University Press

R2: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

# OTHER LEARNING RESOURCES:

- 1. <a href="https://www.youtube.com/watch?v=rl85jxktfms">https://www.youtube.com/watch?v=rl85jxktfms</a>
- 2. https://www.slideshare.net/JavedIqbal15/presentation-on-vocabulary-building-14522369

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Create effective written communication for professional scenarios, incorporating engineering terminology and conventions.	1,2,3,4,5,10 and 12							
2	Demonstrate proficient verbal communication skills, applying engineering vocabulary and technical language appropriately.	1,2,3,4,5,10 and 12							
3	Evaluate and apply effective teamwork strategies in engineering contexts, fostering collaboration and innovation.	1,2,3,4,5,10 and 12							
4	Develop and deliver professional presentations using appropriate engineering language and communication techniques.	1,2,3,4,5,10 and 12							
5	Analyze and adapt communication strategies for diverse engineering workplace scenarios, demonstrating cross-cultural competence.	1,2,3,4,5,10 and 12							

Course	Course	Co	PO	PO	PO	PO	PO 5	PO						
code	Name	S	1	2	3	4	3	6	7	8	9	10	11	12
22UBPD2 14R	1   CO   FOR   2   EMPLOYABI   CO   LITY FOR   3	CO 1	1	1	1	1	1					3		2
		CO 2	1	1	1	1	1					3		2
		CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTER	R – III								
Course Title		MOC	OCS II:	HTM	IL						
Course code	2MOCECS217R	Total credits: 4	L	T	P	S	R	O/F	С		
		Total hours: 45T+30P	0	0	0	0	0	0	1		
Pre-requisite	NIL	Co-requisite				1	NIL	•	•		
Programme	Bachelor of Technology in Computer Science & Engineering										
Semester	3										
Course	Understand HTM	L syntax and struct	ture.								
Objectives	Create semantical	y meaningful web	pages.								
(Minimum 3)	Incorporate multir	nedia (images, aud	lio, vide	eo).							
	Implement forms for	_			cessil	oility	and re	esponsive	ness best		
	practices for well-re		11	U		•		•			
CO1	Students will under	-		ructur	e of I	HTMI					
CO2	To create well-struc	tured and semantica	ılly mean	ningfu	ıl web	page	es usin	g HTML	tags.		
CO3	To explore how to i web pages.	ncorporate multimed	dia elem	ents s	such a	s ima	ges, a	udio, and	video into		
CO4	They will learn to in	mplement forms and	input el	emen	ts to c	ollec	t user	data.			
	They will be able to design.				•						
Unit-No.	Con	tent	Contac Hour		Lea	rnin	g Out	come	BL		
I	Introduction to HT	ML: Overview of	8	U	Inders	tandi	ng the	World	1,2,3		
	the World Wide	Web and HTML,		V	Vide V	Veb a	nd H	ΓML,			
	basic structure	of an HTML				_	HTML				
		standing HTML					_	tags for			
	•	ments, creating						ohs, and			
	headings, paragr	_						ng text			
	breaks, working w	ith text formatting				-	nd sty	_			
	and styling					-	ndatio				
							conte	ent			
	TIDAY DI	1 4 11			reatio			•			
П	HTML Elements Semantic HTML level semantic understanding att usage, linking	elements, text- elements , ributes and their	8	el m	Aodule emant lemen nasteri nhanc	ic a its ing	ınd t efi attribi	ext-level fectively, ates for tionality,	3,4		
	anchor tags, inclumultimedia conten	iding images and		ir en	ags,	and and	es wit incom	h anchor reporating ltimedia, rehensive content			

			creation.	
III	Forms with HTML: Introduction to HTML forms and their importance, Form structure using <form> tag, Input types for text, email, password, etc., using radio buttons, checkboxes, and select lists, implementing form validation with HTML attributes</form>	10	Forms with HTML teaches the importance and structure of HTML forms, utilizing <form> tag for form creation, incorporating input types like text, email, password, radio buttons, checkboxes, and select lists, and implementing form validation through HTML attributes, ensuring proficient form development skills.</form>	3,4
IV	HTML5 Features and Advanced Techniques: Introduction to HTML5 and its new features ,semantic elements in HTML5 , incorporating geolocation and local storage, utilizing canvas for graphics and animations, working with responsive design and media queries	10	HTML5 Features and Advanced Techniques introduces HTML5's new features including semantic elements, geo location, local storage, canvas for graphics/animations, and responsive design with media queries, ensuring proficiency in modern web development practices and enhanced user experience.	4
V	Accessibility and Best Practices: Importance of web accessibility, semantic markup for improved accessibility, implementing ARIA roles and attributes, testing and validating HTML code, applying best practices for cross-browser compatibility and performance optimization	9	Accessibility and Best Practices module emphasizes the importance of web accessibility, using semantic markup for improved accessibility, implementing ARIA roles and attributes, testing and validating HTML code for compliance, and applying best practices for cross- browser compatibility and performance optimization, ensuring inclusive and efficient web development skills.	4
	Practical Con	mponent	SKIIIS.	
Practical 1				

## T1: "HTML and CSS: Design and Build Websites" by Jon Duckett:

• Beginner-friendly book with visual examples and clear explanations of HTML and CSS concepts.

# T2: "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins:

Comprehensive guide covering HTML basics and beyond, suitable for beginners.

## **REFERENCE BOOKS:**

R1: "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics" by Jennifer Niederst Robbins

R2: "HTML5: Up and Running" by Mark Pilgrim

#### OTHER LEARNING RESOURCES:

## 1. YouTube Tutorials:

Channels like Traversy Media, The Net Ninja, and Academind offer video tutorials on HTML for visual learners.

## 2. HTML Cheat Sheets and Reference Cards:

Download and use cheat sheets for quick reference to HTML tags and attributes.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Students will understand the basic syntax and structure of HTML	1,2,3,4,5,10 and 12						
2	To create well-structured and semantically meaningful web pages using HTML tags.	1,2,3,4,5,10 and 12						
3	To explore how to incorporate multimedia elements such as images, audio, and video into web pages.	1,2,3,4,5,10 and 12						
4	They will learn to implement forms and input elements to	1,2,3,4,5,10 and 12						

	collect user data.	
5		1,2,3,4,5,10 and 12
	They will be able to apply best practices for accessibility and	
	responsiveness in HTML design.	

Course code	Cours	Co	PO	PO1	PO1									
	e	S	1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO												
		1	2	2	2	2	3					2		2
		CO												
ANTO CE CCA	MOO	2	2	3	3	2	3					2		2
2MOCECS2	CS II:	CO												
17R	HTM	3	2	2	2	2	3					2		2
	L	CO												
		4	2	2	2	3	3					2		2
		CO												
		5	3	3	3	3	3					2		2

		SEMESTER – III	[							
Course Title		CO-CURRICULA	R ACT	IVI	TIES	5				
Course code	22UBCC211	Total credits: 4	L	T	P	S	R	O/F	C	
		Total hours: 45T+30F	0	0	0	4	0	0	1	
Pre-requisite	NIL	Co-requisite				]	NIL			
Programme	Bachelor	of Technology in Com	puter So	cieno	ce &	En	ginee	ering		
Semester	3									
Course	Actively engage in diverse club activities (dance, music, photography, drama,									
Objectives	iteracy) to foster personal development.									
(Minimum 3)	Participate enthusiastically in workshops and competitions, enhancing practical									
	skills and competitiv	skills and competitive spirit.								
	Develop proficiency	Develop proficiency to represent ADTU effectively in inter-university and national								
		asing leadership and to						•		
	*	ills from industry exp			wo	rksł	iops.	enhanc	ing	
	0	nce and career reading		8			F ,		6	
CO1	proressional compete		•55.							
		erse club activities such onal interests and skills				pho	togra	phy, drai	ma, and	
CO2										
	•	ally in workshops and c g practical learning and	-		_		with :	ındıvıdua	al hobbies	
CO3		epresent ADTU effection				vers	ity, s	itate, and	l national	
CO4		ps conducted by industrespective fields of int	• •	erts,	gai	ning	valu	able ins	ights and	
CO5	-	ee learning approach that well-rounded personal contexts.	_				_		holistic	
Unit-No.	Con	tent	Contac Hour	t	Lea	rnin	g Ou	itcome	BL	
I		range of activities	10				at Ad		4,5	
		curriculum intended				•	ocial			
		rest, These activities					thro	_		
		the social and soft						ctivities		
	skills and	1					e, mu			
	_	ofthelearners, Keeping					ohy, a	and		
	in mind the 36					a. Tl	•			
		dentsare engaged in		_		cipat				
		eaded under different				shop		and		
		music, photography,			_		ons,			
	drama, literary etc.,				_			sions,		
		cipate inregular club competitions as per			_	_	then	n tor y and		
	activities, workshops	, compeniions as per		11	nici-	uIIIV	CISIL	y anu		

their interest and hobbies, The student	national level events.	
members of the club are trained represent		
AdtU in various inter University student		
and national level competitions, Renewed		
personalities are invited to conduct		
workshops that benefit the members and		
students by giving them the platform to		
learn from experts in the respective fields.		

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Engage actively in diverse club activities such as dance, music, photography, drama, and literacy, fostering personal interests and skills development.	1,2,3,4,5,6,10 and 12
2	Participate enthusiastically in workshops and competitions aligned with individual hobbies and interests, enhancing practical learning and competitive spirit.	1,2,3,4,5,6,10 and 12
3	Gain proficiency to represent ADTU effectively in inter- university, state, and national level competitions, demonstrating leadership and teamwork.	1,2,3,4,5,6,10 and 12
4	Benefit from workshops conducted by industry experts, gaining valuable insights and skills applicable to their respective fields of interest.	1,2,3,4,5,6,10 and 12
5	Experience a 360-degree learning approach that integrates academic growth with holistic development, nurturing well-rounded personalities capable of thriving in various professional and social contexts.	1,2,3,4,5,6,10 and 12

Course code	Course Name	Co s	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	<b>PO</b> 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	CO-	CO 1	2	2	2	1	2	2				2		2
22UBCC2	CURRICUL AR	CO 2	2	2	2	1	2	3				2		2
11	ACTIVITIE S	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2

	3
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		SEMESTE	R – III								
Course Title		EXTRA CUR	RICULA	AR A	CTIV	TTIE	S				
Course code	22UBEC211	Total credits: 4	L	T	P	S	R	O/F	С		
		Total hours:	0	0	0	4	0	0	1		
		45T+30P									
Pre-requisite	NIL	NIL Co-requisite NIL									
Programme	Bache	Bachelor of Technology in Computer Science & Engineering									
Semester			3								
Course	Develop effective	planning skills to	contribu	ite m	eanin	gfull	y, ma	intain			
Objectives	commitment, and	manage time and J	prioritie	s.							
(Minimum 3)	Cultivate leadersh	nip qualities and pa	ssion fo	r div	erse i	ntere	sts be	yond aca	ademics.		
	Engage in co-curr	ricular activities for	r holistic	e pers	sonali	ity de	velop	ment.			
	Demonstrate clear	expression, in-depth	evaluation	on, an	d ana	lytica	l skill	s in chose	n topics,		
	integrating transfer	able learning experie	ences.								
CO1											
	_	hat they can make m	ieaningfu	ıl con	tribut	ions,	maint	aın a com	mitment,		
	and manage their ti	me and priorities.									
CO2											
	Transform passion	ate students who de	monstrat	te lea	dershi	ip and	d purs	ue intere	sts beyond		
	their academics.										
CO3											
		te in various co-ci	urrıcular	activ	/ities	leadı	ng to	their m	ultifaceted		
604	personality develop	oment.									
CO4	Express their ideas	s, views, In-depth ev	zaluation	and	analv	sis cl	early	in the tor	oic of their		
	interest.	, views, in depth ev	uruuron	una	anary	515 C1	curry	in the top	or then		
CO5											
	Demonstrate and pr	ractices different act	ivities, b	y Inte	gratin	ıg leai	rning	experienc	es by		
	demonstrating trans	sferable skills.									
Unit-No.	Cox	ntent	Contac	.4	Loc		a Out	00220	BL		
Unit-No.	Col	itent	Hour		Lea	41 111111	g Oui	come	BL		
I	AdtU encourage	es a range of	10		dtI⊺ f	Oster	s holis	tic	4,5		
•	activities outside	ŭ	10				t throu		7,5		
		ended to meet				_		ivities			
		, These activities					nusic,				
		elop the social and						more.			
		promote a holistic		_	_			n club			
	development to					_		ops, and			
	_	d the 360 degree						ancing			
	learning methodo	ology the students		so	ocial s	skills	and le	earning			
	are engaged in	different activities		fı	om ir	ndustr	y exp	erts,			
	headed under di	fferent clubs viz.			_	-	em fo	r			
	_	otography, drama,			ationa						
	literary etc., T	the students are		C	ompe	titions	S.				

encouraged to participate in regular	
club activities, workshops,	
competitions as per their interest and	
hobbies, The student members of the	
club are trained represent AdtU in	
various inter University student and	
national level competitions,	
Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	
Practical Con	mponent

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10 and 12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10 and 12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10 and 12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10 and 12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10 and 12

Course code	Course Name	Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	PO1 1	PO1 2
		CO 1	2	2	2	1	2	2				2		2
221101102	EXTRA CURRICUL	CO 2	2	2	2	1	2	3				2		2
22UBEC2 11	AR ACTIVITIE	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – IV						
Course Title		Computer Org	ganizatio	on & A	Archi	tectu	re		
Course code	22BTCS221R	Total credits: 3	L	T	P	S	R	O/F	С
		Total hours: 42T	2	1	0	0	0	0	3
Dua magnisita	Ducanommina	Co voquigito					NI:I		
Pre-requisite	Programming For Problem	Co-requisite					Nil		
	Solving								
Programme		or of Technology i	n Compi	utor s	cionc	hree	Fngi	neering	
Semester		all/ IV semester of							
Course		ne organization							ems and
<b>Objectives</b>		computers.	una ure	intee	iuic	01 0	ompu	ici syst	oms and
(Minimum 3)		le basic componer	nts of co	mnıı	er sv	stem	s besi	des the o	computer
	arithmetic.	-		mpu	ici sy	Stelli	3 0031	ides the t	ompater
	3. Discuss		rganizat	ion.	me	mory	or	ganizatio	on and
		nt, and pipelining	_	•		3	01		
CO1	Understand the in	1 1		ents	of a	com	puter	system	with the
	instruction set arc		•					J	
CO2	Analyse the variou							ıter arithı	netic and
	discuss the various	•		•			•		
CO3	Analyse the contro	ol unit design app	roaches,	men	nory	desig	n tecl	hnologies	and I/O
	transfers.	0 11			·			C	
CO4	Demonstrate the co	oncepts of pipelini	ng, paral	llel pi	ocess	ing a	nd co	ncurrent	access to
	memory			_					
CO5	Summarize the co	oncepts of memo	ry orga	nizati	on w	ith r	nappi	ng funct	ions and
	replacement algorith	nms.							
Unit-No.	Con	tent	Contac	ct	Lea	arning	g Out	come	BL
			Hour	•					
I	Functional blocks	-	8						
	CPU, memory	, input-output		U	Inders	standi	ng t	he key	
	subsystems, contro							s of a	
	set architecture of				•			ng CPU,	
	instruction execu	•			nemor	•	_	ut/output	1,2, 3
		of instructions,			evices	-	and	their	
	addressing modes				nterrel		ships	and	
	•	struction sets of		О	perati	ons			
	some common CP								
II	Data represen	•	8		Inders			how	
	number represent				•		•	ent data	
	floating point	representations,			-	-		decimal,	
	character represer	_					•	ns. Learn	
	arithmetic – inte	-			onver			methods	2 4
	subtraction, ripple	•						mats and	3, 4
	look-ahead adder,	-			ompre			their	
	- shift-andadd,	_			_		III (	computer	
	carry save multip				perati		œ	and	
	C	non-restoring		P	rograi	ummill)	g.		
	techniques, floatin	g point arithmetic.							

	Introduction to x86 architecture			
III	CPU control unit design: hardwired and micro-programmed design approaches, Case study — design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization. Peripheral devices and their characteristics: Input-output subsystems, I/O device interface, I/O transfers — program controlled, interrupt driven and DMA,	10	Understand the architecture and function of the CPU control unit, including instruction decoding, control signal generation, and execution sequencing. Learn to design control units using both hardwired and microprogrammed approaches, and comprehend their role in	3, 4
	privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB		overall CPU performance.	
IV	Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.	8	Understand the concept and implementation of pipelining in CPU architecture to improve instruction throughput. Learn about various stages of pipeline execution, potential hazards (data, control, structural), and techniques for hazard mitigation. Gain insight into the impact of pipelining on overall system performance and efficiency.	4
V	Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.	8	Understand the structure and organization of computer memory, including hierarchical levels (cache, primary, secondary storage), memory addressing, and data access methods. Learn about memory management techniques, such as paging and segmentation, and comprehend their impact	4

	on system performance
	and resource allocation.

T1:"Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

### **REFERENCE BOOKS:**

R1: "Computer Organization and Embedded Systems", 6th Edition by CarlHamacher, McGraw Hill Higher Education.

R2: "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill.

R3: "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the interaction of the components of a computer system with the instruction set architecture of a CPU and addressing modes.	1, 2, 3, 10, 12
2	Analyse the various data representation techniques, perform computer arithmetic and discuss the various adders and multipliers.	1, 2, 3, 4, 5, 10, 12
3	Analyse the control unit design approaches, memory design technologies and I/O transfers.	1, 2, 3, 10, 12
4	Demonstrate the concepts of pipelining, parallel processing and concurrent access to memory.	1, 2, 3, 4, 10, 12
5	Summarize the concepts of memory organization with mapping functions and replacement algorithms.	1, 2, 3, 4, 5, 10, 12

Course code	Course Name	со	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	P O 9	PO1 0	P O 11	P O 12
		CO 1	2	3	1							1		3
22BTCS221	Computer Organizatio	CO 2	3	3	3	2	2					1		3
R	n & Architectur	CO 3	2	2	2							1		3
	e	CO 4	2	2	3	2						1		3
		CO 5	2	2	2	2	1					1		3

		SEMESTE	CR – IV											
<b>Course Title</b>		Оре	erating S	Syste	ms									
Course code	22BTCS222R	Total credits: 3	L	T	P	S	R	O/F	C					
		Total hours:	3	0	4	0	0	0	5					
		42T+60P												
Pre-requisite		Co-requisite												
Programme	Bachelor of Technology in Computer science and Engineering  Fall/ IV semester of the second year of the program													
Semester	Fall/ IV semester of the second year of the program													
Course	4. To learn the mechanisms of OS to handle processes and threads and their													
Objectives	communication and the mechanisms involved in memory management in													
(Minimum 3)	contemporary OS.													
	_	5. To gain knowledge on Mutual exclusion algorithms, deadlock detection												
		and agreement pi												
	6. To know	the components	and r	nana	geme	ent a	aspect	s of co	oncurrency					
	managem													
CO1		g system evolution	on, type	es, s	ervic	es, a	nd st	ructures	including					
	UNIX and WIND													
		oncepts, relationshi	•				e thre	ead adva	ntages, and					
	^ ^	duling objectives, al	_				•							
		chanisms and solu				•		-	s deadlock					
	conditions and use	prevention, avoidan	ce, detec	ction,	and r	ecov	ery tec	chniques.						
	1	management cond	•		_		•		_					
		nory principles, and												
CO5	1	are, device controlle		•	•				•					
	_	disk scheduling a	-	s, fil	e ma	nage	ment	concepts	, allocation					
Unit-No.		ory implementation tent	S. Contac	-4	Tas		~ 04		BL					
Unit-No.	Con	tent	Hour		Lea	(LIIII)	g Out	come	DL					
I	Introduction:		7											
1		erating Systems,	,	T	Jnder	ctand		the						
		perating systems,			undar			concepts						
		ing Systems, OS			nd		u olutio	_						
		Calls, Structure of			perat			systems,						
	an OS-Layere				liffere	_	OS	types,						
		erating Systems,			ervice		and	system						
	Concept of Virtua	•				-		tructural	2					
	Concept of Virtua	i iviaciiiic.			nodel			perating						
							ayered							
					nonol		-	1,						
								d grasp						
								benefits						
						•	i and achin							
II	Processes:		8		Jnder:			rocesses,						
11		ess Relationship,	O				•	s, states,						
		of a Process,					_	and the	2, 4					
		ansitions, Process						Block	2, 4					
	Control Block	(PCB), Context			PCB)		Learn	about						
	Control Diock	(1 CD), COMEA		(	( CD		_caiii	about						

	switching. Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads, Process Scheduling: Foundation and Scheduling objectives, Types of Schedulers, Scheduling criteria: CPU utilization, Throughput, Turnaround Time, Waiting Time, Response Time; Scheduling algorithms: Pre-emptive and Non pre-emptive, FCFS, SJF, RR; Multiprocessor scheduling.		threads, their states, benefits, and types, including multithreading. Grasp process scheduling foundations, objectives, types of schedulers, scheduling criteria, and algorithms like FCFS, SJF, RR, including preemptive and non-preemptive methods, and multiprocessor scheduling.	
III	Inter-process Communication: Critical Section, Race Conditions, Mutual Exclusion, Hardware Solution Deadlocks: Definition, Necessary and sufficient conditions for Deadlock, Deadlock Prevention, Deadlock Avoidance: Banker's algorithm, Deadlock detection and Recovery.	8	Understand inter-process communication, focusing on critical sections, race conditions, and mutual exclusion, including hardware solutions.  Learn about deadlocks, including their definition, necessary and sufficient conditions, prevention, avoidance using the Banker's algorithm, and methods for detection and recovery. Gain insight into ensuring robust and efficient process synchronization.	2, 4
IV	Memory Management: Basic concept, Logical and Physical address map, Memory allocation: Contiguous Memory allocation – Fixed and variable partition— Internal and External fragmentation and Compaction; Paging. Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging, Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).	8	Understand memory management concepts, including logical and physical address mapping, contiguous memory allocation with fixed and variable partitions, internal and external fragmentation, and compaction. Learn about paging, virtual memory basics, control structures, locality of reference, demand paging, and page replacement algorithms like Optimal, FIFO, SC,	2, 4, 5

			NRU, and LRU for	
			]	
			utilization and	
			management.	
${f V}$	I/O Hardware:	8	Gain understanding of	
	I/O devices, Device controllers,		I/O hardware, including	
	Direct memory access Principles of		devices, controllers, and	
	I/O Software: Goals of Interrupt		principles of direct	
	handlers, Device drivers, Device		memory access (DMA).	
	independent I/O software,		Explore I/O software	
	Secondary-Storage Structure		goals, including interrupt	
	File Management:		handlers, device drivers,	
	Concept of File, Access methods,		and device-independent	
	File types, File operation, Directory		I/O software. Learn file	
	structure, File System structure,			
	_			
	Allocation methods (contiguous,		access methods, types,	2, 4, 5
	linked, indexed), Free-space		operations, directory and	
	management.		file system structures,	
	Disk Management:		allocation methods, and	
	Disk structure, Disk scheduling,		free-space management.	
	Disk reliability, Disk formatting,		Understand disk	
	Boot-block, Bad blocks.		management	
			encompassing structure,	
			scheduling, reliability,	
			formatting, boot-block,	
			and handling bad blocks	
			for efficient storage and	
			retrieval operations.	
Practical	1.Write Shell Script for followings		Upon completion of these	
	a. To find the global complete path		shell scripting tasks,	
	for any file.		learners will gain	
	b.To broadcast a message to a		proficiency in file path	
	specified user or a group of users		retrieval, user message	
	logged on any terminal.		broadcasting, selective	
	c. To copy the file system from two		file copying based on	
	directories to a new directory in		timestamp, file	
	such a way that only the latest file		comparison and copying,	
	is copied in case there are		zero-sized file deletion,	
	common files in both the	20	identifying files with	1,2,3,4
	directories.		multiple links, listing	, , ,
	d.To compare identically named		executable files,	
	files in two different directories		displaying formatted	
	and if they are same, copy one of		date/time with a greeting,	
	them in a third directory		and sorting directories by	
	e.To delete zero sized files from a		file size in descending	
	given directory (and all its sub-		order.	
	directories).			
	f. To display the name of those files			
	(in the given directory) which are			
	having multiple links.			

g.To display the name of all executable files in the given directory.  h.Write a script to display the date, time and a welcome message (like Good Morning etc.). The time should be displayed with "a.m." or "p.m." and not in 24 hours notation.  i. Write a script to display the directory in the descending order			
of the size of each file  2. Implementation of FCFS (First Come First Serve) CPU Scheduling.  3. Implementation of SJF (Shortest Job First) CPU Scheduling.  4. Implementation of Round Robin (RR) CPU Scheduling.  5. Implementation of Priority CPU Scheduling Algorithm.	20	Upon implementing FCFS, SJF, Round Robin, and Priority CPU scheduling algorithms, learners will achieve proficiency in understanding and simulating these fundamental scheduling techniques, gaining insight into their respective advantages, limitations, and practical applications in optimizing CPU resource allocation and system performance.	2,3,4, 5
6. Implementation of FIFO Replacement Algorithm. 7. Implementation of Optimal Page Replacement Algorithm. 8. Implementation of LRU Page Replacement Algorithm by Stack method 9. Implement the producer- consumer problem using threads	20	Through implementing FIFO, Optimal, and LRU page replacement algorithms, as well as the producer-consumer problem using threads, learners will develop a deep understanding of memory management strategies, gaining practical experience in simulating and evaluating these techniques to optimize resource allocation, enhance system performance, and mitigate concurrency issues in computer systems.	2,3,4,5,6

T1: Operating System Concepts Essentials, 9th Edition by AviSilberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.

T2: Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

### **REFERENCE BOOKS:**

- R1: Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing.
- R2: Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- R3: Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- R4: Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze operating system evolution, types, services, and structures including UNIX and WINDOWS	1, 2,3, 4, 5, 10, 12
2	Analyze process concepts, relationships, and states, examine thread advantages, and appraise CPU scheduling objectives, algorithms, and criteria.	1, 2,3, 4, 5, 10, 12
3	Evaluate IPC mechanisms and solutions for classical problems; assess deadlock conditions and use prevention, avoidance, detection, and recovery techniques.	1, 2,3, 4, 5, 10, 12
4	Evaluate memory management concepts, including mapping, allocation strategies, paging, virtual memory principles, and analyse page fault/replacement algorithms.	1, 2,3, 4, 5, 10, 12
5	Analyze I/O hardware, device controllers, DMA principles, and I/O software, secondary-storage structures, disk scheduling algorithms, file management concepts, allocation methods, and directory implementations.	1, 2,3, 4, 5, 10, 12

Course	Course	С	PO1	PO										
code	Name	О	*	2	3	4	5	6	7	8	9	10	11	12
		CO 1	3	2	2	3	2					3		2
22BTCS2	Operati	CO 2	3	2	2	2	2					2		1
22R	ng Systems	CO 3	3	3	3	3	2					3		1
		CO 4	2	2	3	2	3					2		2
		CO 5	2	2	2	3	2					3		1

		SEMES	TER – IV	V									
Course Title		Design	& Anal	ysis of	Alg	gori	thn	ns					
Course code	22BTCS223R	Total	L	T	P	S	R	(	)/F		С		
		credits: 3	3	0	0	0	0		0		3		
		<b>Total hours:</b>											
		45T											
Pre-requisite	Data	Co-requisite	C / C++	Progra	mm	ing				•			
	Structures												
Programme	Back	nelor of Techno	logy Cor	nputer	scie	nce	an	d E	ngine	ering			
Semester		Fall/ IV semest	er of the	second	yea	r of	'th	e pr	ogran	n			
Course	1. Analyz	te the asymptot	tic perfor	rmance	of	algo	orit	hms	S.				
Objectives		strate a familia	-	-	_	-							
(Minimum 3)	3. Apply	important alg	gorithmi	c desig	gn	par	adi	igms	s and	l me	thods of		
	analysi												
CO1	Analyze algo			_			ons	, so	olve	matl	hematical		
	analyses, show												
CO2	Apply sorting a		gorithms,	matrix	mul	tipli	cat	ion,	using	brute	force and		
	divide-and-conc												
CO3	Apply greedy			_	grai	mmi	ing	to	optin	nize	problems,		
	showcasing exp												
CO4	Apply strategie	-	blems lil	ke the	N-Ç	)uee	en,	kna	psack	, and	traveling		
	salesperson prol												
CO5			_	-					•				
	Evaluate decision tree lower bounds, grasp P, NP, and NP-Complete complexity classes, showing understanding of lower bound theory's algorithmic implications												
Unit-No.	Con	itent	Contac	et L		ning	g O	utco			BL		
		ntent	Contac Hour	et L	earr				me		BL		
Unit-No.	Introduction:	<b>Characteristics</b>	Contac	Upo	earr	com	ıple	eting	this		BL		
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	Drogramming		algorithmic	
	Programming		· ·	
			strategies—Brute-	
			Force, Greedy, and	
			Dynamic	
			Programming—to	
			solve computational	
			problems efficiently	
			and optimally.	
III	Advanced Algorithmic	10	Upon completion,	
	Strategies: Branch and		learners will master	
	Bound and Backtracking		advanced algorithmic	
	methodologies for the design		strategies such as	
	of algorithms; Illustrations of		Branch and Bound,	
	these techniques for Problem-		Backtracking, and	
	Solving, Bin Packing, Knap		heuristics, applying	
	Sack TSP. Heuristics –		them to solve complex	
	characteristics and their		computational	3, 4,
			_	3,4,
	application domains.		problems like Bin	
			Packing, Knapsack, and	
			Traveling Salesman	
			Problem (TSP),	
			enhancing problem-	
			solving skills across	
			diverse application	
			domains.	
IV	Graph and Tree	10	Upon mastering graph	
IV	Graph and Tree Algorithms: Traversal	10	and tree algorithms	
IV	_	10		
IV	Algorithms: Traversal	10	and tree algorithms	
IV	Algorithms: Traversal algorithms: Depth First	10	and tree algorithms including DFS, BFS,	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth	10	and tree algorithms including DFS, BFS, shortest path, transitive	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST,	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and	
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting,	10	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and	3, 4
IV	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.	7	and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of Algorithms, Computability		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand the fundamental	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard,		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand the fundamental concepts of	3, 4
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard, Approximation algorithms,		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand the fundamental concepts of computability in	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard,		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand the fundamental concepts of computability in algorithms, distinguish	
	Algorithms: Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS); Shortest path algorithms, Transitive closure, Minimum Spanning Tree, Topological sorting, Network Flow Algorithm.  Tractable and Intractable Problems: Computability of Algorithms, Computability classes – P,NP, and NPhard, Approximation algorithms,		and tree algorithms including DFS, BFS, shortest path, transitive closure, MST, topological sorting, and network flow algorithms, learners will effectively analyze and solve problems using graph structures, enhancing their proficiency in algorithm design and application across diverse computational domains.  Upon completion, learners will understand the fundamental concepts of computability in	

NP-complete, NP-hard)
problems, comprehend
Cook's theorem,
identify standard NP-
complete problems, and
apply reduction
techniques to solve
complex computational
challenges effectively.

T1:Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson, Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.

T2: Fundamentals of Algorithms – E. Horowitz et al.

### **REFERENCE BOOKS:**

R1: Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.

R2: Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.

R3: Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

	CO PO Mapping											
SN	Course Outcome (CO)	Mapped Program Outcome										
1	Analyze algorithms, apply asymptotic notations, solve mathematical analyses, showing proficiency in problem-solving.	1, 2, 3, 4, 11, 12										
2	Apply sorting and searching algorithms, matrix multiplication, using brute force and divide-and-conquer strategies.	1, 2, 3, 4, 11, 12										
3	Apply greedy approaches and dynamic programming to optimize problems, showcasing expertise in algorithmic design.	1, 2, 3, 4, 9, 10, 11, 12										
4	Apply strategies to solve problems like the N-Queen, knapsack, and traveling salesperson problems.	1, 2, 3, 4, 9, 10, 11, 12										
5	Evaluate decision tree lower bounds, grasp P, NP, and NP-Complete complexity classes, showing understanding of lower bound theory's algorithmic implications.	1, 2, 3, 4, 5, 9, 10, 11, 12										

Course code	Course Name	со	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	Design & Analysis of Algorith	CO 1	2	2	2	2							3	2
22BTCS22		CO 2	2	2	2	2							2	2
3R		CO 3	2	2	3	3					1	1	2	2
	ms	CO 4	2	3	2	2					1	1	2	2
		CO 5	1	2	1	2	2				1	1	1	2

		SEME	STER –	IV						
<b>Course Title</b>		]	Discrete N	Mather	natio	cs				
Course code	22BTCS224R	<b>Total credits:</b>	L	T	P	S	R	O/F	С	
		4	3	1	0	0	0	0	4	
		Total hours:								
		52T								
Pre-requisite	Programmin	Co-requisite				ľ	Vil			
	g For									
	Problem									
Ducamana	Solving	halam of Tashmala	ar in Co		aa!		and E			
Programme Semester	Bachelor of Technology in Computer science and Engineering Fall/ IV semester of the second year of the program									
Course	1. To prov	vide students wit			•					
Objectives	_	s will learn ab							cate and	
(Minimum 3)	function		out topi	ics su	CII a	10	gic ai	id proors,	sets and	
(Minimum 3)			n probal	hility	recu	ırsior	n grai	nh theory	matrices	
		3. Students will also learn probability, recursion, graph theory, matrices, Boolean algebra and other important discrete math concepts.								
CO1		concepts of rela								
CO2	Enable to solve logical problems using truth table.									
CO3	Understand the concept of algebraic structures and it's relevant theorems.									
CO4	Understand the basic counting techniques									
CO5	Understand the concepts of graphs and their basic properties.									
IImi4 No	Car	404	Comto	a4	т.		O	400	BL	
Unit-No.	Co.	ntent	Conta	Ci	L	earm	ng Ou	tcome	BL	
Í.			Ноп	r I						
T	Sets relations	and functions:	Hour 12	r						
I	Sets, relations of Basic operations	=	Hour 12		pon	com	pletion	n. learners		
I	Basic operati	ions on sets,	12	U	•		•	n, learners		
I	Basic operation Cartesian pro	ions on sets, oducts, disjoint	12	Uj w	ill	un	derstar	nd and		
I	Basic operation of Cartesian production (sum),	ions on sets, oducts, disjoint and power sets.	12	Uj wi m	ill anipı	un ulate	derstar sets	nd and through		
I	Basic operation of the control of th	ions on sets, oducts, disjoint and power sets. es of relations,	12	Uj w: m ba	ill anipı ısic	un ulate op	derstar	nd and through ns and		
I	Basic operate Cartesian pro- union (sum), Different type their compositi	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses.	12	Uj wi m ba	ill anipi isic artesi	und ulate op ian	derstar sets peratio	nd and through ns and products,		
I	Basic operation of their composition of their compo	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions,	12	U; w; m ba Ca	ill anipu sic artesi ompre	und ulate op ian ehend	derstar sets peratio	nd and through ns and products, us types of		
I	Basic operation of the composition of the compositi	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses.	12	U w m ba Ca cc re	ill anipu asic artesi ompro	und ulate op ian ehend ns	derstar sets peratio	nd and through ns and products, us types of including		
I	Basic operation of their composition composition composition composition of their complete page 18 operation of the composition of the c	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. artial ordering,	12	U w m ba Ca co re	anipu anipu asic artesi ompro lation	undulate option ehend ns sition	derstar sets peratio I vario	through ns and products, us types of including inverses,		
I	Basic operation of the composition of the compositi	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. artial ordering, ce, complete,	12	W m ba Ca	anipu anipu artesi ompro lation ompo	undulate option ehend ns sition ana	sets setsoceration various and lyze	through ns and products, us types of including inverses, different	1,2, 3	
I	Basic operation cartesian production (sum), Different type their composition composition complete particular chain, latticular distributive,	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. artial ordering, ce, complete, modular and	12	U w m ba Ca co re co an fu	anipo asic artesi ompro lation ompo ad netic	undate optian ehend ns sition analons	sets peration I varion as and Iyze with	through ns and products, us types of including l inverses, different th their	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	W m ba Ca co re co an fu	anipuanipuanipuanipuanipuanipuanipuanipu	undulate optian ehendens sition analons sition	derstar sets peratio l vario as and lyze with	through ns and products, us types of including l inverses, different th their l inverses.	1,2, 3	
I	Basic operation cartesian production (sum), Different type their composition composition complete particular chain, latticular distributive,	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m ba Ca co re co an fu co Ti	anipuasic artesiomprolation atdusticomponeticomponeticomponety	und ulate Optian ehend ns sition anal ons sition will	sets peratio  I vario  Is and lyze  with as and also	through ns and products, us types of including l inverses, different th their l inverses. grasp the	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m ba Ca co re co an fu co TI co	anipo anipo artesi ompro lation ompo netico ney oncep	undate optian ehend ns sition ana ons sition will ots of	derstar sets perational l varional as and alyze with as and also comp	through ns and products, us types of including l inverses, different th their l inverses. grasp the lete partial	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m ba Ca co re co an fu co or	anipu anipu asic ompre lation ompo ad netic ompo ney oncep	undate option chence ana ons sition ana ons sition will ots of	derstar sets perational l varional als and also comp lattice	through ns and products, us types of including l inverses, different h their l inverses. grasp the lete partial s (chain,	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m ba Ca co re co an fu co or co	anipu anipu asic ompro lation ompo ad ompo oney oncep derir	und ulate opian ehend ns sition anal ons sition will ots of	derstar sets peratio l vario as and alyze with as and also comp lattice	through ns and products, us types of including l inverses, different h their l inverses. grasp the lete partial s (chain, listributive,	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m ba ca ca ca re ca an fu ca ca or ca m	anipu anipu asic ompre lation ompo ad netic ompo ney oncep	undate option chendens sition analons sition will ots of ng, ete, ar,	derstar sets peratio l vario as and alyze with as and also comp lattice	through ns and products, us types of including l inverses, different h their l inverses. grasp the lete partial s (chain, listributive, olemented),	1,2, 3	
I	Basic operate Cartesian pro- union (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean	12	U w m baa Ca co re co an fu co or co m Bo	anipu anipu asic ompro lation ompo ad onctic ompo ney oncep derir omple odula	undate option chendens sition analons sition will ots of ng, ete, ar,	derstar sets perational l varional also also complattice d compand	through ns and products, us types of including l inverses, different h their l inverses. grasp the lete partial s (chain, listributive, olemented),	1,2, 3	
I	Basic operate Cartesian prounion (sum), Different type their compositi Different type their compositi Complete pachain, lattic distributive, complemented and pseudo Boo	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean olean lattices.	12	U w m ba Cc cc re cc an fu cc or cc m Bo Bo	anipu anipu asic artesi ompo dad netic ompo ney oncep derir omple oduli	und ulate optian ehend ns sition ana ons sition will ots of ng, ete, ar, un latt	derstar sets perational l varional also also complattice docomp and ices.	through ns and products, us types of including l inverses, different h their l inverses. grasp the lete partial s (chain, listributive, olemented),	1,2, 3	
	Basic operate Cartesian prounion (sum), Different type their compositi Different type their compositi Complete parchain, lattic distributive, complemented and pseudo Boo	ions on sets, oducts, disjoint and power sets. es of relations, ons and inverses. es of functions, ons and inverses. ertial ordering, ce, complete, modular and lattices. Boolean olean lattices.	12	U with many bases of the control of	anipuralisic sartesic omproduction ompound once on once of once on once of once once once once once once once once	undulate Option	derstar sets perational l varional also also complattice d compand ices.	through ns and products, us types of including l inverses, different th their l inverses. grasp the lete partial s (chain, listributive, plemented), pseudo-	1,2, 3	

	soundness, completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.		logic, proficiency in proof systems, evaluation of satisfiability and validity, understanding of soundness and completeness, application of the deduction theorem, and introduction to first-order logic and its theory.	
III	Algebraic Structures:  Algebraic structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations ring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).	12	Upon completion, learners will understand algebraic structures like semigroups, monoids, groups, rings, integral domains, fields, and Boolean algebra, with applications in coding theory and quotient structures.	2, 3, 4
IV	Introduction to Counting:  Basic counting techniques — inclusion and exclusion, pigeon- hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.	10	Upon completion, learners will proficiently apply basic counting techniques, including inclusion-exclusion, pigeonhole principle, permutation, combination, summations, and understand introductory concepts of recurrence relations and generating functions.	1, 2, 3
V	Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.	8	Upon completion, learners will understand fundamental graph theory concepts such as degrees, paths, cycles, subgraphs, isomorphism, Eulerian and Hamiltonian paths, and trees.	2, 3, 4

T1:C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.

T2:K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.

## **REFERENCE BOOKS:**

R1: R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the concepts of relation, function and partially ordered set	1, 2, 3, 4, 12					
2	Enable to solve logical problems using truth table.	1, 2, 3, 4, 12					
3	Understand the concept of algebraic structures and it's relevant theorems.	1, 2, 3, 4, 12					
4	Understand the basic counting techniques.	1, 2, 3, 4, 12					
5	Understand the concepts of graphs and their basic properties.	1, 2, 3, 4, 12					

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	PO1 2
	CO 1	3	3	2	2								2	
22BTCS22	Discrete	CO 2	3	2	3	2								2
4R	Mathemati cs	CO 3	3	3	2	2								2
		CO 4	3	2	3	2								2
		CO 5	3	3	2	2								2

SEMESTER – IV										
<b>Course Title</b>		Enviro	onmenta	l Scie	ence					
Course code	22BTCS226R	Total credits: 3	L	T	P	S	R	O/F	C	
		Total hours: 52T	2	0	0	0	0	0	2	
Pre-requisite		Co-requisite					Nil			
Programme		or of Technology ir								
Semester		all/ IV semester of					rogra	m		
Course		ding Ecological Sy								
Objectives		Environmental Is								
(Minimum 3)		Environmental St						Practices.		
CO1	Understand the rela	tionships between n	atural an	d mar	n-mad	e sys	tems.			
CO2	administrative, and	thinking for shap legal) for environ ty, and sustainable d	mental p	orotec						
CO3	Understand the con	sequences of human	n actions	on th	ne wel	of 1	ife, gl	obal econ	omy, and	
	quality of human lif									
CO4		Environment Pollution				nent	issues	, Impact o	of Human	
	Population and mod	lern civilization on t	he Envir	onme	nt .					
CO5	Analyse various as on the environment	Analyse various aspects of human population, and the impact of the population growth on the environment.								
Unit-No.	Con	Contac Hour	t	Learning Outcome				BL		
I	environment, hydrosphere, I biosphere, s composition, Life systems, pr organizations, Me types of plants and Producers, co decomposers.	pe, components of atmosphere, ithosphere and tructure and o and eukaryotic tabolic principles; I animals.	12	w fu th en co h, bi	vill undam ne ncomponydrosp iosphe orokar ukaryo rincip nimal cologi	und passir nents phere ere), yotic otic), class cal ers, c	erstan con envi ng its (atm , lith life r plan sificati role	cepts of ronment, s scope, nosphere, systems and netabolic at and tons, and	1,2, 3	
II	Ecology: Termino approach, ecosyste ecosystems; struct mineral cycling, entrophic chains. De evolution.	em, types of ure and function, nergy flow and	10	w co te ty m fl	rill oncep ermino opes, nineral	grasp ts blogy struc l cy rophi	i, ecture, cling, ic cha	learners cological ncluding cosystem function, energy ins, and cosystem	2, 3, 4	

	1		davalamment	
			development and	
			evolution, enabling them	
			to analyze and interpret	
			ecological systems and	
			their dynamics effectively.	
III	Environmental Pollution:	12	Upon completion, learners	
	Sources, causes, assessment, effect,		will comprehend the	
	prevention and control of water		sources, causes,	
	pollution, air pollution noise and		assessment, effects,	
	land pollution. Strategies of		prevention, and control of	
	management, concept of		water, air, noise, and land	
	sustainability. Energy, e n v i r o n		pollution. They will	
	m e n t, and their relationship with		understand management	2, 3, 4
	human activities. Water Resources		strategies, sustainability	
	and utilization, forest resources.		concepts, and the	
	,		interrelationship between	
			energy, environment, and	
			human activities,	
			including the utilization of	
			water and forest resources.	
IV	Global Environmental Problems:	10	Upon completion, learners	
1 4	Human health, settlements,	10	will understand global	
			environmental issues	
	management of rivers, lakes, forests,			
	wild life and catchments. Role of		including human health	
	society, NGO and Govt. agencies.		impacts, sustainable	
	Concept of urbanization and green		settlement management,	
	cities Global Warming, greenhouse		conservation of rivers,	
	causes and effects, carbon		lakes, forests, and wildlife.	
	Sequestration.		They will grasp the roles	12, 3,
			of society, NGOs, and	4
			government agencies in	-
			environmental	
			stewardship, and	
			comprehend concepts	
			related to urbanization,	
			green cities, global	
			warming, greenhouse gas	
			causes and effects, and	
			carbon sequestration.	
V	International agreements and	8	Upon completion, learners	
	protocols, National forest policy		will grasp international	
	and Environmental laws and acts.		agreements and protocols	
	EIA.		concerning environmental	
			conservation, understand	
			national forest policies,	2, 3, 4
			environmental laws, and	
			acts governing sustainable	
			practices. They will also	
			comprehend	
			Environmental Impact	
			Environmental impact	170

	Assess	sment	(EIA)	
	proces	sses, enabling	g them	
	to con	tribute effecti	ively to	
	enviro	nmental		
	manag	gement and	policy	
	imple	mentation.		

T11. Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the relationships between natural and man-made systems.	1,2,3,4,7,12
2	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development	1,2,3,4,7,12
3	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	2,7,12
4	Understand about Environment Pollution, Global Environment issues, Impact of Human Population and modern civilization on the Environment .	2,3,7
5	Analyse various aspects of human population, and the impact of the population growth on the environment.	1,2,3,4,7,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P O 1 1	PO1 2
		CO 1	1	2	2	2			3					3
22BTCS22	F	CO 2	2	2	2	2			3					3
6R	Environmental Science	CO 3		3					3					3
	•	CO 4		1	2				3					
		CO 5	1	2	2	2			3					3

	SEMESTER – IV								
<b>Course Title</b>		Tec	chno Prof	fession	al Ski	ills II	[		
Course code	22BTCS225R	<b>Total credits:</b>	L	T	P	S	R	O/F	C
		1	0	0	2	0	0	0	1
		<b>Total hours:</b>							
		30P							
Pre-requisite		Co-requisite							
Programme	Bac	helor of Techno							
Semester	1 5 1	Fall/ IV semes							
Course		p advanced tec		ills an	d kno	owled	lge rel	evant to the	e specific
Objectives 2	-	ional field or in	•	1. C	- CC -	_4:		4::4:	L -1: 4 -
(Minimum 3)		e communicat							-
	context	ues, and stal	kenoiders	5 1II	botn	tecr	micai	and non	-technicai
		s. students for suc	ecassful a	ntry int	o and	Ladva	ncama	nt within th	air chosan
	_	on through prac		-					
	_	-making.	иси скр	criciicc	, pro	Jiem	301 1111 2	s domines, t	ina cuncar
CO1		evelop highly skilled and knowledgeable management professional who can							
		eal with various areas and aspects of businesses.							
CO2	Develop analyti		_				ofessio	nal who ca	n be more
	efficient and inn	fficient and innovative in practice.							
CO3	Gather knowled	ge about various	developr	nent co	ncept	s and	the the	eories of de	velopment.
CO4	Encourage the s						•		
CO5	Effectively com	municate scienti	fic and tec	chnical	know	ledge	in a p	rofessional	manner.
Unit-No.	Co	ntent	Cont	act	L	earni	ng Ou	tcome	BL
			Hou	ır			Ü		
I	C Programmi	ng:	6	1	Jpon	com	pletion	, learners	
	Programming	constructs	3,	7	will u	nders	tand fu	ındamental	
	Control States	nents, Looping	5,	(	C pro	gram	ming	constructs,	
	Arrays, Strings					-		statements,	
					_	-		ms, arrays,	2
					and	_		nipulation,	_
						_		to write,	
								ze basic to	
							e-level		
TT	Administration	· · · · · · · · · · · · · · · · · · ·					ficient		
II	Advanced C P	_	6		-	com	_	i, learners	
	and Unions, Fi	nters, Structure	S		will orogra			vanced C	
	and Unions, Fi	ic Handing.		_	nclud		the	concepts, use of	
					unctio	_	ше	pointers,	3, 4
							ມກ່ວກຄ	, and file	
					nandli			techniques,	
						-		o develop	
				,	muUII	₅ (1	10111 U	o develop	

III	Analog Electronic Circuits:	6	more complex and efficient C programs with enhanced functionality and data management capabilities. Upon completion, learners will understand the principles and design of analog electronic circuits, including amplifiers, oscillators, filters, and their applications, enabling them to analyze and build analog systems effectively.	2
IV	Digital electronic Circuits	6	Upon completion, learners will understand the design and operation of digital electronic circuits, including logic gates, flip-flops, counters, and memory devices, enabling them to analyze, design, and implement digital systems effectively.	2
V	Data Structure and Algorithms	6	Understand and implement data structures and algorithms to solve computational problems efficiently and optimize program performance.	2

T1:Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

T2:Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,9,10,12						
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,9,10,12						

3	Gather knowledge about various development concepts and	1,2,3,4,5,9,10,12
	the theories of development.	
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,9,10,12
5	Effectively communicate scientific and technical knowledge in	1,2,3,4,5,9,10,12
	a professional manner.	

Course code	Course Name	C O	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	Techno Professio	CO 1	2	2	3	2	2				3	2	3	3
22BTCS22		CO 2	3	2	3	2	2				2	2	3	3
5R		CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

		SEMESTER	R – IV							
<b>Course Title</b>	ENGL	ISH LANGUAGE F	PROFIC	CIEN	CY F	OR E	NGI	NEERS		
Course code	22UBPD223R	<b>Total credits: 2</b>	L	T	P	S	R	O/F	C	
		Total hours: 36P	0	0	4	0	0	0	2	
Pre-requisite	English for	Co-requisite					Nil	l .		
	Employability									
	for Engineers									
Programme	Bache	<b>Bachelor of Technology Computer science and Engineering</b>								
Semester	F	all/ IV semester of t	he seco	nd ye	ar of	the p	rogra	m		
Course		7. To enhance the writing skills in different areas including Paragraph							aragraph	
Objectives		d letter writing.								
(Minimum 3)		and and enhance the			-					
		rize students with				tual	vocab	oulary an	d Use of	
	-	rbs and idioms in a								
CO1		ective written con	nmunic	cation	skil	lls in	n Eng	glish, en	nploying	
	proper grammar a		_		_					
CO2		texts, extracting re	elevant	infor	matic	on, ar	nd sur	nmarizin	g it with	
G02	clarity and cohere			•	1				1 1.	
CO3	11 0	language proficie	•				nunıc	ation, 1	ncluding	
COA		discussions in engi		-				-tti	ال ما ما ما ما	
CO4	-	hesize complex tec		infor	matic	on, ae	emons	strating a	avancea	
CO5	_	d expression in En	_	d de	\allma	nto	cuch	oc ron	orta and	
COS		ecise language and						as rep	orts and	
Unit-No.		tent	Contac				g Out	come	BL	
			Hour			· ,	5 0 000			
I	Writing Skills		7		Jpon c	compl	etion,	learners		
	i. Paragraph Wri	ting &		W	ill en	hance	e their	r writing		
	Narratives	8		sl	kills	throu	gh p	aragraph		
	ii. Letter Writing	g		W	riting	, nai	rative	s, letter		
	iii. Technical Wr	iting		W	riting	, a	nd 1	technical		
				W	riting	. Th	ey w	vill also	1,2, 3	
	Pipe and cistern i.l	Introduction of		u	nderst	and	the b	asics of		
	pipes and			p	ipes	and	cister	ns, and		
	cistern iii.Solving	different types			_	-		ency in		
	of questions				_			related		
				p:	robler	ns eff	ective	1v		
II	Self- Management	Skills	7	U	Jpon c	compl	etion,	learners		
II	Self- Management  i. SWOT Analys		7	U	Jpon c	compl dev	etion, elop	learners self-		
II		is	7	W m	Jpon c /ill nanage	compl dev ement	etion, elop skills	learners self- sthrough		
П	i. SWOT Analys	is	7	W m S	Jpon c rill nanage WOT	dev devement ar	etion, velop skills nalysis	learners self- sthrough s, goal		
П	<ul><li>i. SWOT Analys</li><li>ii. Goal Setting a</li></ul>	is	7	W m S	Jpon ovill nanage WOT etting,	compl dev ement ar	etion, velop skills nalysis	learners self- sthrough s, goal personal	123	
П	<ul><li>i. SWOT Analys</li><li>ii. Goal Setting a</li></ul>	is	7	W m S so	Jpon or ill nanage WOT etting,	develomple develoment and	etion, velop skills nalysis nd actices	learners self- s through s, goal personal s. They	1,2, 3	
П	<ul><li>i. SWOT Analys</li><li>ii. Goal Setting a Hygiene</li></ul>	is nd Personal	7	W m S See h, w	Jpon controlly of the c	development develo	etion, velop skills nalysis nd actices	learners self- sthrough s, goal personal s. They tand the	1,2, 3	
П	<ul><li>i. SWOT Analys</li><li>ii. Goal Setting at Hygiene</li><li>Mixture</li></ul>	is nd Personal ck	7	U w m S see h, w b.	Jpon cill nanage WOT etting, ygiend ill alasics	development  are profession u  of	etion, velop s skills nalysis nd actices nderst	learners self- sethrough sethrough personal sethrough tand the mixtures,	1,2,3	
П	<ul><li>i. SWOT Analys</li><li>ii. Goal Setting a Hygiene</li><li>Mixture allegation and Clo</li></ul>	is nd Personal ck basics	7	W m S S G h w b al	Jpon cill nanage WOT etting, ygiene cill alasics	development develo	etion, yelop s skills nalysis nd actices nderst f r and	learners self- sthrough s, goal personal s. They tand the	1,2, 3	

			solving related problems effectively.	
III	Vocabulary Development i.Understanding different aspects of a word (such as the use of say, tell, speak). ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus  Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement	7	Develop vocabulary through understanding word usage, learning strategies, contextual learning, phrasal verbs, idioms, and effective dictionary/thesaurus use. Analyze statements and actions.	1,2, 3
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session  Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle Matrix	11	Upon completion, learners will master interview skills for various formats, answering strategies for common questions, and dress code ethics. They will also enhance problem-solving abilities through mock interviews and practice with linear and circular arrangement puzzles and matrix-based puzzles.	1,2, 3
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt)	4	Upon completion, learners will enhance grammar skills through word-stress and syllable practice, addressing common errors. They will also master concepts of profit, loss, and discount, including basic principles and problem-solving	1,2, 3

Profit loss and discount	techniques related to these
i.Introduction to basics	financial calculations.
ii. Introduction to discount	
iii. Probems related on the topic	

T1: Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.

T2: • McDowell, Gayle Laakmann.2008.Cracking the Coding Interview (Indian Edition)

### **REFERENCE BOOKS:**

R1: Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction Harper Perennial R2: Taylor J. and Wright, J., IELTS Advantage Reading Skills: A step-by-step guide to a high IELTS reading score, Delta Publishing by Klett

R3: Murphy, Raymond,.(2012) English Grammar in Use Book with Answers: A Self- Study and Practice Book for Intermediate Learners of English, Cambridge University Press

R4: Job Interview Skills , Paige Labert, Publisher: DiDio Calderone Giuseppina

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate effective written communication skills in	2,3,7,8,10,12
	English, employing proper grammar and vocabulary.	
2	Analyze technical texts, extracting relevant information,	1,2,3,4,10,12
	and summarizing it with clarity and coherence.	
3	Apply English language proficiency in oral	10,12
	communication, including presentations and discussions	
	in engineering contexts.	
4	Evaluate and synthesize complex technical information,	1,2,3,4,10,12
	demonstrating advanced comprehension and expression	
	in English.	
5	Construct and critique engineering-related documents,	1,2,3,4,10,12
	such as reports and manuals, using precise language and	
	appropriate conventions.	

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	ENGLISH	CO 1		1	1				1	2		3		1
22UBPD22	LANGUAG E	CO 2	2	2	2	2						2		2
3R	PROFICIEN CY FOR	CO 3										3		1
	ENGINEER S	CO 4	2	2	2	1						2		2
		CO 5	3	2	2	2						3		3

~ ====	SEMESTE							
<b>Course Title</b>	MOOCS III: Web Application Develop				ngo DB			
Course code	22MOCS221R   Total credits: 1	L	T P	S R	O/F	C		
	Total hours: 15P	0	0 0	0 0	0	1		
Pre-requisite	Nil Co-requisite			Nil				
Programme	5. 1							
Semester	Fall/ IV semester of the second year of the program							
Course	1. Discuss the organization	and arch	itecture o	of comp	uter syste	ms and		
Objectives	electronic computers.	<u>*</u>						
(Minimum 3)	2. Analyze the basic components of computer systems besides the computer							
		arithmetic.						
		rganizatio	on, men	nory o	rganizatio	n and		
	management, and pipelining							
CO1	Grasp the core principles of web de	velopmen	ıt.					
CO2	Become proficient in writing clean, eff							
CO3	Leverage JavaScript libraries and frame					amic and		
	user-friendly web interfaces with intera		ents and a	nimations	•			
CO4	Implement client-server communication							
CO5	Grasp the concepts of NoSQL databa	ises and e	xplore Mo	ongoDB f	or data sto	rage and		
	retrieval.	1						
Unit-No.	Content	Contact	Lea	rning Ou	tcome	BL		
		Hour						
I	Introduction to Web Development	3	•	ompletion				
	Fundamentals			understan	id web			
	The Web Development Landscape:		develop		. 1 1.			
	Understanding the building blocks				including			
	of the web, including HTTP requests		Client_se	erver arc	chitecture,			
	1 1			GGG T	~ .			
	and responses, client-server		HTML,		avaScript,			
	architecture, and the role of HTML,		HTML, and t	heir int	eractions.			
	architecture, and the role of HTML, CSS, and JavaScript.		HTML, and t They v	heir int vill gain	eractions.			
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side		HTML, and t They v using l	heir int will gain browser	eractions. skills in developer			
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between		HTML, and to the triangle of triangle	heir int will gain browser diffe	eractions. skills in developer erentiating			
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end		HTML, and to the tools, client-si	their int will gain browser of diffe ide and so	eractions. skills in developer crentiating erver-side			
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript		HTML, and to the triangle tools, client-sistering to the triangle tools, client-sistering tools.	their int will gain browser of diffe ide and so g, and	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides.		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer crentiating erver-side	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools:		HTML, and to the triangle tools, client-sistering to the triangle tools, client-sistering tools.	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements,		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests.		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher:		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and structure, along with fundamental		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		
	architecture, and the role of HTML, CSS, and JavaScript. Client-Side vs. Server-Side Scripting: Differentiating between front-end and back-end functionalities and how JavaScript interacts with both sides. Browser Developer Tools: Introduction to browser developer tools for inspecting elements, debugging code, and analyzing network requests. HTML and CSS Refresher: Reviewing basic HTML syntax and		HTML, and to the tools, client-si scripting core Jav	their intwill gain browser of different series of the control of t	eractions. skills in developer rentiating erver-side mastering	3		

	the core syntax of JavaScript,			
	including variables, data types,			
	-			
	operators, control flow statements, and functions.			
***		2	** 1 1	
II	Mastering JavaScript Programming	3	Upon completion, learners	
	DOM Manipulation: Understanding		will master JavaScript	
	the Document Object Model (DOM)		programming, including	
	and using JavaScript to manipulate		DOM manipulation, event	
	elements, attributes, and styles.		handling, reusable	
	Event Handling: Learning to		functions, object-oriented	
	respond to user interactions like		programming, and	
	clicks, scrolls, and form submissions		asynchronous techniques	
	using event listeners.		(callbacks, promises,	
	Working with Functions and		async/await). They will	
	Objects: Creating reusable		also be introduced to	
	functions, understanding object-		popular JavaScript	
	oriented programming concepts, and		libraries and frameworks	
	working with built-in JavaScript		like jQuery and React for	3
	objects.		advanced web	
	Asynchronous Programming:		development.	
	Exploring asynchronous		00 / 01 sp. 1110 1101	
	programming techniques like			
	callbacks, promises, and async/await			
	to handle asynchronous operations			
	effectively.			
	•			
	1			
	Frameworks: Introducing popular			
	JavaScript libraries like jQuery or			
	React for simplifying common tasks			
	and building more complex web			
	interfaces.			
III	Building Interactive Web	3	Upon completion, learners	
	Interfaces		will create engaging web	
	Internation Florents and House		interfaces using interactive	
	Interactive Elements and User		elements, implement form	
	Experience: Focusing on creating		validation and error	
	engaging user experiences with		handling, explore web	
	interactive elements like forms,		APIs for external data	
	animations, and dynamic content.		access, understand single-	
	Form Validation and Error		page applications (SPAs)	2
	Handling: Implementing JavaScript-		with frameworks like	3
	based form validation to ensure user		React or Angular, and	
			learn web application	
	input accuracy and handling		deployment strategies.	
	potential errors gracefully.		1 7	
	Introduction to Web APIs:			
	Exploring web APIs for accessing			
	data and functionalities from			
	external sources like weather APIs			
	CALCINAL SOURCES LIKE WEALIEL AFTS			

	or social media APIs.  Building Single-Page Applications (SPAs): Understanding the concept of SPAs and learning how JavaScript frameworks like React or Angular can be used to build them.  Deployment Strategies: Learning how to deploy your web applications to a web server for			
IV	Server-Side Development with Node.js  Introduction to Node.js: Understanding Node.js as a server-side JavaScript runtime environment and its role in web development.  Building a Simple Web Server: Creating a basic web server using Node.js to handle HTTP requests and respond with HTML content.  RESTful APIs: Learning the principles of RESTful APIs for designing communication protocols between the front-end and back-end of web applications.  Routing and Handlers: Implementing routing mechanisms in Node.js to handle different URL paths and associated functionalities.  Databases and Data Persistence: Understanding the need for data persistence in web applications and how Node.js can interact with databases.	3	Upon completion, learners will understand Node.js as a server-side runtime, create simple web servers, design RESTful APIs for front-end and back-end communication, implement routing mechanisms, and interact with databases for data persistence in web applications.	3
V	Data Management with MongoDB  Introduction to NoSQL Databases: Exploring the concepts of NoSQL databases and their advantages compared to traditional relational databases.  MongoDB Fundamentals: Learning about MongoDB as a popular	3	Upon completion, learners will understand NoSQL databases, focusing on MongoDB's document-based structure. They will perform CRUD operations, design efficient data models, and utilize advanced	3

NoSQL document database and its core data structures (documents and collections).  CRUD Operations: Performing Create, Read, Update, Delete (CRUD) operations on MongoDB data using its query language and drivers for Node.js.  Data Modeling for MongoDB: Learning how to design efficient data models for your web applications using MongoDB's document structure.  Advanced Features: Exploring advanced functionalities of	MongoDB features like complex queries, sorting, and data aggregation for robust data management in web applications	
1 0		

T1:Haverbeke, Marijn. Eloquent javascript: A modern introduction to programming. No Starch Press, 2018

T2: Chodorow, C. "Introduction to mongodb." In Free and Open Source Software Developers European Meeting (FOSDEM), vol. 18, pp. 80-83. 2010.

## **REFERENCE BOOKS:**

R1: 1. Robson, Elisabeth, and Eric Freeman. Head First Html With CSS & XHTML. " O'Reilly Media, Inc.", 2005.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Grasp the core principles of web development.	1,2,3,4,5,10,12						
2	Become proficient in writing clean, efficient, and maintainable JavaScript code.	1,2,3,4,5,10,12						
3	Leverage JavaScript libraries and frameworks like jQuery or React to create dynamic and user-friendly web interfaces with interactive elements and animations.	1,2,3,4,5,10,12						
4	Implement client-server communication.	1,2,3,4,5,10,12						
5	Grasp the concepts of NoSQL databases and explore	1,2,3,4,5,10,12						

MongoDB for data storage and retrieval.

Course	Course	СО	PO1	РО	PO1	PO1	PO1							
code	Name		*	2	3	4	5	6	7	8	9	0	1	2
22MOCS22 1R	MOOCS III: Web	CO 1	2	2	2	2	3					2		2
	Applicatio n	CO 2	2	3	3	2	3					2		2
	Developme nt with	CO 3	2	2	2	2	3					2		2
	Java Script and Mongo	CO 4	2	2	2	3	3					2		2
	DB	CO 5	3	3	3	3	3					2		2

		SEMESTE	R – IV									
<b>Course Title</b>	CO CURRICULAR ACTIVITIES											
Course code	22UBCC221	Total credits: 1	L	T	P	S	R	O/F	С			
		Total hours: 30P	0	0	0	4	0	0	1			
Pre-requisite	Nil	Co-requisite				]	Nil					
Programme	·	elor of Technology	Comput	er sci	ence a			eering				
Semester		all/ IV semester of										
Course		ent classroom educ							nces and			
Objectives	hands-on activities that reinforce and expand upon academic concepts.											
(Minimum 3)	2. Develop essential skills such as problem-solving, critical thinking,											
	communication, and collaboration through structured, curriculum-aligned											
	activities.											
	3. Encourage	students to exp	lore the	eir ir	iterest	s an	d tal	lents, bu	ild self-			
	confidence	e, and cultivate a	well-ro	ounde	ed cha	aract	er by	particip	oating in			
		-curricular prograi										
CO1	Demonstrate the					_			sroom to			
	real-world situation						-					
CO2	Exhibit improved p	-		_			ation	, and coll	aboration			
G02	skills, essential for b											
CO3	Show increased so				and a	wel	l-rour	nded cha	racter by			
CO4	exploring and devel				<u> </u>	•		<u> </u>	11 1114			
CO4	Engage in community service and social initiatives, fostering a sense of responsibility,											
CO5	empathy, and active citizenship.											
CO5	Demonstrate strong teamwork and leadership abilities, learned through participation in											
#T */ %T	group activities and leadership roles within co-curricular programs.  Content Contact Learning Outcome BL											
I Init-No					Lea	rning	Out	come	RI.			
Unit-No.	Con		Contac	et	Lea	rning	g Out	come	BL			
Unit-No.	Con	tent		et	Lea			come activities	BL			
	Con	tent es a range of	Contac Hour	et C	lo-curr	ricula	r i	activities	BL			
	AdtU encourage activities outsid	tent a range of	Contac Hour	C e	o-curr	ricular e stud	r ;		BL			
	AdtU encourage activities outsid curriculum inter	tent  es a range of the the regular	Contac Hour	C en aj	o-curr	ricular e stud	r ;	activities practical academic	BL			
	AdtU encourage activities outsid curriculum inter	es a range of the the regular anded to meet These activities	Contac Hour	C en an co	o-curr nhance	ricular e stud tion	r alents' of a	activities practical academic	BL			
	AdtU encourage activities outsid curriculum interlearner's interest,	es a range of the the regular anded to meet. These activities lop the social and	Contac Hour	C en an co	lo-curr nhance pplicat oncept evelop	ricular e stud tion es, coment	r stents' of a critica	activities practical academic l skills	BL			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve	es a range of the the regular anded to meet These activities lop the social and romote a holistic	Contac Hour	C en an co	lo-curr nhance pplicat oncept evelop	ricular e stud tion es, coment oment	r step to the step	activities practical academic l skills problem-	BL			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and process.	es a range of the the regular anded to meet. These activities lop the social and romote a holistic the learners,	Contac Hour	et C en an	co-currenhance pplicate oncept evelop olving.	ricular e stud tion es, coment oment , con	r step to the step	activities practical academic 1 skills problem- nication),	BL			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo.	s a range of the the regular and to meet These activities lop the social and romote a holistic the learners, the 360 degree logy the students	Contac Hour	et C en ap co do so fo (c) ar	do-currentance pplicate oncept oncept olving obter confide warene	ricular e stud tion es, coment oment pers	r a lents' of a critica (J mmur onal	activities practical academic l skills problem- nication), growth self- promote	BL			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodol are engaged in or	es a range of the the regular anded to meet. These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities.	Contac Hour	et Control of Control	do-currentance pplicate concept evelope olving oster confide warene ocial	ricular e stud tion es, coment , con pers ence, ess),	r selents' of a critica (j	activities practical academic l skills problem- nication), growth self- promote onsibility				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in content of the saded under difference activities.	s a range of the the regular and to meet These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities of the clubs viz.	Contac Hour	et C en ap co do so fo (c) ar so th	do-currentance pplicate oncept over the confider confider octal arough	ricular e stud tion es, co oment , cor pers ence, ess),	r selents' of a critica (Jonnmur onal	activities practical neademic l skills problem- nication), growth self- promote onsibility mmunity	<b>BL</b> 3			
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in content of headed under diff Dance, music, pho	s a range of the the regular and to meet. These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities ferent clubs viz. otography, drama,	Contac Hour	et C en and condition of the condition o	do-currentance pplicate concept evelop olving oster confide warene ocial arough	ricular e stud tion es, coment , con pers ence, ess),	r selents' of a critical (John mur onal respondent	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in content headed under diff Dance, music, pholiterary etc., The	s a range of the the regular anded to meet These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities activities of the students of the students are	Contac Hour	et Company conduction of the c	do-currenhance pplicate oncept evelope olving oster confide warene ocial arough ngager eamwo	ricularie studition as, coment, con persence, ess),	r seritica (Jammur onal respondent	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in content headed under diffunce, music, pholiterary etc., Thencouraged to par	s a range of the the regular and to meet. These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities are students are students are students are students.	Contac Hour	ct C en and condition of the condition o	do-currenhance pplicate oncept over confide warene ocial arough ngager camwo bilities	ricular e stud tion es, coment pers ence, ess), ment, ork as	r selents' of a critica (I) mmur onal respo and and leeparir	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in control headed under diff Dance, music, pholiterary etc., The encouraged to particular activities	s a range of the the regular and to meet These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities afferent clubs viz. Totography, drama, the students are sticipate in regular s, workshops,	Contac Hour	et Control of the con	do-currentance pplicate poster confide warened poster post	ricularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicularicula	r selents' of a critica (j) mmur onal respo and and leeparir suc	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ag them access in				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in contract the literary etc., The encouraged to particular competitions as permanded activities competitions as permanded activities ac	s a range of the the regular and to meet These activities the learners, the 360 degree the 360 degree to the students different activities of the students are students are students are tricipate in regular s, workshops, or their interest and	Contac Hour	C en any condition of the en and for any for a	do-currenhance pplicate oncept evelope olving oster confide warene ocial arough ngager eamwo bilities or ho cadem	ricular e stud tion es, co pers ence, ess), ment, ork a s, pro-	r selents' of a critica (I) mmur onal respo and and leeparir	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ng them				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in cheaded under diff Dance, music, pholiterary etc., The encouraged to parclub activities competitions as perhobbies, The stude	s a range of the the regular anded to meet. These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities ferent clubs viz. The students are students are ticipate in regular s, workshops, or their interest and tent members of the	Contac Hour	C en any condition of the en and for any for a	do-currentance pplicate poster confide warened poster post	ricular e stud tion es, co pers ence, ess), ment, ork a s, pro-	r selents' of a critica (j) mmur onal respo and and leeparir suc	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ag them access in				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in contract the literary etc., The encouraged to particular activities competitions as perhobbies, The stude club are trained results.	s a range of the regular and to meet the regular and to meet the regular and to the social and the romote a holistic the learners, the 360 degree dogy the students different activities are the students are tricipate in regular s, workshops, or their interest and the terpresent AdtU in	Contac Hour	C en any condition of the en and for any for a	do-currenhance pplicate oncept evelope olving oster confide warene ocial arough ngager eamwo bilities or ho cadem	ricular e stud tion es, co pers ence, ess), ment, ork a s, pro-	r selents' of a critica (j) mmur onal respo and and leeparir suc	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ag them access in				
	AdtU encourage activities outsid curriculum interlearner's interest, are aimed to deve soft skills and produced development of Keeping in mind learning methodo are engaged in cheaded under diff Dance, music, pholiterary etc., The encouraged to parclub activities competitions as perhobbies, The stude	s a range of the the regular and to meet These activities lop the social and romote a holistic the learners, the 360 degree logy the students different activities are the students and the students are students and the students are students and the students and the students are s	Contac Hour	C en any condition of the en and for any for a	do-currenhance pplicate oncept evelope olving oster confide warene ocial arough ngager eamwo bilities or ho cadem	ricular e stud tion es, co pers ence, ess), ment, ork a s, pro-	r selents' of a critica (j) mmur onal respo and and leeparir suc	activities practical academic l skills problem- nication), growth self- promote onsibility mmunity cultivate eadership ag them access in				

Renewed personalities are invited t	
conduct workshops that benefit th	2
members and students by givin	
them the platform to learn from	1
experts in the respective fields.	

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands-on experiences and projects.	1,2,3,4,5,6,10,12
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
22UBCC2 21		CO 1	2	2	2	1	2	2				2		2
	CO CURRICUL AR ACTIVITIES	CO 2	2	2	2	1	2	3				2		2
		CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTE	R – IV							
<b>Course Title</b>		EXTRA CURI	RICUL	AR A	CTIV	ITIE	S			
Course code	22UBEC221	Total credits: 1	L	T	P	S	R	O/F	С	
		Total hours: 30P	0	0	0	4	0	0	1	
Pre-requisite	Nil Co-requisite Nil									
Programme	Bache	elor of Technology	Comput	ter sci	ience a	and I	Engin	eering		
Semester	F	all/ IV semester of	the seco	nd ye	ar of t	the p	rogra	m		
Course	1. Enhance s	tudents' practical s	kills, te	amw	ork, a	nd le	aders	hip abili	ties	
Objectives	through engaging activities that complement academic learning and									
(Minimum 3)	• •	ersonal growth.								
		sical, emotional, s					_		_	
	_	portunities for cr	eative e	expre	ssion,	athl	etic _]	participa	tion, and	
		y involvement.								
		active particip				•				
		cultivating a se		resp	onsib	oility,	, em	pathy, a	nd civic	
		nt among students.								
CO1	_	so that they can			_	con	itribu	tions, m	aintain a	
602		manage their time						!	40 harrand	
CO2	their academics	ite students who de	monstrat	e ieac	ıersmı	o and	pursi	ie interes	is beyond	
CO3		to in verious so a	umiaulan	ootiv	rition 1	landir	ag to	thair m	ltifogotod	
COS		Learn to participate in various co-curricular activities leading to their multifaceted personality development.								
CO4	• • •		aluation	and a	analyc	is cla	orly i	n the toni	c of their	
CO4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their									
CO5	Interest.  Demonstrate and practices different activities, by Integrating learning experiences by									
202	demonstrating trans		en vines,	, oy 1	1110510	umg	icuriii	ing exper	iences by	
Unit-No.		tent	Conta	ct	Lea	rning	g Out	come	BL	
			Hour				,			
I	AdtU encourage	s a range of	30							
	activities outsid	e the regular		U	Jpon c	ompl	etion,	students		
	curriculum inte	nded to meet		W	/ill	devel	op	practical		
		These activities		s	kills,	tea	mwor	k, and		
		lop the social and			eaders	•		abilities,		
	_	romote a holistic			_			c growth		
	development to	•			_			athletic,		
		the3 60 degree						ties, and		
	•	logy the students		_	ain	a	sen			
	0 0	lifferent activities			espons		•		3	
		fferent clubs viz.						gh active		
	_	Dance, music, photography, drama, participation in								
	•	literary etc., The students are community service and social initiatives.								
	club activities, workshops, competitions as per their interest and									
		tudent members of the								
		represent AdtU in								
		versity student and								
	various intel Offix	orbity brudent and								

n	ational level competitions,
R	Renewed personalities are invited to
C	onduct workshops that benefit the
n	nembers and students by giving
tl	nem the platform to learn from
e	xperts in the respective fields.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12						
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics	1,2,3,4,5,6,10,12						
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12						
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12						
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12						

Course code	Course Name	СО	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	2	1	2	2				2		2
22110EC2	EXTRA	CO 2	2	2	2	1	2	3				2		2
22UBEC2 21	CURRICUL AR ACTIVITIES	CO 3	1	1	2	1	2	2				3		3
	ACTIVITIES	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMI	ESTER -	IV								
Course Title		BASIC A	ACCLIM	ATIZI	NG SI	ΚII	LS	S (BAS)				
Course code	23UULS221R	Total	L	T	P	S	R	O/F	C			
		credits: 1	0	0	2	0	0	0	1			
		Total										
		hours: 30										
D '''		P										
Pre-requisite		Co-										
D	requisite											
Programme		Bachelor of Technology Computer science and Engineering Fall/ IV semester of the second year of the program										
Semester												
Course Objectives	_	_	or the re	ındame	ntais	ΟΙ.	но	spitality ii	ndustry and its			
(Minimum 3)	applicatio		ta famili		.i+la +la		1	rina aanim	mant's Pr			
	2. Students v Utensils.	will be able	to failill	arize w	IIII III	e c	001	king equip	ment s &			
		will be able	to handl	diffor	ant m	ode	<b>3</b> 0. (	of recornet	ione			
CO1	Apply foundat											
COI	environments			i princi	pies t	o a	uaj	ot effective	ery in diverse			
	chvironnients a	and Situation	115.									
CO2	Analyze enviro	onmental fa	ctors inf	uencing	g accl	im	atiz	zation, der	nonstrating a			
	comprehensive understanding of adaptation mechanisms.											
CO3	Evaluate personal adaptability through practical exercises, fostering a											
	proactive approach to acclimatization challenges.											
CO4	Synthesize acclimatization strategies for varying contexts, demonstrating											
004	creativity and flexibility in response.											
	creativity and	nexionity ii	respon									
CO5	"Demonstrate	mastery in a	acclimati	zation t	echni	qu	es,	utilizing o	critical			
	thinking to add	dress unfore	seen cha	llenges								
Unit-No.	Conte	ent	Contac	f T	earn	nσ	Ωι	ıtcome	BL			
	Conti		Hour		2041 II	5	0.	iteome	DL.			
I	Introduction t	to	6									
-	Accommodati											
	Management											
	a agrara											
	<ul><li>◆Telephone</li></ul>	handling		Upo	n		cc	ompletion,				
	technique			•		wil		efficiently				
	• Organizing	of Dooms						nmodation				
	•Organizing of	of Kooilis.		faci	lities,	d	em	onstrating	1,2, 3			
	•Cleaning 6	equipment's		prof	icienc			telephone				
	and uses.			_	dling,			room				
				orga	anizati	on,	,	cleaning				
	<ul><li>Bed making</li></ul>	Process.		equi	ipmen	t	ι	itilization,				
				and	1	ed		making				
				proc	cesses							

II	Fundamental of Cooking  Uses of basic cooking equipment's  Uses of fire & Fuel  Different cuts of vegetables  Uses of herbs & spices Regional Food Habits	6	Upon completion, learners will demonstrate competency in using cooking equipment, managing fire and fuel, preparing vegetable cuts, utilizing herbs and spices, and understanding regional food habits.	2, 3, 4
III	Food and Beverage skills  Introduction to catering industry  Types menus and beverages  Identifications of Cutlery, crockery & glassware  Table etiquettes or manners  Customer handling skills or Situation Handling	6	Upon completion, learners will master the catering industry, understand menu and beverage types, identify cutlery, crockery, and glassware, practice table etiquette, and develop customer handling and situation management skills.	2, 3, 4
IV	Travel management  Travel Documentation (Types)  Application passport & Visa  Tourism products (UNESCO sites)  Types of logistics in travel and tourism management	6	Upon completion, learners will effectively manage travel logistics, handle travel documentation including passports and visas, understand tourism products like UNESCO sites, and apply various types of logistics in travel and tourism management.	1, 2, 3
V	<ul> <li>Basic Hospitality Skills</li> <li>Various Egg         Preparations     </li> <li>Canapés preparations</li> <li>Mock tail &amp; Shakes         Preparations     </li> <li>Butter Rice / Lemon</li> </ul>	6	Upon completion, learners will proficiently prepare a variety of dishes including eggs, canapés, mocktails, shakes, rice dishes, lentils, and both vegetarian and nonvegetarian dishes in basic	2, 3, 4

Rice	hospitality settings.	
• Various Lentils Preparations		
• 1 non-veg preparation/ 1 veg preparation		

T1:Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt ltd-New Delhi.

T2: Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restauranteur, Guides.

#### **REFERENCE BOOKS:**

R1: Mohammed Zulfikar (2010) - Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	1,2,3,4,7,10,12						
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	1,2,3,4,7,10,12						
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	1,2,3,4,7,10,12						
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	1,2,3,4,7,10,12						
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges	1,2,3,4,7,10,12						

Course	Course Name	СО	PO1	PO	PO	РО	РО	РО	РО	РО	PO	PO1	PO1	PO1
code	Course Tvaine	CO	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	1	1	2	2			3			1		2
23UULS11	BASIC ACCLIMATI	CO 2	1	1	2	2			3			1		2
1R	ZIG SKILLS (BAS)	CO 3	1	2	3	2			3			1		2
	(Bris)	CO 4	2	3	2	3			3			1		2
		CO 5	3	3	3	3			3			1		2

		SEMESTER	R – V							
<b>Course Title</b>	Signals and Systems									
Course code	22BTCS311R	<b>Total credits: 3</b>	L	T	P	S	R	O/F		C
		<b>Total hours: 45T</b>	3	0	0	0	0	0		3
<b>Pre-requisite</b>	Nil	Co-requisite					Nil		·	
Programme		Computer So	cience &	Eng	gineer	ring				
Semester	Summer/ V semester of the third year of the program									
Course	10. Introduces	students for an intern	nediate l	evel	of flu	ency	with s	signals a	nd :	systems
Objectives	in both con	tinuous time and disc	rete time	<b>)</b> .						
(Minimum 3)	_	udents for more ac			-	in d	ligital	signal	pro	cessing
		(including audio, image and video processing).								
	_	12. Prepares students in communication theory, and system theory, control and								
	robotics.									
CO1		Understand different types of signals-continuous and discrete, odd and even, periodic and								
	aperiodic etc.									
CO2	Understand Classifications of the standard forms of Signals with respect to systems									
	ased on their properties.									
CO3		Analyse the concepts of Laplace transform based continuous time and discrete time								
~ ~ .	analysis of signals a	<u>.</u>								
CO4	7	Analyzation of the concepts of Fourier transform based continuous time and discrete								
GO -	time analysis of signals and systems.									
CO5		Analyzation of Z-transform in continuous time signals and systems by using appropriate								
<b>T</b> T • ( <b>N</b> T	mathematical tools.		<b>G</b> 4	. 1					-	DY
Unit-No.	Con	tent	Contact Hour		Lea	ırnın	g Out	come		BL
I	Introduction to	Signal and		Т	o Exp	olain (	differe	ent types		
	System: signal an	_			_			ous and		
	in everyday life,	*	_	d	iscrete		1.0			
	periodicity, de	terminism and	7	p	eriodi		1,2			
	stochastic charac	eteristics, special								
	signal, system proj	perties.								
II	Behaviour of	continuous and		С	lassif	icatio	ons	of the	е	
	discrete time LT	I <b>system:</b> Impulse		st	andar	d for	ms o	f Signal	S	
	response, ste	•	8			_		system	S	1,2
	convolution, input	_	Ū	b	ased o	on the	ir pro	perties		1,2
		of causality and								
	stability of LTI sys									
III	-	form: Laplace			-	_		ncepts o		
	Transform and	its inverse:			_			m base		
	Definition, exist	· ·			ontinu		tim			
	•	onvergence and	10					alysis o	Ī	1.0
	properties, Applic	_	10	S1	gnals	and	systen	ns.		1,2
	transform for t	•								
	continuous time	•								
	(stability etc.) Sig	milicance of poles								
IV	& zeros.									
I X/	Fourier Analysis	of Continuous	12		nalyz	ation	_	of the	اد	1,2

	and discrete Time Signals and		concepts of Fourier	
	Systems: Fourier Series, Fourier		transform based	
	Transform and properties,		continuous time and	
	Parseval"s theorem, Frequency		discrete time analysis of	
	response of LTI systems. Sampling	signals and systems.		
	Theorem.			
V	<b>Z-Transform:</b> Z-Transform and its		Analyzation of Z-	
	inverse: Definition, Existence		transform in continuous	
	Region of convergence and		time signals and systems	
	properties. Application of Z-	8	by using appropriate	1,2
	Transform for the analysis of		mathematical tools.	
	Discrete time LTI systems,			
	Significance of poles and zeros.			

T1: Oppenheim Alan, V., Willsky Alan. S., and Nawab, H., "Signals and Systems", Prentice Hall, 1997.

## **REFERENCE BOOKS:**

R1: Haykin Simon, "Communication Systems", 3rd Edition, John Wiley, 1995.

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand different types of signals-continuous and discrete, odd and even, periodic and aperiodic etc.	1,2,3,4,5,10,12						
2	Understand Classifications of the standard forms of Signals with respect to systems based on their properties.	1,2,3,4,10,12						
3	Analyse the concepts of Laplace transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,10,12						
4	Analyzation of the concepts of Fourier transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,10,12						
5	Analyzation of Z-transform in continuous time signals and systems by using appropriate mathematical tools.	1,2,3,4,5,10,12						

Course Code	Course	CO	PO	PO	PO	PO	РО	PO	PO	PO	PO	PO1	PO1	PO1
	Name	S	1	2	3	4	5	6	7	8	9	0	1	2

		CO 1	3	2	3	2	1			2	3
	Signals	CO 2	3	3	3	3				3	3
22BTCS311 R	and System s	CO 3	3	3	3	3				3	3
		CO 4	3	2	3	2	1			2	3
		CO 5	3	2	3	2	1			2	3

SEMESTER – V													
<b>Course Title</b>		Database 1	Manage	ment	Syste	ems							
Course code	22BTCS312R	Total credits: 4	L	T	P	S	R	O/F	C				
		Total hours:	3	0	2	0	0	0	4				
		35T+30P											
Pre-requisite	File Systems	Co-requisite					Nil						
Programme		Computer S	Science &	& En	ginee	ring							
Semester		Fall/ V semester of											
Course	1. To understand ar	d use data manipula	tion lang	guage	to qu	ery, u	pdate	, and man	age a				
Objectives	database.												
(Minimum 3)	2. To develop an understanding of essential DBMS concepts such as: database security,												
	ntegrity, concurrency.												
	3. To design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.												
CO1		ndamental concepts	of data	base	mana	geme	nt sy	stems wit	h DBMS				
~~~	languages and data												
CO2		of query languages	such as	DDL	and I)ML :	tor de	signing a	relational				
002	database.					•		<u> </u>	,•				
CO3	***	properties and conc	urrency	contr	ol sc	nemes	s to p	beriorm tr	ansaction				
CO4	processing with dat	•	in a Can a	41	4: 4:		d a41a						
CO4	Apply security to the	ne database by check	ang for a	utner	mcan	on an	a aum	iorization.					
CO5	Apply advanced to	pics of data wareho	using an	d dat	a min	ing, o	distrib	uted data	pases and				
	web databases.												
Unit-No.	Cor	tent	Contac	et	Lea	arnin	g Out	come	BL				
			Hour										
I	Database system	architecture:	6	Α	nalyz	ing d	ata sy	stem					
	Data Abstraction,						and th	ne data					
	Independence, Da			n	nodels	S.							
	Language (DDL),												
	Manipulation Lan	_							1,2				
		Entity-relationship											
	*	model, relational											
	*	ted data models,											
		straints, data											
II	manipulation oper		10			.:	D	Relational					
11	Relational query Relational algebra	0 0	10		analyz Mary	-		database					
	domain relational	_			esign	_	ages,	query					
	DDL and DML co	-			rocess		ana	and					
	source and Comm	•			ptimiz	_	1	ana					
	MYSQL,	oronar BBIVIS			Pum	zation.	••						
	ORACLE, DB2, S	OL server.							1,2				
	Relational databa												
	Domain and data of	_											
	Armstrong's axion	-											
	Dependency prese												
	design.												
<u> </u>	_												

	Query processing and			
	optimization: Evaluation of			
	relational algebra expressions,			
	Query equivalence, Join strategies,			
	Query optimization algorithms.			
III	Transaction processing:	8	Analysing the concepts of	
	Concurrency control, ACID		Transaction Processing.	
	property, Serializability			
	ofscheduling, Locking and			1,2
	timestamp based schedulers, Multi-			1,2
	version and optimistic, Concurrency			
	Control schemes, Database			
	recovery.			
IV	Database Security: Authentication,	6	Analyzation of the	
	Authorization and access control,		concepts of Database	1,2
	DAC, MAC and RBAC models,		Security.	1,2
	Intrusion detection, SQL injection.			
V	Advanced topics: Object oriented	5	Analyzation of Advanced	
	and object relational databases,		topics of Object oriented	
	Logical databases, Web databases,		and object relational	1,2
	Distributed databases, Data		databases.	
	warehousing and data mining.			
Practical	10.Database Design and		Describe, illustrate, and	
	Modeling: Introduction to		explain the creation of ER	
	Database Systems, Data		Diagrams and Converting	
	Abstraction and Data Models,		ER Models to Relational	
	Entity-Relationship (ER)	6	Schemas.	1,2,3,4
	Modeling, Relational Model and			
	Schema Design, Case Studies			
	and Lab Exercises: Creating ER			
	Diagrams and Converting ER Models to Relational Schemas.			
	11.SQL Querying and Data		Describe, illustrate, and	
	Manipulation: Introduction to		explain the creation of	
	SQL, Data Definition Language		Writing and Executing	
	(DDL), Data Manipulation		SQL Queries.	
	Language (DML), Data Query		SQL Queries.	
	Language (DQL), Advanced	6		1,2,3,4
	SQL Queries: Joins, Subqueries,			
	and Views, Case Studies and			
	Lab Exercises: Writing and			
	Executing SQL Queries.			
	12.Transaction Management and		Describe, illustrate, and	
	Concurrency Control:		explain and creation of	
	Introduction to Transactions,		Transaction Management	
	ACID Properties (Atomicity,	6	and Concurrency Control	1,2,3,4
	Consistency, Isolation,			
	Durability), Concurrency			
	Control Mechanisms, Isolation			
	.,	<u> </u>	<u> </u>	

Levels and Locking, Case Studies and Lab Exercises: Implementing Transactions and Concurrency Control.			
13.Database Security and Authorization: Introduction to Database Security, User Authentication and Roles, Access Control and Authorization, SQL Injection and Security Best Practices, Case Studies and Lab Exercises:	6	Describe, illustrate, and explain Database Security and Authorization	1,2,3,4
Securing Databases			
14.Advanced topics: Object- Oriented Databases, Distributed Databases, Data Warehousing and OLAP, NoSQL Databases, Case Studies and Lab Exercises: Implementing Advanced Database Solutions.	6	Describe, illustrate, and explain the Implementation of Advanced Database Solutions.	1,2,3,4

T1: "Database System Concepts", 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

REFERENCE BOOKS:

R1: "Principles of Database and Knowledge-Base Systems", Vol 1 by J. D. Ullman, Computer Science Press.

R2: "Fundamentals of Database Systems", 5th Edition by R. Elmasri and S. Navathe, Pearson Education.

R3: "Foundations of Databases", Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the fundamental concepts of database management systems with DBMS languages and data models.	1,2,3,4,5,9,11,12						
2	Apply the concepts of query languages such as DDL and DML for designing a relational database.	1,2,3,4,5,9,11,12						
3	Apply the ACID properties and concurrency control schemes to perform transaction processing with database recovery.	1,2,3,4,5,9,11,12						

4	Apply security to the database by checking for authentication and authorization.	1,2,3,4,5,9,11,12
5	Apply advanced topics of data warehousing and data mining, distributed databases and web databases.	1,2,3,4,5,9,11,12

Course	Course	CO	PO1	PO	PO1	PO1								
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
		СО												
		1	2	2	3	2	2				3		3	3
	Database Manageme	CO 2	3	2	3	2	2				2		3	3
22BTCS31 2R	nt Systems	CO 3	3	2	3	3	3				3		3	2
		CO 4	3	2	3	1	3				2		3	2
		CO 5	3	2	3	3	3				2		2	2

		SEMESTE	R - V									
Course Title		Formal Langu		uton	nata T	heor	y					
Course code	22BTCS313R	Total credits: 3	L	T	P	S	R	O/F	С			
		Total hours: 36T	3	0	0	0	0	0	3			
Pre-requisite	Knowledge in	Co-requisite]	Nil					
	Mathematics											
	and Data											
	Structure and											
	Algorithm											
Programme	G	Computer S			_							
Semester		mmer/ V semester										
Course	_	an introduction to				ideas	s or tr	ieoreticai	computer			
Objectives (Minimum 3)		n the perspective of ce the fundamental		-	-	aal 1a	mana	ac aran	mar and			
(William 3)	automata th		i conce _l	Jis Oi	10111	11a1 10	ingua	ges, gran	imai, and			
		problem-solving a	bilities 1	ısing	deteri	minist	ic an	d non-det	erministic			
	machines.											
CO1	Understand the fund	Understand the fundamental characteristics of formal languages and formal grammar.										
CO2		ilarity between deter										
CO3		imization of determi										
CO4	Analyze the similarity between non-deterministic push-down automata and context-free											
~~=	grammars.											
CO5	Analyze the fundamental characteristics of Turing machines and how they are used in											
Unit-No.	computing.	tent	Contac	·+	Loo	mnine	g Out	2022	BL			
Omt-No.	Con	tent	Hour	I	Lea	1111115	g Out	come	BL			
I	Introduction to	Finite Automata:	11041		escrit	oe, il	llustra	ite, and				
		Finite Automata,			xplain		he	central				
		s of Automata		I	oncep		of A	utomata				
	Theory, Deter	ministic Finite	8		heory				1,2			
	Automata (DFA),	Nondeterministic										
	Finite Automata	(NFA), Finite										
	Automata with Ep											
II	Regular Exp			I		•	llustra	ite, and				
		ular Expressions,			xplain			regular				
	Finite Automata	C			xpress			and				
	Expressions, A	Applications of ssions, Proving		Ič	ınguag	ges.						
		to Be Regular,	8						1,2			
		ies of Regular										
	Languages, Ed	~										
	Minimization o	_										
	Pumping Lemma.											
III	Context Free	Grammars and		D	escrib	oe, il	llustra	ite, and				
	Languages: Def	inition, Leftmost	6	e	xplain	C	ontext	Free	1,2			
	and rightmost	grammars, Parse		G	ramm	ars aı	nd Lai	nguages.				

	trees, Ambiguity: Ambiguous grammar, Removing ambiguity, Normal forms, Applications of context free grammars: Parsers			
IV	Pushdown automata (PDA) and context free languages (CFL): Definition & representation of pushdown automata, Acceptance by PDA: By final state, By empty stack, Deterministic PDA, Equivalence of PDA and CFL, Pumping lemma for CFL Closure properties of CFL.	8	Describe, illustrate, and explain the representation of pushdown automata and context free languages.	1,2
V	Turing machines: Definition, Language of a Turing machine, Programming Turing machines, The Church-Turing thesis, A simple programming language, Extensions of the basic Turing machine.	6	Describe, illustrate, and explain the basic Turing machine.	1,2

T1: Theory of Computer Science : Automata, Languages and Computation – K.L.P. Mishra and N. Chandrasekaran, PHI.

T2: Introduction to Languages and Theory of Computations – Martin J. C., TMH.

REFERENCE BOOKS:

R1: Introduction to Automata Theory, Languages and Computation – Hopcroft, Ullman, Pearson Education.

R2: Elements of the Theory of Computation – Papadimitrou, C. and Lewis, C.L, PH.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the fundamental characteristics of formal languages and formal grammar.	1,2,3,10,12
2	Understand the similarity between deterministic and non- deterministic finite automata	1,2,3,4,5,10,12
3	Understand the minimization of deterministic and nondeterministic finite automata.	1,2,3,4,5,10,12
4	Analyze the similarity between non-deterministic push-down	1,2,3,4,5,10,12

	automata and context-free grammars.	
5	Analyze the fundamental characteristics of Turing machines and how they are used in computing.	1,2,3,4,5,10,12

Course code	Course	CO	PO1	PO	РО	PO	PO	РО	PO	PO	PO	PO1	PO1	PO1
	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
	Formal Languag e & Automat a Theory	CO 1	2	2	1							1		1
		CO 2	3	3	2	2	1					1		2
22BTCS313 R		CO 3	3	3	3	1	1					1		2
		CO 4	3	3	2	2	1					1		2
		CO 5	3	3	2	2	1					1		2

		SEMESTE	$\mathbf{R} - \mathbf{V}$									
Course Title		Object-Or	iented P	rogr	ammi	ng						
Course code	22BTCS314R	Total credits: 5	L	T	P	S	R	O/F	С			
		Total hours:	3	0	4	0	0	0	5			
		39T+60P										
Pre-requisite	File Systems	Co-requisite					Nil					
Programme			Science & Engineering									
Semester		mmer/ V semester										
Course		nts to understand the	e basic o	bject	-orien	ted p	rogran	nming co	ncepts and			
Objectives	apply them in p	•	_									
(Minimum 3)		ong students the inh			_		_					
		ents to develop GUI-	-based a _l	pplica	ations	using	g AW	Γ, Swing	and Even			
901	handling.											
CO1	Understand object-	oriented programmir	ng conce	pts ar	nd imp	oleme	nt in j	ava.				
CO2	Understand and ap	pply building block	s of OC	Ps 1	angua	ige, i	nherita	ance, pac	kage and			
	interfaces, and anal	yse real-world probl	ems in te	erms (of the	se.						
CO3	Understand and ap	ply concepts like m	ultithrea	ding,	exce	ption	handl	ing etc.	in object-			
	oriented programs.											
CO4	Apply exception-ha	andling methods in p	rogramn	ning.								
CO5	Create interactive a	s well as GUI-based	iava app	licati	ions in	ı proj	ect-ba	sed learn	ing.			
Unit-No.		tent	Contac				g Out		BL			
			Hour				8 0 40					
I	Java Overview:		7	A	nalyz	ing J	ava an	d its				
	Java Introduction,	Platform		р	ropert	ties, a	nd als	o array				
	Independence, JV	M & JDK, Data		a	nd str	ing.						
	types, Operators, l	f, else statement,										
	Switch condition,	while, do-while,										
	for loop, break and	d continue										
	statement.								1,2			
	Array and String:											
	Single Array &	Multidimensional										
	Array, Library	Classes-String,										
	String Buffer &	Wrapper Class,										
	Command line	arguments and										
	Various String Op	erations.										
II	Classes, Objects		8			-		, objects,				
	•	Object reference,		a	nd me	thods	S.					
	Constructor:	Constructor										
	<i>O</i> ,	Method: Method										
	_	ecursion, Passing							1,2			
		ject form Method,							1,2			
	new operator,											
	-	() method, Import										
		import, Access										
	control, Nested	class, Inner class,										

	Anonymous inner class.			
III	Inheritance and Interfaces in Java: Overview of Inheritance, inheritance in constructor, Inheriting Data members and Methods, Multilevel Inheritance – method overriding Handle multilevel constructors super keyword, Stop Inheritance, final keyword. Creation and Implementation of an interface, Interface reference, instance of operator, Interface inheritance, Dynamic method dispatch, Abstract class, Comparison between Abstract Class and interface, inside of System.out.println – statements.	8	Analyzing the concepts of Inheritance and Interfaces in Java.	1,2
IV	Exception Handling in Java: Exception and Error, Use of try, catch, throw, throws and finally, Built in Exception, Custom exception, Throwable Class. JAVA File Handling: Overview of Different Stream (Byte Stream, Character stream), Readers and Writers class, File Class, File Input Stream, File Output Stream, Input Stream Reader and Output Stream Writer class, File reader and writer class, File Writer, Buffered Reader class.	8	Analyzation of the concepts of Exception Handling in Java.	1,2
V	Applet, AWT and Swing: Applet: Applet Fundamental, Applet Architecture, Applet Skeleton, Requesting Repainting, Event Handling: various event handling mechanisms, various classes related to event sources and event listeners, AWT: window fundamentals, creating frames, Adding removing various controls, Layout managers, Introduction To Swing.	8	Analyzation of fundamentals of Applet, AWT and Swing.	1,2

Practical	1. Hands-on Introduction to Object-		Describe, illustrate and	
	Oriented Programming: Practical exercises on creating classes and objects, Implementing encapsulation through practical examples, Coding exercises on constructors and destructors, Applying access modifiers (public, private, protected) in practical scenarios.	12	explain coding exercises on constructors and destructors, applying access modifiers in practical scenarios.	1,2,3,4
	2. Practical Inheritance and Polymorphism: Coding exercises on implementing different types of inheritance (single, multi-level, and multiple), Practical examples of method overriding, Creating and using abstract classes and interfaces, Implementing static and dynamic binding through practical examples.	12	Describe, illustrate and explain practical examples of method overriding, Creating and using abstract classes and interfaces, Implementing static and dynamic binding through practical examples,	1,2,3,4
	3. Advanced OOP Concepts in Practice: Practical exercises on creating and using packages and namespaces, Implementing exception handling in real-world scenarios, Creating and managing multithreaded applications, Practical exercises on generics and collections.	12	Describe, illustrate and explain creation and managing multithreaded applications, Practical exercises on generics and collections.	1,2,3,4
	4. Software Design and Development in Action: Hands-on Object-Oriented Analysis and Design (OOAD) exercises, Implementing design patterns (e.g., Singleton, Factory, Observer) in practical scenarios, Software testing and debugging exercises, Code optimization and refactoring practical sessions.	12	Describe, illustrate and explain Software testing and debugging exercises, Code optimization and refactoring practical sessions.	1,2,3,4
	5. Project-Based Learning and GUI Development: Practical exercises on building Graphical User Interfaces (GUI), Implementing event handling in GUI applications, Developing interactive and GUI-based applications using Swing/JavaFX/Qt, Project-based	12	Describe, illustrate and explain development of a real-world application using OOP concepts and GUI.	1,2,3,4

learning: Developing a real-world		
application using OOP concepts and		
GUI.		

- T1: Herbert Schildt and Dale Skrien, "Java Fundamentals A comprehensive Introduction", McGraw Hill
- T2: Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne.
- T3: T. Budd, "Understanding Object- Oriented Programming with Java", Pearson Education.

REFERENCE BOOKS:

- R1: P.J.Dietel and H.M.Dietel, "Java How to program", Prentice Hall.
- R2: P.Radha Krishna, "Object Oriented programming through Java", CRC Press.
- R3: S.Malhotra and S. Choudhary, "Programming in Java", Oxford University Press.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand object-oriented programming concepts and implement in java.	1,2,3,4,5,10,12
2	Understand and apply building blocks of OOPs language, inheritance, package and interfaces, and analyse real-world problems in terms of these.	1,2,3,4,5,10,12
3	Understand and apply concepts like multithreading, exception handling etc.in object-oriented programs.	1,2,3,4,5,10,12
4	Apply exception-handling methods in programming.	1,2,3,4,5,10,12
5	Create interactive as well as GUI-based java applications in project-based learning.	1,2,3,4,5,10,12

Course	Course	CO	PO1	PO	PO1	PO1								
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		~~												
		CO 1	2	2	3	1	1							1
	Object- Oriented	CO 2	2	1	3	1	1							1
22BTCS31 4R	Programmi ng	CO 3	2	1	2	1	1							1
		CO 4	2	1	2	1	1							1
		CO 5	2	2	2	1	1							1

		SEMESTE	R - V									
Course Title		PE-1 : Found	ations of	Data	a Scio	ence						
Course code	22BTCS316R	Total credits: 3	L	T	P	S	R	O/F	C			
		Total hours: 30T	3	0	0	0	0	0	3			
Pre-requisite	Nil	Co-requisite					Nil					
Programme			Science & Engineering									
Semester			r of the third year of the program									
Course	•	ndamental knowled	_		scienc	e wi	ith qu	aerying a	and			
Objectives		red for the field of da							_			
(Minimum 3)		_	andling heterogeneous data, pre-process and									
		for better understand	_	•	4	.1	. 1	1	L-:11			
	_	damental knowledge		scier	ice too	ois ai	ia gai	n basic s	K111			
CO1	Acquire foundationa	l-time data science p										
CO2	Understand and app	•				ادرس	. 0.41 ₋ -	antinal -	anati ass -			
	Apply advanced too Manage diverse da		<u>~</u>									
	through visualization	• • • • • • • • • • • • • • • • • • • •	oy progra	1111111	ing i	or ki	iowie	uge repr	esentation			
	Demonstrate numer		ata scienc	e to	nols to	- sol	ve re	al-world	nrohlems			
	through industrial ca	-	ata scienc)OIS (5 501	ve 10	ur worra	proorems			
Unit-No.	Con		Contact	t	Lea	rning	2 Out	come	BL			
			Hour			•	•					
I	Introduction			Т	o acq	uire f	ounda	tional				
	NeedforDataScience	ce-		k	nowle	dge i	n data	ι				
	WhatisDataScience	e - Data Science		S	cience							
	Process	_							1,2			
		ceandDataScience-										
	Prerequisites for a		5									
TT	ToolsandSkillsrequ			Т	'o			danatand				
II	and Basic Statist	a Analysis (EDA)			o xplora	ntory		derstand Data				
		Data Analysis			•	•		nd Basic				
		measures, Basic			tatisti							
		hs and summary	7		· · · · · · · · · · · · · · · · · · ·		corrac					
	statistics) of EDA	· · · · · · · · · · · · · · · · · · ·	,						1.0			
	Lifecycle, Disco	very, Developing							1,2			
	Initial Hypothe	ses, Identifying										
	Potential Data So	ources, EDA case										
		otheses on means,										
	1 1	nd variances,										
	Errormetrics			+_								
III	Data Science Me				'0 : 4 -	appl	•	various				
	Analytics for Data	_			lgorith cience		of	Data				
	Data Analytics Data Prepara	, Data Discovery, ation, Model		3	cience	5			1,2			
	Planning,	mon, wiodei										
	Model	Building,	6									
	1110401	Danding,	U									

	Communicate Results, Data cleaning -Data integration- Data Reduction-Data Transformation and Data Discretization, Feature Generation and Feature Selection, Feature Selection algorithms:Filters-Wrappers			
IV	Basic Machine Learning Algorithms: Classifiers-Decision tree-Naïve Bayes-k-Nearest Neighbors(k-NN),k-means— SVM,AssociationRulemining— Ensemblemethods	6	Analyzation of the concepts of Basic Machine Learning Algorithms.	1,2
V	Platform for Data Science: PythonforDataScience — PythonLibraries —Data Frame Manipulation with numpyand pandas — Exploration Data Analysis —Time Series Dataset — Clustering with Python— Dimensionality Reduction .Python integrated Development Environments(IDE) for Data Science.	6	Analyzation of Python integrated Development Environments(IDE) for Data Science.	1,2

T1Sanjeev Wagh, Manisha Bhende, Anuradha Thakare, 'Fundamentals of Data Science, CRCPress,1st Edition, 2022

T2Datasciencefromscratch-FirstprincipleswithPython,JoelGrus,OâReily,2015.

REFERENCEBOOKS:

- **R1** Doing Data Science, Straight Talk From The Frontline, Cathy O'Neil and Rachel Schutt,O'Reilly(2014).
- **R2**AvrimBlum,JohnHopcroft,Ravindran Kannan, "FoundationsofDataScience",Cambridge UniversityPress, First Edition, 2020.
- **R3** Data Mining: Concepts and Techniques", Third Edition, 2 Jiawei Han, MichelineKamberand Jian Pei,ISBN 0123814790 (2011).

R4BigDataandBusiness Analytics, JayLiebowitz, CRC press (2013)

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Acquire foundational knowledge in data science.	1,2,3,4,10,12
2	Understand and apply various data analytics techniques.	1,2,3,4,10,12
3	Apply advanced tools to work on dimensionality reduction and mathematical operations.	1,2,3,4,5,10,12
4	Manage diverse data types and employ programming for knowledge representation through visualization.	1,2,3,4,10,12
5	Demonstrate numerous open-source data science tools to solve real-world problems through industrial case studies.	1,2,3,4,5,10,12

Course code	Course	CO	PO1	PO	PO1	PO1								
	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	3						1		2
	Foundatio	CO 2	2	2	1	3						1		2
22BTCS316 R	ns of Data Science	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	$\mathbf{R} - \mathbf{V}$								
Course Title		PE-1:	Neural :	Netw	orks						
Course code	22BTCS316R	Total credits: 3	L	T	P	S	R	O/F	C		
		Total hours: 30T	3	0	0	0	0	0	3		
Pre-requisite	Nil	Co-requisite	Nil								
Programme		Computer S	Science &	& En	gineer	ring					
Semester	Su	mmer/ V semester	of the th	ird y	ear of	the	progr	am			
Course	1. To under	stand, analyze, and	d apply	vari	ous A	rtific	ial N	leural Ne	twork		
Objectives	architect	ures.									
(Minimum 3)	2. To train a	lgorithms for a rang	ge of app	olicat	ions i	n mac	chine	learning a	and		
	deep lear	ning.									
CO1	Understand the his	torical development	s and p	otent	ial app	olicat	ions o	of Artifici	al Neural		
	Networks (ANN).										
CO2	Analyse Artificial N	Neural Network arch	itectures	base	ed on c	onne	ctivity	and learn	ning		
	strategies.										
002		1.1 0 11				D					
CO3		orithms for discret	e and c	ontin	iuous	Perce	eptron	network	s in Feed		
604	Forward Networks.	// /tt 4	1	1	1. 34	4	- f . C -	1('	-1 N1		
CO4		ation training and e	xpiore t	ne ai	cnitec	ture	or Co	nvolution	ai Neurai		
CO5	Networks in Deep I		ما د ما نام		D: 4:.	4: .			Mamaam		
CO5		ecture and training	_			ectio	nai A	ssociative	Memory		
Unit-No.	-	d Network in Assoc					~ 04		DI		
Unit-No.	Con	tent	Contac Hour		Lea	rnin	g Out	come	BL		
I	Introduction t	o Neural	Hour			uiro f	ounda	tional			
1	Networks	o Meurai			nowle						
	Introduction,	Humans and			Netwoi	-	11 1 100	1141			
	1	anization of the		1	1Ct W OI	. Ко.					
	Brain, Biolog										
		Artificial Neuron	5						1,2		
		eristics of ANN,									
	McCulloch-Pitts	Model, Historical									
	Developments,	Potential									
	Applications of A	NN.									
II	Essentials of	Artificial		7	o und	lersta	nd Es	sentials			
	Neural Networks			C	of A	rtific	ial	Neural			
	Artificial Neuron	Model, Operations		N	Vetwor	ks.					
	of Artificial No	euron, Types of									
	Neuron Activatio	n Function, ANN	7						1.2		
	Architectures,	Classification							1,2		
	Taxonomy of AN	N- Connectivity,									
	Learning Strate	gy (Supervised,									
	Unsupervised,	Reinforcement),									
	Learning Rules.										
III	Feed Forward No	etworks			То	app	ly	various			
		crete, Continuous			lgorith		of	Neural	1,2		
	and Multi-Cate			N	Vetwor	ks.			1,2		
	Algorithms:	Discrete and									
								-	210		

	Continuous Perceptron Networks,			
	ADALINE, MADALINE.	6		
IV	Deep Learning		Analyzation of the	
	Introduction, Perceptron, Multilayer		concepts of Deep	
	Perceptron, Delta Rule,		Learning.	
	Backpropagation Training, Learning	6		1.2
	Algorithm, Normalization,			1,2
	Limitations of the Perceptron			
	Model, Convolutional Neural			
	Network, Recurrent NN.			
V	Associative Memories	6	Analyzation of BAM	
	General Concepts of Associative		Training Algorithms.	
	Memory, Bidirectional Associative			
	Memory (BAM) Architecture, BAM			1,2
	Training Algorithms: Storage and			
	Recall Algorithm. Architecture of			
	Hopfield Network.			

T1Simon Haykin,—Neural Networks-A Comprehensive Foundation, Macmillan Publishing Co., New York.

T2Neural Networks-James A Freeman David MSK, Pearson Publication

REFERENCEBOOKS:

R1 Introduction to Artificial Neural Systems Jacek M. Zurada, JAICO Publishing House

R2K. Mahrotra, C.K. Mohan and Sanjay Ranka,—Elements of Artificial Neural Networks, MIT Press

R3 S. Rajasekharanand G. A. Vijayalakshmipai,—Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications, PHI Publication.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the historical developments and potential applications of Artificial Neural Networks (ANN).	1,2,3,4,11,12
2	Analyse Artificial Neural Network architectures based on connectivity and learning strategies.	1,2,3,4,5,11,12
3	Apply training algorithms for discrete and continuous Perceptron networks in Feed Forward Networks.	1,2,3,4,5,9,10,11,12
4	Apply backpropagation training and explore the architecture of Convolutional Neural Networks in Deep Learning.	1,2,3,4,5,9,10,11,12

5	Evaluate the architecture and training algorithms of	1,2,3,4,5,9,10,11,12
	Bidirectional Associative Memory (BAM) and Hopfield	
	Network in Associative Memories.	

Course	Course	CO	PO1	PO	PO1	PO1								
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	3	1	2							2	2
	Neural	CO 2	3	3	1	2	2						2	1
22BTCS31 6R	Networ ks	CO 3	2	2	3	2	2				1	2	1	3
		CO 4	2	2	3	2	2				1	1	1	2
		CO 5	2	2	2	1	2				1	1	1	2

		SEMESTE	$\mathbf{R} - \mathbf{V}$												
Course Title		Techno I	Profession	nal S	kills I	V									
Course code	22BTCS315R	Total credits: 1	L	T	P	S	R	O/F		7)					
		Total hours: 30P	0	0	2	0	0	0	1	Į					
Pre-requisite	Nil	Co-requisite					Nil								
Programme		Computer S													
Semester		mmer/ V semester													
Course		letailed revision of (Computer	Scie	ence &	Engi	ineeri	ng conce	pts lea	ırned					
Objectives	so far.														
(Minimum 3)															
	•	problems in real-life situations. evelop highly skilled and knowledgeable development professional who can deal with													
CO1		_		lopn	nent pi	rofess	sional	who ca	n deal	with					
	various areas and as	spects of businesses.	•												
CO2	Develop analytical	and research ability	as manag	emei	nt prof	essio	nal w	ho can b	e more						
	efficient and innova	tive in practice.													
CO3	Gather knowledge a	hout various develo	nment co	ncen	ite and	the t	heoria	es of dev	alonme	ent					
CO4	Encourage the stude		_			the ti	iicorii	cs of dev	ыории	JIIL.					
CO5	Effectively commun					in a	profe	essional r	nanner	<u> </u>					
Unit-No.	,	tent	Contac				_	come	В						
UIIIt-No.	Con	tent	Hour	L	Lea	1.111115	z Oui	come	D	L					
I	C Programming		Hour	Г	evelor	n hasi	ic ski	lls of C							
•	Cirogramming		7		rogran	-		115 01 0	1	,2					
			,	P	2081411		>		1,	,∠					
II	Analog and D	igital Electronic		Г	evelop	2 01	nalyti	cal and							
11	Circuits	igital Electronic			•		•	cai and f Analog							
	Circuits		8			oigita	-	Electronic		,2					
					ircuits	_		Acctronic							
III	Data Structure and	Algorithms					wledo	ge about							
	Zam Structure und				arious	1110		elopmen							
			10			s od		Structure		,2					
					nd Alg										
IV	Computer Org	ganization and		_	nalyza			of the	:						
	Architecture				oncept			Computer		2					
			12)rganiz			and		,2					
					crchite										
V	Operating Systems	S		A	nalyza	ation	of	of basic							
			8	concepts of Operating						,2					
				S	ystems	3									

TEXT BOOKS/REFERENCE BOOKS:

T1: "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.

T2: Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

- T3: Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- T4: M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- T5: Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- T6: S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- T7: Stallings, Computer Organization & Architecture, Pearson.
- T8: Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Understand different types of signals-continuous and discrete, odd and even, periodic and aperiodic etc.	1,2,3,4,5,9,10,11,12									
2	Understand Classifications of the standard forms of Signals with respect to systems based on their properties.	1,2,3,4,5,9,10,11,12									
3	Analyse the concepts of Laplace transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,9,10,11,12									
4	Analyzation of the concepts of Fourier transform based continuous time and discrete time analysis of signals and systems.	1,2,3,4,5,9,10,11,12									
5	Analyzation of Z-transform in continuous time signals and systems by using appropriate mathematical tools.	1,2,3,4,5,9,10,11,12									

Course	Course	CO	PO1	PO	PO	PO	PO	PO	PO	РО	РО	PO1	PO1	PO1
code	Name	S	*	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	3	2	2				3	2	3	3
	Techno Professio nal Skills	CO 2	3	2	3	2	2				2	2	3	3
22BTCS31 5R	IV	CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

1		SEMESTE!	K – V							
Course Title		COMPETENT EN	NGLISI	I FO	R EN	GINI	EERS			
Course code	22UBPD314R T	Total credits: 2	L	T	P	S	R	0/	F	C
	T	Total hours: 60P	0	0	4	0	0	0)	2
Pre-requisite	Nil	Co-requisite					Nil			
Programme		Computer S	cience &	& Eng	gineer	ing				
Semester	Sum	mer/ V semester o	of the th	ird y	ear of	the	progr	am		
Course	1. Build a strong for	undation in technic	cal voca	bular	y rela	ted t	o engi	ineeri	ing d	lisciplines
Objectives	such as mechanical, e	electrical, civil, etc.								
(Minimum 3)	•	and spoken cor						y for	r pro	ofessiona
	interactions, including						-			
	3. Enhance the ability		_	ret te	echnica	al doc	cumen	its, re	searc	ch papers
	manuals, and industry									
CO1	Demonstrate proficier	nt usage of English	langua	ge ski	ills in t	techn	ical co	ommu	ınica	tion and
	documentation.									
CO2	Evaluate and critique	engineering texts	extracti	jø ess	sential	infor	matio	n and	Svni	hesizing
	complex ideas.			-5 501					. ~ <i>j</i> 110	
	-									
CO3	Generate clear and ef	fective technical re	ports, p	esent	tations	, and	docui	menta	ation	in
	English.									
				effect	tive na	rticir	ation	in en	gine	erino
CO4	Assess and refine ora	l communication sl	cills for							211115
CO4	Assess and refine oral discussions and prese		kills for	CIICC	r	1		•	8	
CO4	Assess and refine ora discussions and prese		kills for	CITCC		1		•	8	
CO4	discussions and prese Comprehend advance	ntations. ed technical vocabu	lary and	l lang	uage s					_
	discussions and prese	ntations. ed technical vocabu	lary and	l lang	uage s					_
	discussions and prese Comprehend advance	ed technical vocabue and professional c	lary and	l lang	guage s	truct	ures n	ecessa	ary f	_
CO5	discussions and prese Comprehend advance engineering discourse	ed technical vocabue and professional c	lary and	l lang	guage s	truct		ecessa	ary f	or
CO5	discussions and prese Comprehend advance engineering discourse	ed technical vocabue and professional c	lary and	l lang	guage s	truct	ares no	come	ary f	or
CO5 Unit-No.	Comprehend advance engineering discourse Conte	ed technical vocabue and professional cent	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or
CO5 Unit-No.	Comprehend advance engineering discourse Conte Email Etiquette i. Different parts of	ed technical vocabue and professional cent	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or
CO5 Unit-No.	Comprehend advance engineering discourse Conte	ed technical vocabue and professional cent	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or
CO5 Unit-No.	Comprehend advance engineering discourse Conte Email Etiquette i. Different parts of	ed technical vocabue and professional cent	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or
CO5 Unit-No.	Comprehend advance engineering discourse Conte	ed technical vocabue and professional cent emails and eds & Wonder	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte	entations. ed technical vocabuse and professional content emails and emails and eds & Wonder Communication,	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte	entations. ed technical vocabuse and professional content emails and emails and eds & Wonder Communication,	llary and commun Contac Hour	l langication	uage son. Lea	rning p bas	ures no	come	ary f	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Cont	entations. ed technical vocabuse and professional content emails and eds & Wonder Communication, rely to a client's	Contac Hour	l langication	Lea Develo	rning p bas	g Outo	come	ary f	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte	entations. ed technical vocabuse and professional content emails and eds & Wonder Communication, rely to a client's	llary and commun Contac Hour	l langication	Lea Develo	rning p bas nmin	g Outo	come ls of (ary for	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Conte Email Conte Cont	entations. ed technical vocabuse and professional coent emails and eds & Wonder Communication, evely to a client's	Contac Hour	l langication	Lea Develo rogran	rning p bas nmin h abi	g Outo	come ls of (ary for	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Conte Email Conte Cont	entations. ed technical vocabuse and professional coent emails and eds & Wonder Communication, evely to a client's	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Conte Email Conte Cont	entations. ed technical vocabuse and professional coent emails and eds & Wonder Communication, evely to a client's	Contac Hour	I langication	Lea Develo rogran	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Conte Cont	entations. ed technical vocabuse and professional coent emails and eds & Wonder Communication, rely to a client's Skills me	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	or BL
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Conte Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Cont	entations. ed technical vocabuse and professional coent emails and eds & Wonder Communication, rely to a client's Skills me	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	BL 1,2
CO5 Unit-No.	Comprehend advance engineering discourse Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Context	entations. ed technical vocabuse and professional content emails and eds & Wonder Communication, wely to a client's Skills me ance of Time	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	BL 1,2
CO5 Unit-No.	Comprehend advance engineering discourse Conte Conte Conte Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Conte Email Conte Cont	entations. ed technical vocabuse and professional coent emails and rds & Wonder Communication, rely to a client's Skills me ance of Time nt Matrix, Basic	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	BL 1,2
CO5 Unit-No.	Comprehend advance engineering discourse Conte Email Etiquette i. Different parts of usage of Magic Wor Phrases ii. Effective Email Context	entations. ed technical vocabuse and professional content emails and eds & Wonder Communication, wely to a client's Skills me ance of Time	Contac Hour	I langication	Developesearch	rning p bas nmin p as h abi Digita	g Outo	come ls of (ary for	BL 1,2

	Practice Session: Preparing time management matrix			
III	Interview Skills i. Preparation before the interview ii. Non-verbal cues for interview skills, Interview dos and don'ts iii. Handling difficult questions in Interview	10	Gather knowledge about various development concepts od Data Structure and Algorithms	1,2
IV	i. Introduction to Conflict Management ii. Conflict Management Strategies	10	Analyzation of the concepts of Computer Organization and Architecture	1,2
V	Practice Sessions	9	Analyzation of basic concepts of Operating systems	1,2

T1: Wren, P.C and Martin, H. 1995. High School English Grammar and Composition, S Chand Publishing.

T2: Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press

REFERENCE BOOKS:

T1: Mccarthy. (2008) English Vocabulary in Use Upper - Intermediate with CD ROM, Cambridge University Press

T2: Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Demonstrate proficient usage of English language skills in technical communication and documentation.	1,2,3,4,5,10,12							

2	Evaluate and critique engineering texts, extracting essential information and synthesizing complex ideas.	1,2,3,4,5,10,12
3	Generate clear and effective technical reports, presentations, and documentation in English.	1,2,3,4,5,10,12
4	Assess and refine oral communication skills for effective participation in engineering discussions and presentations.	1,2,3,4,5,10,12
5	Comprehend advanced technical vocabulary and language structures necessary for engineering discourse and professional communication.	1,2,3,4,5,10,12

Course	Course	CO	PO1	PO	PO	PO	PO	РО	PO	PO	РО	PO1	PO1	PO1
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
	Compete	CO 1	1	1	1	1	1					3		2
	nt English for	CO 2	1	1	1	1	1					3		2
22UBPD31 4R	Engineer s	CO 3	1	1	1	1	1					3		2
		CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTE	$\overline{\mathbf{R} - \mathbf{V}}$											
Course Title		CO CURRIO	CULAI	R AC'	ΓΙVΙΤ	IES								
Course code	22UBCC311R	Total credits: 1	L	T	P	S	R	O/F	C					
		Total hours: 15P	0	0	0	4	0	0	1					
Pre-requisite	Nil	Co-requisite					Nil							
Programme	Bache	elor of Technology	Compu	ter sc	ience	and I	Engin	eering						
Semester		all/ IV semester of t												
Course	1. Compleme	ent classroom educ	ation b	y inte	egratii	ng pr	actica	al experie	ences and					
Objectives	hands-on a	hands-on activities that reinforce and expand upon academic concepts. 2. Develop essential skills such as problem-solving, critical thinking,												
(Minimum 3)	2. Develop essential skills such as problem-solving, critical thinking, communication, and collaboration through structured, curriculum-aligned													
	activities.													
	3. Encourage students to explore their interests and talents, build self-													
	confidence, and cultivate a well-rounded character by participating in													
	diverse co-curricular programs.													
CO1	Demonstrate the ability to apply theoretical knowledge from the classroom to													
	real-world situations through hands-on experiences and projects.													
CO2	Exhibit improved problem-solving, critical thinking, communication, and collaboration													
202		ooth academic and p							-					
CO3		elf-confidence, self			and a	ı we	ll-roui	nded chai	racter by					
604	exploring and developing their interests and talents. Engage in community service and social initiatives, fostering a sense of responsibility,													
CO4		•	al initi	atives	, foste	ring a	a sens	e of respo	onsibility,					
CO5	empathy, and active	teamwork and lead	lorchin	ohilit	ios los	ornad	throu	ah portio	notion in					
COS	-	leadership roles wit	_					ign partici	ipation in					
Unit-No.		tent	Conta					come	BL					
Omt-No.	Con	tent	Hou		Lea	11 11111	ց Ծաւ	Come	BL					
I	AdtU encourage	s a range of	15		Co-cur	ricula	r	activities						
	activities outsid	Č						practical						
		nded to meet						academic						
		These activities			oncep		critica							
		lop the social and			levelo			problem-						
	soft skills and p	romote a holistic		s	olving	, co	mmui	nication),						
	development of	the learners,		f	oster	pers	sonal	growth						
	Keeping in mind	the 360 degree		(confid	ence,		self-						
	learning methodo	logy the students		a	waren	ess),		promote						
	are engaged in o	lifferent activities		S	ocial		respo	onsibility	3					
	headed under dit	ferent clubs viz.			hrougl			mmunity	3					
	_	otography, drama,						cultivate						
	literary etc., T							eadership						
		ticipate in regular	abilities, preparing them for holistic success in											
	club activities													
		r their interest and			caden		and	social						
	*	ent members of the		(ontext	lS.								
		represent AdtU in												
	national level	rersity student and competitions,												
	national level	compeniions,												

Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands-on experiences and projects.	1,2,3,4,5,6,10,12
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12

Course	Course	CO	PO1	PO	PO	PO	PO	РО	PO	PO	PO	PO1	PO1	PO1
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
	CO CURRICUL AR ACTIVITIE S	CO 1	2	2	2	1	2	2				2		2
		CO 2	2	2	2	1	2	3				2		2
22UBCC 221		CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTEI	R – V												
Course Title		EXTRA	-CURR	ICUI	LAR										
Course code	22UBEC311R	Total credits: 1	L	T		S R	O/F	C							
		Total hours: 60P	0	0	0	4 0	0	1							
Pre-requisite	Nil	Co-requisite				Nil									
Programme	Computer Science & Engineering Summer/ V semester of the third year of the program														
Semester															
Course	•	cial and soft skills: Fo		•	sition (of interp	ersonal ski	lls and							
Objectives	_	gement abilities amon	U				. 1,:0	. 1							
(Minimum 3)		 Promote holistic development: Encourage students to engage in multifaceted activities beyond academics, nurturing their leadership and interests. 													
		3. Facilitate in-depth expression: Provide opportunities for students to articulate their ideas and opinions clearly and critically analyze topics of interest.													
	their ideas and opinions clearly and critically analyze topics of interest.														
CO1	their ideas and opinions clearly and critically analyze topics of interest. earn to a plan so that they can make meaningful contributions, maintain a commitment,														
	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.														
CO2	•	ate students who den	nonstrate	lead	ership	and pur	sue interes	ts beyond							
	their academics.														
CO3	Learn to participa	te in various co-cu	rricular	activi	ties le	ading to	their m	ıltifaceted							
	personality develop					8									
CO4	_	, views, In-depth eva	aluation a	and a	nalysis	clearly	in the top	ic of their							
	interest.														
CO5	Demonstrate and p	oractices different ac	ctivities,	by Ir	tegrati	ng learr	ning exper	iences by							
	demonstrating trans		,	J	υ	O									
	-			1				T							
Unit-No.	Con	tent	Contact	,	Learn	ing Ou	tcome	BL							
I	AdtU encourage	es a range of	Hour 8	Cts	idonta	davalar	a well-								
1		le the regular	o			•	rsonality,								
		nded to meet			luding	_	effective								
		These activities			·		nip skills,								
		elop the social and		_	-		diverse								
		romote a holistic		_	_		xpression								
	development to						gration of								
	Keeping in mind	the3 60 degree		lea	rning	exp	periences,								
	learning methodo	logy the students		fos	stering		holistic								
		different activities		de	velopm	ent.		2,3							
		fferent clubs viz.													
	_	otography, drama,													
	literary etc., T														
		rticipate in regular													
	club activitie	* '													
		er their interest and ent members of the													
		represent AdtU in													
		versity student and													
	various inter Office	cisity student and													

national level competitions,	
Renewed personalities are invited to	
conduct workshops that benefit the	
members and students by giving	
them the platform to learn from	
experts in the respective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12

Course	Course	CO	PO1	РО	PO1	PO1	PO1							
code	Name	s	*	2	3	4	5	6	7	8	9	0	1	2
22UBEC31 1R	Extra- Curricul ar	CO 1	2	2	2	1	2	2				2		2
		CO 2	2	2	2	1	2	3				2		2
		CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

Course Title Course code	22BTCS316R		lictive A	SEMESTER – V Predictive Analysis											
Course code	22BTCS316R			_	_			0.75							
		Total credits: 3 Total hours: 45T	L 2	T 0	P 1	S 0	R 0	O/F 0	<u>C</u>						
Pre-requisite	Nil	Co-requisite		U	1		<u> </u>	U	3						
Programme	1411	Computer S	Science &	& Eı	ıgineer		1111								
Semester	Su	mmer/ V semester					orogr	am							
Course		ze the students with													
Objectives		an be used for effec					•								
(Minimum 3)	3. Provide stud	dents with the know	ledge to	appl	y predi	ctive	analy	tics techni	iques to						
	solve practi	cal business probler	ns and ir	npro	ve deci	ision-	makir	ng process	es.						
CO1	Understand and crit	ically apply the cond	cepts and	d me	thods o	of Pre	dictive	e analytics	S.						
		Understand and apply IBM SPSS Modeller in Data Mining, what kinds of data can be mined, what kinds of patterns can be mined.													
CO3	Applying and analy advanced field oper	sing how to use fund	ctions, de												
	Get exposed to the t							<i>y</i> -							
CO5	Understanding of IE				_										
Unit-No.	Con	tent	Contac Hour		Lea	rnin	g Out	come	BL						
I	ANALYTICS OV	ERVIEW				cs c	oncep	basic ots and business							
	What is Predictive predictive model w	orks, why			context		, 111	business							
	predictive modelin models in Predictiv	-	7						1,2,3						
	How Predictive an	alytics:							, ,						
	Transforming data	into future													
	insights, Analytics	trends: Past,													
	Present & Future,	Γowards a													
	Predictive enterpri	se.													
II	Statistical Analys	is			Unders statistic			damental concepts,							
	Define Statistics at Measures of Central Median and Mode, Dispersion: Absolute measures of disper Quartile Deviation Standard Deviation Variation, Moment Kurtosis.	al Value; Mean, Measures of Ite and Relative sion - Range, Mean Deviation, Coefficient of	8	1	techniq applica analysis	ues, tions s to o	and in lerive	l their	2,3,4						
III	DATA MINING		10	1		ts, al app			2, 3, 4						

	What is a Data Mining applications? Strategy for data mining: CRISP-DM, Steps of Data Mining, Stages and tasks in CRISP-DM, Life Cycle of a Data Mining Project, Skills Needed for Data Mining. Identify nodes and streams, The framework of a Data – mining project, Brief the unit of analysis, Explain the type of dialog box.		knowledge from large data sets.	
IV	UNIT OF ANALYSIS Concepts of Unit of analysis (Distinct, Aggregate, SetToFlag), Integrate data, CLEM Expression, Role of Relationship between two fields, Identifying the modeling objective.	12	Understand the concept and importance of the unit of analysis in research and data analysis.	2,3, 4
V	PREDICTIVE ANALYTICS WITH IBM WATSON STUDIO Understanding of IBM Cloud, IBM Watson Studio, Watson studio Components, Creating a Machine Learning Model, Data preparation, Watson Machine learning, Data Refinery, Watson Studio Neural Network Modeler, IBM Watson Studio jobs, Use case with AutoAI.	8	Understand predictive analytics concepts and IBM Watson Studio features for building predictive models. (2 - Understand). Apply IBM Watson Studio tools to develop and deploy predictive models effectively	2, 3, 4
Practical Com	ponent			
Practical 1	Introduction to Predictive Analysis	3	Explain the concept of predictive analysis and its importance in decision-making.	2
Practical 2	Predictive Modeling	3	Describe how predictive models work and their applications in various domains.	2
Practical 3	Analytics Trends Over Time	3	Analyze past, present, and future trends in analytics and their impact on business strategies.	4
Practical 4	Measures of Central Tendency	3	Compute and interpret mean, median, and mode for a dataset.	3

Practical 5	Measures of Dispersion	3	Calculate and compare measures of dispersion such as range, standard deviation, and coefficient of variation.	4
Practical 6	Skewness and Kurtosis Analysis	3	Evaluate skewness and kurtosis to understand the shape and distribution of data.	3
Practical 7	CRISP-DM Framework Overview	3	Outline the stages and tasks in the CRISP-DM framework for data mining projects.	3
Practical 8	Experiment: Data Mining Project Life Cycle	3	Apply the stages of a data mining project life cycle to a practical case study.	4
Practical 9	Data Preparation Using Watson Studio	3	Utilize IBM Watson Studio's Data Refinery for data preparation tasks like cleaning and feature engineering.	3
Practical 10	Utilize IBM Watson Studio's Data Refinery for data preparation tasks like cleaning and feature engineering.	3	Differentiate between distinct, aggregate, and SetToFlag units of analysis in data mining contexts.	4

IBM Courseware

T1 Predictive Analytics Mesmerizing & fascinating by ERIC SIEGEL

REFERENCE BOOKS:

R1 "Applied Predictive Modeling" by Max Kuhn and Kjell JohnsonDatabase Management Systems

R2 "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy

R3 "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" by Eric Siegel

Additional Resources:

- 1. https://www.ibm.com/topics/predictive-analytics
- 2. https://www.simplilearn.com/what-is-predictive-analytics-article
- 3. https://www.ibm.com/products/watson-studio

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Understand different types of signals-continuous and discrete, odd and even, periodic and aperiodic etc.	1, 2, 3, 4, 5, 10, 12							
2	Understand Classifications of the standard forms of Signals with respect to systems based on their properties.	1, 2, 3, 4, 5, 10, 12							
3	Analyse the concepts of Laplace transform based continuous time and discrete time analysis of signals and systems.	1, 2, 3, 4, 5, 10, 12							
4	Analyzation of the concepts of Fourier transform based continuous time and discrete time analysis of signals and systems.	1, 2, 3, 4, 5, 10, 12							
5	Analyzation of Z-transform in continuous time signals and systems by using appropriate mathematical tools.	1, 2, 3, 4, 5, 10, 12							

Course code	Course Name	Co s	PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
22BTCS31 6R	Predicti ve Analysi s	CO 1	2	2	1	1	1					1		2
		CO 2	3	3	3	3	2					2		3
		CO 3	3	2	3	3	3					2		3
		CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

		SEMESTE	R – VI									
Course Title			mpiler l	Desig	n							
Course code	22BTCS321R	Total credits: 4	L	T	P	S	R	O/F	С			
		Total hours:	3	0	2	0	0	0	4			
		45T+30P										
Pre-requisite	Theory of	Co-requisite		ı	ı	1	Nil	1	l			
_	Computation	_										
Programme	Bache	lor of Technology i	n Comp	uter	Scien	ce &	Engir	eering				
Semester	W	inter/ II semester o	of the th	ird y	ear of	the p	rogra	am				
Course	20. Discuss the	process of translati	ng a hig	h-leve	el lang	guage	to ma	chine cod	e required			
Objectives	for compile	r construction.										
(Minimum 3)	21. Analyze the	21. Analyze the software tools and techniques used in compiler construction such as										
	lexical anal	yser and parser gene	erators									
	22. Discuss the	data structures use	d in con	npiler	const	ructio	n suc	h as abstr	act syntax			
	trees, symb	ol tables, three addre	ess code	and s	stack r	nachi	nes.		·			
CO1	·	nt phases of a compi						principles	S.			
CO2		niques to build a lang		_			•					
CO3		ected translations, ev										
CO4		ociation of runtime s							orocedure			
	calls.		υ					,				
CO5	Apply code optimiz	ation on intermedia	te code f	or tar	get co	de ge	nerati	on.				
Unit-No.	11 7	tent	Conta				g Out	BL				
Cint-No.	Con	tent	Hour		Lea	11 IIIII	g Out	come	DL.			
I	Compiler structu	re:	8		Inders	stand	the	analysis-	1,2,3			
	Analysis-synthesis		J		ynthe		mod	-	1,2,0			
		ous phases of a			-			ne role of				
	_	ased approach to			exical		analys					
	_	ruction. Lexical			onver		sour					
	•	with input, Parser				_		tools like				
	1	, Token, Lexeme			LEX.		8					
	*	egular definition,										
	Transition diagran	-										
II	Syntax analysis:	15, 2211	8	(Trasp	the	cond	cepts of	3,4			
	"	ty, Associativity,	J		context			grammars				
	_	p-down parsing,					_	lop skills				
	1	scend parsing,				vario		parsing				
		n the grammars,						ling top-				
	Predictive pars	-			lown	ano		ottom-up				
	parsing, Opera	-						utilizing				
	grammars, LR	parsers (SLR,		_	ools li	-		atmizing				
	Canonical, LALR	•		'	0015 11	KC 17	icc.					
III	Syntax directed t		10	I	Learn	to	desi	gn and	3,4			
	•	thesized attributes,	10					-directed	5,1			
		aph, Evaluation			ransla			schemes,				
	1 0	evaluation of S-			ocusir		on	attribute				
	_	ons L- attributed			gramm	-	and					
		o down translation		-	•			sms, and				
		e checking: Type				-		fferences				
		essions, Structural			etwee		tructu					
	system, Type expl	cosions, su uctural		l	CIWEC	11 8	uuctu	ıaı anu				

	and name equivalence of types,		name equivalence of	
	Type conversion.		types.	
IV	Run time environments:	10	Comprehend the	4
-,	Storage organization, Storage-		organization and	-
	allocation strategies, Access to		management of run-time	
	nonlocal names, Activation tree,		storage, including	
	Activation record, Parameter		activation records and	
	passing, Symbol table and dynamic		parameter passing	
	storage allocation Intermediate code		techniques, and learn the	
	generation: Intermediate		principles of intermediate	
	representations, Translation of		code generation.	
	declarations, Assignments, Control		goneramen.	
	flow, Boolean expressions and			
	procedure calls.			
V	Code generation:	9	Acquire knowledge on the	4
·	Issues in the design of a code		design and implementation	-
	generator, Basic blocks and flow		of a code generator,	
	graphs, Next use information,		emphasizing optimization	
	Register allocation, Code generation		techniques, basic blocks,	
	algorithm, Dag representation of		flow graphs, and register	
	programs, Code generation from		allocation strategies.	
	dags, Peephole optimization and			
	code generator generators.			
	Practical Cor	nponent		
	T			
Practical 1	Design a lexical analyser for a	2	Understand the basics of	3
	simple programming language using		lexical analysis and the	
	LEX.		use of tools like LEX to	
	T 1 .: C	2	create lexical analysers.	2
Practical 2	Implement a program to identify	2	Ability to recognize and	2
	different tokens, lexemes, and		classify tokens, lexemes,	
	patterns in a given source code.		and patterns within a	
Practical 3	Create a transition diagram for a	2	source code.	
Practical 3	Create a transition diagram for a	2	Comprehend the	2
	given regular expression and simulate its working.		conversion of regular expressions to transition	
	simulate its working.		diagrams and their usage	
			in lexical analysis.	
Practical 4	Write a recursive descent parser for	2	Develop and implement	3
1 Tactical 4	a given context-free grammar	2	top-down parsing	3
	(CFG).		techniques using recursive	
	(Cl d).		descent methodology.	
Practical 5	Implement an SLR parser for a	2	Understand and apply	3
i i ucucui 3	specified grammar and test it with		bottom-up parsing	5
	various input strings.		techniques, specifically	
	, anous input surings.		SLR parsing.	
Practical 6	Using YACC, create a parser for a	2	Gain practical experience	3
T Tactical V	small language and demonstrate its	2	with parser generators like	5
	usage with sample inputs.		YACC and their	
	asago with sumple inputs.		integration with lexical	
			mogration with leaten	225

			analysers.	
Practical 7	Construct a dependency graph for a	2	Understand the	4
	given annotated parse tree and		relationship between parse	
	determine the order of attribute		trees and attribute	
	evaluation.		evaluation orders.	
Practical 8	Develop an attribute grammar for a	2	Understand and implement	3
	simple language construct and		syntax-directed translation	
	implement its evaluation using		using attribute grammars.	
	synthesized and inherited attributes.			
Practical 9	Write a type checker for a language	2	Implement type checking	3
	that includes basic types, type		mechanisms and	
	expressions, and type conversions.		understand type systems	
			and conversions.	
Practical 10	Simulate the activation record	2	Understand the structure	3
	creation and management for a		and management of	
	simple recursive function.		activation records in a	
			runtime environment.	
Practical 11	Implement intermediate code	2	Develop skills in	3
	generation for a given set of		generating intermediate	
	language constructs (e.g., if-else,		representations of high-	
	loops).		level language constructs.	
Practical 12	Create a symbol table management	2	Design and implement a	3
	system that handles scope and		symbol table for managing	
	lifetime of variables.		variable scopes and	
			lifetimes.	
Practical 13	Design and implement a basic block	2	Understand the concepts	3
	and flow graph generator for a given		of basic blocks and control	
	intermediate code.		flow graphs in code	
			generation.	
Practical 14	Develop a register allocation	2	Apply graph coloring	3
	algorithm using graph coloring		techniques for efficient	
	techniques.		register allocation during	
			code generation.	
Practical 15	Implement a peephole optimization	2	Understand and apply	3
	technique for a given intermediate		optimization techniques at	
	code and demonstrate its		the code generation level.	
	effectiveness.			

T9: A.V. Aho, R. Sethi, J.D. Ullman, "Compilers: Principles, Techniques and Tools", Addison – Wesley.

T10: Steven S. Muchnick, "Advanced Compiler Design and Implementation", Elsevier

REFERENCE BOOKS:

R6: W. Appel, "Modern Compiler Implementation in C: Basic design", Cambridge Press **R7:** Fraser and Hanson, "A Retargetable C Compiler: Design and Implementation", Addison-Wesley

R8: Dhamdhere, "Compiler Construction", McMillan

OTHER LEARNING RESOURCES:

- 1. www.vssut.ac.in/lecture_notes/lecture1422914957.pdf
- 2. 2.http://csenote.weebly.com/principles-of-compiler-design.html
- 3. http://www.faadooengineers.com/threads/32857,Compiler-Design-Notes-full-book-pdf-download
- 4. https://www.vidyarthiplus.com/vp/thread,37033.html#.WF0PhlMrLD

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Understand different phases of a compiler and explain lexical analysis principles.	1,2,3,4,5,10,12							
2	Apply parsing techniques to build a language-specific syntax analyser.	1,2,3,4,5,10,12							
3	Analyse syntax-directed translations, evaluation order, and type checking.	1,2,3,4,5,10,12							
4	Understand the association of runtime storage allocation with control flow and procedure calls.	1,2,3,4,5,10,12							
5	Apply code optimization on intermediate code for target code generation.	1,2,3,4,5,10,12							

Course	Course	СО	PO	РО	PO1	PO1	PO1							
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
	Compil – er Design	CO 1	3	2	1	2	2					2		3
		CO 2	3	3	3	3	2					2		3
22BTCS32 1R		CO 3	3	3	3	3	2					2		3
		CO 4	3	1	2	2	2					2		3
		CO 5	3	3	3	3	2					2		3

		SEMESTE	R – VI										
Course Title		Comp	puter Ne	etwor	·ks								
Course code	22BTCS322R	Total credits: 4	L	T	P	S	R	O/F	C				
		Total hours: 45T+30P	3	0	2	0	0	0	4				
Pre-requisite	Programming	Co-requisite	Linux										
Ducanama	Skills	on of Toolonele on in	- Comm	4	Caian	aa 0 -	Ei						
Programme Semester		or of Technology in nter/ II semester o											
Course		the fundamentals of							lin naco				
Objectives		g and flow control.		mmu	mean	ons p	тистр	ies of fried	na acces				
(Minimum 3)	_												
(William 3)		with the TCP/IP pro	-		-		-		otocols				
		rite network-capabl						• •	0.00015.				
		the structure of cl			-				ild clier				
	server programs.												
CO1	Understand the bas		nunicatio	n, ne	etworl	king,	inter	net, physi	cal laye				
	techniques, and circu					O.			•				
CO2	Analyze data link lay	ver techniques, flow	control	, and	error	proto	cols.						
CO3	Analyse network lay	er protocols along v	with rout	ing is	ssues.								
CO4	Summarize transpor	t and application l	layer op	eratio	ons ai	nd pr	otoco	ls along	with Qo				
	services.												
CO5	Design and execute skills in network app	_		ammi	ng pi	roject	s, sho	owcasing	advance				
Unit-No.	Cont		Contac	·t	I As	arnin	σ Out	come	BL				
CIII-140.	Cont	Cit	Hour		Lu	41 11111,	g Out	come					
I	Introduction to ne	tworks, internet.	8	U	Inders	stand	the	e OSI	2				
	protocols and star							uite, and					
	model, layers in OS	SI model, TCP/IP			asic		oncep						
	suite, Addressing	, Analog and		a	ddress	sing,	sign	als, and					
	digital signals.	Physical Layer:		tı	ansm	ission	n medi	a.					
	digital transmission	n, multiplexing,											
	transmission media	, circuit switched											
	networks, Datag												
	virtual circuit netw												
	Telephone network												
II	Data link layer: Int		8					ction and	2,3				
	coding, cyclic co				orrect			chniques,					
	framing, flow and					_	_	ocols like					
	Noiseless channels	-					point	t-to-point					
	HDLC, point to poi	nt protocols		p	rotoco	ols.							
III	Network Layer: Lo	gical addressing.	10	(ain k	nowle	edge o	n logical	2,4				
	internetworking, tu				ddress		-	routing					
	mapping, ICMP, IC	-			rotoco	_	and	address					
1	·	stocols multipost		n	nappir	ng tec	hniqu	es.	1				
	uni-cast routing pro	blocois, municast [11	1 1		1						
	routing protocols.	nocois, municast		"	11	C	•						
IV			10		Compr			the	2,3				

	SCTP, data traffic, congestion,		to-process delivery,	
	congestion control, QoS, integrated services, differentiated services,		TCP/UDP protocols, and	
	QoS in switched networks.		congestion control mechanisms.	
	Qos in switched networks.		mechanisms.	
V	Application Layer – Domain name	9	Understand domain name	2
•	space, DNS in internet, electronic	,	space, DNS operations,	4
	mail, FTP, WWW, HTTP, SNMP,		email protocols, FTP,	
	multi-media, network security		HTTP, and basics of	
	mutti-media, network security		network security.	
			network security.	
Practical 1	Configure a simple network	2	Demonstrate the ability to	3
	consisting of multiple devices such		configure basic network	
	as routers, switches, and computers.		settings and troubleshoot	
	Test connectivity and troubleshoot		connectivity problems.	
	any issues encountered.			
Practical 2	Use network analysis tools like	2	Gain proficiency in	4
	Wireshark to capture and analyze		protocol analysis and	
	network traffic. Identify different		understanding of the OSI	
	protocols, their headers, and their		model layers.	
	roles in the OSI model.			
Practical 3	Use oscilloscopes or signal	2	Understand the	2
	analysers to examine analog and		fundamentals of analog	
	digital signals transmitted over the		and digital signals in	
	network. Interpret signal		networking and their	
	characteristics and identify any		analysis	
	anomalies.		_	
Practical 4	Implement a block coding technique	2	Gain hands-on experience	3
	such as Hamming codes to detect		in implementing error	
	and correct errors in transmitted data		detection and correction	
	frames. Analyse its effectiveness in		mechanisms in the data	
	error detection and correction.		link layer.	
Practical 5	Implement CRC error detection	2	Understand the theory and	3
	mechanism in a data link layer		practical implementation	
	protocol such as Ethernet. Calculate		of CRC for error detection.	
	CRC values for given data frames			
	and verify error detection capability.			
Practical 6	Implement and analyze flow control	2	Understand the concepts	4
	mechanisms such as Stop-and-Wait		of flow control and error	
	and Sliding Window protocols.		control in data link layer	
	Measure throughput and efficiency		protocols.	
	under different network conditions.			
Practical 7	Configure IP addresses using both	2	Demonstrate proficiency	3
	IPv4 and IPv6 addressing schemes		in configuring logical	
	for a network topology. Verify		addresses	
	connectivity and troubleshoot		andunderstanding IP	
	addressing conflicts.		addressing schemes.	
Practical 8	Implement and compare different	2	Understand the operation	4
	routing protocols such as RIP,		of routing protocols and	
	0 1	l .	6 I	

	OSPF, and BGP in a simulated		their impact on network	
	network environment. Analyze		performance.	
	routing tables and convergence		performance.	
	times.			
Practical 9	Configure Address Resolution	2	Gain practical experience	3
	Protocol (ARP) and Neighbor		in address resolution and	
	Discovery Protocol (NDP) for		mapping techniques.	
	mapping network layer addresses to			
	data link layer addresses. Verify			
	mappings and troubleshoot			
	resolution issues.			
Practical 10	Capture and analyse UDP and TCP	2	Understand the differences	4
	traffic using packet analysis tools.		between UDP and TCP	
	Compare their characteristics, such		protocols and their	
	as connection establishment,		suitability for different	
	reliability, and overhead.		applications.	
Practical 11	Configure QoS mechanisms such as	2	Understand the importance	5
	traffic prioritization, traffic shaping,		of QoS in ensuring reliable	
	and congestion management in a		and efficient network	
	network. Measure and analyze QoS		performance.	
	metrics under different traffic loads.			
Practical 12	Implement and evaluate congestion	2	Gain practical insights into	4
	control algorithms such as TCP's		congestion control	
	congestion avoidance and		mechanisms and their	
	congestion control mechanisms.		impact on network	
	Measure throughput and packet loss		performance.	
	under congested conditions.			
Practical 13	Configure and troubleshoot DNS	2	Understand the operation	3
	servers and clients. Analyze DNS		of DNS and its role in	
	queries and responses using network		translating domain names	
	diagnostic tools.	_	to IP addresses.	
Practical 14	Set up email servers (SMTP, IMAP)	2	Gain practical experience	3
	and FTP servers. Demonstrate the		in configuring and	
	exchange of emails and file transfers		securing email and FTP	
	between clients and servers.		services.	
	Implement security measures such			
D 4: 14.5	as encryption and authentication.	•	TT 1 , 1 , 1 , 1	
Practical 15	Deploy web servers (HTTP,	2	Understand the principles	3
	HTTPS) and web applications.		of web service security	
	Implement security measures such		and implement security	
	as SSL/TLS encryption, HTTPS,		measures to protect against	
	and web application firewalls to		threats.	
	protect against common attacks.			

- **T11:** Data Communications and Networking–Behrouz A. Forouzan, Fourth EditionTMH,2006.
- **T12:** Computer Networks—Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

R9: An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education

R10: Understandingcommunications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.

R11: Computer and Communication Networks, Nader F. Mir, Pearson Education

R12: Computer Networking: A Top-Down Approach Featuring the Internet, James F. Kurose, K. W. Ross,3rd Edition, Pearson Education.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the basics of data communication, networking, internet, physical layer techniques, and circuit switching.	1,2,3,4,5,12
2	Analyze data link layer techniques, flow control, and error protocols.	1,2,3,4,5,12
3	Analyse network layer protocols along with routing issues.	1,2,3,4,5,12
4	Summarize transport and application layer operations and protocols along with QoS services.	1,2,3,4,5,12
5	Design and execute computer network programming projects, showcasing advanced skills in network application development.	1,2,3,4,5,12

Course code	Course Name	СО	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	P O 11	P O 12
		CO 1	3	1	2	1	1							3
	Comput	CO 2	3	2	3	1	1							3
22BTCS32 2R	er Network s	3	3	2	3	1	1							3
		CO 4	3	2	3	1	2							3
		5 5	3	3	3	3	2					1		3

		SEMESTER	R – VI									
Course Title		Professional E	lective-	II: D	ata M	lining	5					
Course code	22BTCS317R	Total credits: 3	L	T	P	S	R	O/F	C			
		Total hours: 45T	3	0	0	0	0	0	3			
Pre-requisite	Basic	Co-requisite				ľ	NIL					
	Programming											
	Skills											
Programme	Bachelor of Technology in Computer Science & Engineering											
Semester		Winter/ II semester of the third year of the program										
Course		basics of data mini	ing, inc	ludin	g its	appli	cation	s, challe	nges, and			
Objectives		es of data attributes.		_			_					
(Minimum 3)	_	iency in association		_		_	such	as freque	nt itemset			
	_	and association rule		_								
	1	ering, prediction, ar			ion m	ethod	ls, inc	cluding a	lgorithms,			
201		metrics, and ensembl			, 1	C	1		1 4:0:			
CO1		e real-life data, ma	stering	statis	stical	tound	ation	s, and 1	aentifying			
CO2	challenges in data n	nning. n Rule Mining to		NGC "	rootic	o1	robla.	ne dom	onetratin ~			
CO2		oroficiency in applica		588 F	пасис	ai p	lobiei	iis, deiii	onstrating			
CO3		lysis in unsupervise		ing t	o rea	1_wor	ld da	tacete cl	nowcasing			
003		clustering techniques		ing (.o rea	1-W01	ia aa	itasets, si	lowcasing			
CO4	•	r methodologies for		iction	usin	σ D:	ata N	Tining te	echniques			
		ical application skill	_	iction	dom	5 50	1	mmg u	oeimiques,			
CO5		on techniques in		ised	learn	ing	for N	Machine	Learning			
	* * *	asing proficiency in	•			_						
Unit-No.		tent	Contac				_	come	BL			
			Hour									
I	Introduction to D	ata Mining:	8	U	Inders	tand o	lata m	nining	2			
	What is data minin	ng, applications of		C	oncep	ts, typ	es of	data				
	data mining, issue	_		a	ttribut	es, an	d basi	ic				
	faced in data min			st	tatistic	al de	scripti	ions.				
	attributes – nomin	*										
	numeric, discrete											
		escriptions of data										
	– measures of cer											
	dispersion, major	tasks in data pre-										
TT	processing	N. #* *	0		1	- l d	L Gua av		2.2			
II	Association Rule	Frequent itemset,	8		Compre emset		_		2,3			
	maximal frequent	_			lgorith	_						
	frequent itemset,				-		_	th, and				
	-	t generation –			ssocia		-	tii, aiid				
	_	, DIC algorithm			enerat		uic					
	and FP-grow	~		5	-110141							
	Generating associ	~										
	frequent item sets											
III	Clustering:		10	C	rasp c	cluste	r anal	ysis	2,4			
	_	nalysis, need for			oncep							
	cluster analysis.	•			neasur			•				
		<u> </u>							1			

	dissimilarity matrix, proximity and dissimilarity measures for different data attribute types, partitioning based clustering methods, density-based clustering methods and hierarchical clustering methods, measuring cluster quality		clustering methods including partitioning, density-based, and hierarchical.	
IV	Prediction: What is prediction, application areas of prediction, Simple linear regression, Multiple linear regression, Predictor Error measures, Common techniques for assessing accuracy – holdout, random sampling, cross-validation, bootstrap	10	Understand prediction concepts, regression techniques, predictor error measures, and methods for assessing accuracy.	2,3
V	Classification: what is classification, differences between classification and prediction, applications of classification, Some classification algorithms - Decision Trees, Naïve Bayes Classification, Logistic Regression and K-nearest Neighbour Classification, Confusion matrix and metrics for evaluating classifier performance, Overview of ensemble methods — Bagging and Boosting, Ensemble- based classifier - Random Forest	9	Understand classification vs. prediction, classification algorithms like decision trees, Naïve Bayes, logistic regression, and evaluation metrics.	2,4

T13: Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, India

T14: AK Pujari, Data Mining Techniques, University Press, India

REFERENCE BOOKS:

R13: Han, Manilla and Smyth, Principles of Data Mining, PHI, India

R14: Tan, Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc.

OTHER LEARNING RESOURCES:

- 1. https://www.geeksforgeeks.org/data-mining/
- 2. https://www.javatpoint.com/data-mining

3. https://www.tutorialspoint.com/data_mining/index.htm

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand diverse real-life data, mastering statistical foundations, and identifying challenges in data mining.	1,2,3,4,10,12						
2	Utilize Association Rule Mining to address practical problems, demonstrating understanding and proficiency in application.	1,2,3,4,10,12						
3	Apply Cluster analysis in unsupervised learning to real-world datasets, showcasing competence in data clustering techniques.	1,2,3,4,5,10,12						
4	Implement popular methodologies for prediction using Data Mining techniques, demonstrating practical application skills.	1,2,3,4,10,12						
5	Apply Classification techniques in supervised learning for Machine Learning applications, showcasing proficiency in categorizing and classifying data.	1,2,3,4,5,10,12						

Course	Cours	CO	PO	PO	PO	PO	PO	РО	РО	PO	PO	PO1	PO1	PO1
code	e		1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO 1	2	2	1	3						1		2
22BTCS31 7R	Data	CO 2	2	2	1	3						1		2
	Minin g	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	- VI						
Course Title		Professional Electiv	ve-II: A	rtifi	cial In	tellig	ence		
Course code	22BTCS317R	Total credits: 3	L	T	P	S	R	O/F	С
		Total hours: 45T	3	0	0	0	0	0	3
Pre-requisite	Basic	Co-requisite			1	1	NIL	I.	
	Programming								
	Skills, Data								
	structures								
Programme	Bachel	or of Technology in	Compu	ıter i	Scienc	ce & 1	Engin	eering	
Semester	W	inter/ II semester of	the thi	rd ye	ear of	the p	rogra	m	
Course	1. Describe th	e field of AI and its	subfield	ls m	achine	learı	ning, l	NLP and	computer
Objectives	vision								
(Minimum 3)	2. Learn and	implement key NLP	algorith	nms	and m	odels	, such	n as virtua	al agents,
	chatbots, se	entiment classifiers,	and lan	guag	e tran	slatoi	s, to	solve a v	ariety of
	natural lang	uage understanding t	asks.						
	_	ractical Applications		_				-	
	~ ~	of computer vision i					-		vehicles,
		systems, medical im					eality.	•	
CO1	Remember and und	erstand relevance of A	AI in too	lay's	world	1.			
CO2	Gain an idea about l	Machine Learning ap	plication	n in r	eal wo	orld p	roblei	n.	
CO3	*	anding deep learning	•						
CO4	Apply and Analyze	data by applying vari	ious mad	chine	e learn	ing al	gorith	nms.	
CO5	Enhance problem-so	olving abilities with I	BM Clo	ud s	ervice				
Unit-No.	Con	tent	Contac	t	Lea	rning	g Out	come	BL
			Hour						
I	Introduction	to Artificial	8					types of	2,4,5
	Intelligence: Overv							is of AI,	
	Intelligence (AI),	•		_	ractica		app	lications,	
	(ML), and Deep	-			omput	•		eras,	
	Natural Langua				etermi			vs.	
	(NLP), Computer			_			-	ems, and	
	Describe the type	-		tl	ne road	d map	of A	I.	
	what the main foc								
	practical application								
	the eras of comp								
		en deterministic							
	and probabilistic	systems, Road							
	Map of AI.	7.5							
II	Introduction	to Machine	8		_		conc	epts of	2,3
	Learning:	r 1 · r ·			upervi		1 1	and	
	Introduction to M				_			ning, and	
	•	Learning &						nplement	
	Unsupervised Lea				arious		-		
		rithms: Linear			nsupe		1	learning	
	Regression, Logi	_		a	lgorith	ıms.			
	Suppor Vector M								
	Tree,Random Fore								
	Unsupervised Lea								
	K-Means Cluster	ing, Hierarchical							

	Clustering.			
	Clustering.			
III	Introduction to Deep Learning:	10	Understand the basics of	2,3
	Introduction to Deep Learning:	_ •	neural networks, activation	_,-
	Neural Networks, Layers, and		functions,	
	Activation Functions, Back		backpropagation, and deep	
	Propagation, Optimizers, Deep		learning algorithms like	
	Learning Algorithm: ANN, CNN,		ANN, CNN, RNN, LSTM,	
	RNN, LSTM with Tensor flow and		GANs, and RBMs.	
			GAINS, and KDIVIS.	
	Adversarial Networks (GANs)			
	Adversarial Networks (GANs),			
	Restricted Boltzmann Machines			
	(RBMs) and Applications.			
IV	Introduction to Natural Language	10	Understand the	2,3
	Processing and Computer Vision:		components and	
	Introduction to Natural Language		applications of NLP, and	
	Processing, NLP application in real		grasp the basics of	
	world, components of NLP, Vartual		computer vision, image	
	Agents overview, Chatbot and its		classification, and object	
	parts, Tokenization, Stemming &		recognition.	
	Lemmatization in NLP,			
	BagofWords,TF-IDF,Word2Vec,			
	Word Embedding in NLP.			
	Introduction to Computer Vision,			
	Image Classification and Object			
	Recognition, Feature Detection and			
	Description algorithms with Open			
	CV.			
V	Evolution from DeepQA to	9	Understand the evolution	2,3
	Watson services on IBM Cloud:		of Watson services from	
	Explain the DeepQA architecture		DeepQA architecture,	
	was;Explain why IBM decided to		explore IBM Watson	
	commercialize Watson and Describe		services, and create	
	the evolution of Watson services		chatbots using Watson	
	from the original DeepQA		Assistant.	
	architecture to the present.			
	Introduction to IBM Watson:			
	explore Watson Studio, IBM's			
	integrated environment for data			
	scientists, developers, and domain			
ĺ	beleficies, developers, and domain	İ		
	experts to build and denlow MI			
	experts, to build and deploy ML models.			

Creating Chatbots using Watson	
Assistant: learn the basics of Watson	
Assistant, including intents, entities,	
dialog flows, and integration	
capabilities.	
Natural Language Understanding	
(NLU), Language Translator, Text	
to Speech, Speech to Text on IBM	
Cloud.	

T15: Introduction to Data Science: B.UmaMaheswari& R. Sujata.

T16: Deep Learning with TensorFlow and Keras by Amita Kapoor, Antonio Gulli& Sujit pal.

T17: Artificial Intelligence by Stuart J. Russell & Peter Norvig.

T18: Hands-On Artificial Intelligence for IBM Watson: Explore the Power of AI to Innovate and Transform Business Processes" by Dr. Harish Garg.

REFERENCE BOOKS:

R15: Deep Learning Illustrated: A Visual, Interactive Guide to Artificial Intelligence" by Jon Krohn, Grant Beyleveld, and AglaéBassens.

R16: Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth.

R17: Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: AurelienGeron.

OTHER LEARNING RESOURCES:

Python & Machine Learning -https://www.w3schools.com/python/python_ml_getting_started.asp

- 1. AI with IBM https://developer.ibm.com/technologies/artificial-intelligence/
- 2. IBM Cloud https://cloud.ibm.com/docs

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Remember and understand relevance of AI in today's world.	1,2,3,4,10,12						
2	Gain an idea about Machine Learning application in real world problem.	1,2,3,4,10,12						
3	Develop an understanding deep learning concept in AI.	1,2,3,4,5,10,12						

4	Apply and Analyze data by applying various machine learning algorithms.	1,2,3,4,10,12
5	Enhance problem-solving abilities with IBM Cloud service.	1,2,3,4,5,10,12

Course code	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	О	О	О
												10	11	12
		CO 1	2	2	1	3						1		2
22BTCS317 R Intelli	Artificial	CO 2	2	2	1	3						1		2
	ce	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	– VI											
Course Title	PE-III: Machine Learning													
Course code	22BTCS318R	Total credits: 3	L	T	P	S	R	O/F	С					
		Total hours: 45T	3 0 0 0 0 0 3											
Pre-requisite	Basic	Co-requisite		•	•	1	NIL							
	Programming													
	Skills													
Programme	Bachelor of Technology in Computer Science & Engineering													
Semester	Winter/ II semester of the third year of the program													
Course	1. To provide fundamental theoretical foundations knowledge of various learning													
Objectives	algorithms													
(Minimum 3)	2. Apply suit	Apply suitable machine learning techniques for data handling and knowledge												
	extraction													
	3. To gain th	e fundamental knowle	edge a	nd un	derst	and th	ne con	ntext of si	upervised					
	and unsupe	rvised learning throug	h real-	life ex	kampl	es.								
CO1	Recognize the char	acteristics of machine	learnir	ıg stra	tegie	S								
CO2	Demonstrate profi	ciency in data analy	tics a	ınd aj	pply	advai	nced	tools to	work on					
	dimensionality redu	ction and mathematic	al opei	ations	S.									
CO3	Analyze and Apply	the suitable supervis	ed lear	rning	and u	nsupe	ervised	d learning	methods					
	for real-world prob	lems and for handling	unkno	wn pa	tterns	S.								
CO4	Understand the con	cept of ensemble learr	ing an	d its a	pplic	ations	S.							
CO5	Evaluate the perfor	mance of various algo-	rithms											

Unit-No.	Content	Contact	Learning Outcome	BL
		Hour		<u> </u>
I	IntroductiontoMachineLearning	8	Understand the concept of	2
	WhatisMachineLearning?,Typesof		machine learning, its types	
	Machine Learning:		(supervised, unsupervised,	
	Supervised, Unsupervised, and Reinf		reinforcement learning),	
	orcementLearning,ApplicationsofM		and applications in various	
	achineLearningin Various Fields.		fields.	
II	Data Preprocessing and	8	Gain skills in data	2,3
	Exploratory DataAnalysis		collection, cleaning,	
	DataCollectionandCleaning,Handli		handling missing values,	
	ngMissingValues,FeatureScalingan		feature scaling,	
	dNormalization,DataVisualizationT		normalization, and	
	echniques,ExploratoryDataAnalysis		visualization techniques	
	(EDA),statisticalmeasures,Basictoo		for exploratory data	
	ls(plots,graphsandsummarystatistic		analysis (EDA).	
	s)of EDA.			
III	SupervisedLearningandUnsuper	10	Learn various supervised	2,4
	visedLearning		and unsupervised learning	
	LinearandNon-Linearexamples-		algorithms including linear	
	Multi-Class & Multi-Label		regression, decision trees,	
	Support, Clustering basics (Partitione		k-NN, logistic regression,	
	d,HierarchicalandDensitybased)-K-		clustering basics, and	
	Meanslustering-KModeclustering-		principal component	

	Self organizing maps,		analysis.	
	Expectationmaximization –			
	Principalomponent Analysis			
IV	EnsembleLearning	10	Understand ensemble	2,3
	Bagging-		learning techniques such	
	CommitteeMachinesandStacking-		as bagging, boosting,	
	Boosting-Ranking		stacking, and ranking-	
			based aggregation for	
			improving model	
			performance.	
V	ModelEvaluationandOptimizatio	9	Learn model validation	2,5
	n		techniques including	
	ModelValidationTechniques:Train/		train/test split, cross-	
	TestSplit,Cross-		validation, and	
	Validation,PerformanceMetrics,Co		performance metrics like	
	nfusionMatrix,Accuracy,Precision,		confusion matrix,	
	Recall, F1-Score		accuracy, precision, recall,	
			and F1-score.	

T19: T1 S. Shalev-Shwartz, S.Ben-David, "Understanding Machine Learning: From Theory to Algorithms", Cambridge University Press, 2014.

T20: T2 EthemAlpaydin,"Introduction to Machine Learning", MIT Press, Prentice Hall of India,

REFERENCE BOOKS:

R18: MehryarMohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning", MIT Press, 2nd Edition, 2018.

R19: Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997...

R20: Data Mining: Concepts and Techniques", Third Edition, 2 Jiawei Han, Micheline Kamber and Jian Pei, ISBN 0123814790,(2011).

R21: Duda, Richard, Peter Hart, and David Stork, "Pattern Classification," 2 nd Edition, John Wiley & Sons, Hoboken, 2000.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Recognize the characteristics of machine learning strategies	1,2,3,4,10,12

2	Demonstrate proficiency in data analytics and apply advanced	1,2,3,4,10,12
	tools to work on dimensionality reduction and mathematical	
	operations.	
3	Analyze and Apply the suitable supervised learning and	1,2,3,4,5,10,12
	unsupervised learning methods for real-world problems and	
	for handling unknown patterns.	
4	Understand the concept of ensemble learning and its	1,2,3,4,10,12
	applications.	
5	Evaluate the performance of various algorithms.	1,2,3,4,5,10,12

Course code	Course	CO	PO	PO	РО	PO	PO	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	О	О	О
												10	11	12
		CO 1	2	2	1	3						1		2
22BTCS318 R	Machin	CO 2	2	2	1	3						1		2
	Learnin	Co3	3	3	3	3	3					1		3
	g	CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	R – VI													
Course Title		PE-III: B	ig Data	Ana	lytics											
Course code	22BTCS318R	Total credits: 3	L	T	P	S	R	O/F	С							
		Total hours: 45T	3	0	0	0	0	0	3							
Pre-requisite	DBMS	Co-requisite	1			I	NIL	I								
Programme	Bache	lor of Technology in	Comp	ıter S	Scienc	e & :	Engin	eering								
Semester	W	inter/ II semester of	the thi	rd ye	ar of	the p	rogra	m								
Course	4. Gain found	ational knowledge of	Big Dat	a, in	cludin	g its	charac	teristics,								
Objectives	technologie	s, and real-world app	lication	s acro	oss vai	rious	domai	ins.								
(Minimum 3)	5. Learn the architecture and components of Hadoop and Spark, and develop															
	practical skills in data ingestion, processing, and management.															
	6. Develop the ability to perform analytics on Big Data, apply machine learning															
	-	techniques, and utilize visualization tools for insightful data representation.														
CO1		racteristics and real-w	orld ap	plicat	ions c	of Big	g Data,	, different	iating it							
004	from traditional dat		1 6													
CO2		e of Hadoop and Spar	k frame	work	s by e	xecu	ting ba	asic data p	processing							
G02	tasks.		. 4 - 1	14	1	14 1- 1	:1:4 C-	1°.CC								
CO3	-	re various NoSQL da	itabases	ana t	ineir s	uitabi	ility fo	r differen	t types of							
CO4	Big Data storage re-	quirements. ata preprocessing tecl	hnianas	and :	maahi	no 10	ornina	tools for	offootivo							
C04	Big Data analytics.	ata preprocessing tech	miques	anu	шасш	ne ie	arming	10018 101	enective							
CO5		Big Data analytics pip	aeline 116	ing c	·loud-l	hased	l coluti	ions and e	ncuring							
COS	data security and pr		Jenne us	ing c	iouu-	baseu	Soluti	ions and c	ansuring							
Unit-No.			Contac	t	Lea	rnin	g Out	come	BL							
			Hour		Lea	BE .										
I	Introduction to B	ig Data:	8	U	Inders	tand	the de	efinition,	2,4							
	Overview of Big	Data: Definition		cl	haract	eristi	cs, a	nd real-								
	and characteristic	es of Big Data		W	orld	appli	cations	s of Big								
		ocity, Variety,			oata,		well	as the								
		alue), Differences			echnol	_		and								
		al data and Big				ges a	issocia	ited with								
	Data.			it												
	•	he Real World:														
		various domains														
		e, social media, e-														
	Data applications.	Case studies of Big														
		ogies: Introduction														
	•	osystem, NoSQL														
	^	erview (e.g.,														
	MongoDB, Cassar	(0 /														
	_	ges: Data storage														
	_	ssues, Privacy and														
	ethical considerati	•														
		-							1							
	Data Generation S	ources: Structured														
		data, Data from														
	vs. Unstructured															

II	Big Data Processing Frameworks:	8	Grasp the fundamentals of	2,3
11	Hadoop Fundamentals: Architecture	O	Hadoop ecosystem,	2,5
	of Hadoop, Hadoop Distributed File		including HDFS,	
	System (HDFS), MapReduce		MapReduce, and related	
	programming model.		tools, as well as Spark	
	Hadoop Ecosystem Components:		framework and its	
	Introduction to Pig, Hive, HBase,		comparison with Hadoop.	
	and other related tools, Use cases		comparison with Hadoop.	
	and applications of each component.			
	•			
	Data Ingestion Tools: Overview of			
	Sqoop and Flume, Real-time data			
	processing with Apache Kafka.			
	Spark Framework: Introduction to			
	Apache Spark, Spark vs. Hadoop			
	MapReduce, Spark RDDs (Resilient			
	Distributed Datasets).			
	Hands-On Exercises: Basic HDFS			
	commands, Writing and running a			
	simple MapReduce program.			
III	Data Storage and Management:	10	Gain knowledge of	2,3
	NoSQL Databases: Types of NoSQL		NoSQL databases,	
	databases: Document, Key-Value,		focusing on MongoDB,	
	Column Family, Graph, CAP		Cassandra, HBase, and	
	theorem and BASE properties.		Big Data warehousing	
	MongoDB: Features and		solutions, and their	
	architecture of MongoDB, CRUD		features, architecture, and	
	operations in MongoDB, Indexing		operations.	
	and aggregation.			
	Cassandra: Features and architecture			
	of Cassandra, Data modeling in			
	Cassandra, Querying in Cassandra			
	using CQL.			
	HBase: Introduction to HBase and			
	its architecture, HBase data model			
	and operations, Integration of HBase			
	with Hadoop.			
	Data Warehousing Solutions:			
	Introduction to Big Data			
	warehousing solutions like Amazon			
	Redshift and Google BigQuery.			
IV	Big Data Analytics and Tools:	10	Understand the importance	2,3,5
	Introduction to Big Data Analytics:		of analytics in Big Data,	
	Importance of analytics in Big Data,		pre-processing techniques,	
	Types of analytics: Descriptive,		machine learning	
	Diagnostic, Predictive, Prescriptive.		algorithms, and data	
	Data Pre-processing Techniques:		visualization tools.	
	Data cleaning, transformation, and			
	reduction, Handling missing data			
	and outliers.			
	Machine Learning with Big Data:			
l			L	

	Overview of machine learning algorithms used in Big Data, Introduction to scalable machine learning tools like MLlib. Big Data Visualization: Importance of data visualization, Tools for Big Data visualization (e.g., Tableau, D3.js).			
V	Advanced Topics in Big Data Analytics: Real-Time Big Data Analytics: Stream processing with Apache Storm and Spark Streaming, Real- time data pipelines and architectures. Big Data Security and Privacy: Security challenges in Big Data, Techniques and tools for securing Big Data, Cloud-Based Big Data Solutions: Overview of Big Data solutions on AWS, Azure, and Google Cloud, Case studies on cloud-based Big Data implementations. Future Trends in Big Data: Emerging technologies and trends in Big Data, The impact of AI and IoT on Big Data.	9	Explore real-time Big Data analytics, security and privacy challenges, cloud-based Big Data solutions, and future trends in Big Data technologies.	2,4,5

- **T21:** "Big Data: Principles and Best Practices of Scalable Realtime Data Systems" by Nathan Marz, James Warren, Manning Publications.
- **T22:** "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost, Tom Fawcett, O'Reilly Media
- **T23:** "Big Data: A Revolution That Will Transform How We Live, Work, and Think" by Viktor Mayer-Schönberger, Kenneth Cukier, Eamon Dolan/Mariner Books.

REFERENCE BOOKS:

- **R22:** "Hadoop: The Definitive Guide" by Tom White, O'Reilly Media.
- **R23:** "Designing Data-Intensive Applications: The Big Ideas Behind Reliable, Scalable, and Maintainable Systems" by Martin Kleppmann, O'Reilly Media.
- **R24:** "NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence" by Pramod J. Sadalage, Martin Fowler, Addison-Wesley.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the characteristics and real-world applications of	1,2,3,4,10,12
	Big Data, differentiating it from traditional data.	
2	Demonstrate the use of Hadoop and Spark frameworks by	1,2,3,4,10,12
	executing basic data processing tasks.	
3	Analyze and compare various NoSQL databases and their	1,2,3,4,5,10,12
	suitability for different types of Big Data storage requirements.	
4	Evaluate different data preprocessing techniques and machine	1,2,3,4,10,12
	learning tools for effective Big Data analytics.	
5	Design a real-time Big Data analytics pipeline using cloud-	1,2,3,4,5,10,12
	based solutions and ensuring data security and privacy.	

Course code	Course	СО	PO	PO	PO	PO	PO	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	О	О	О
												10	11	12
	Big	CO 1	2	2	1	3						1		2
22BTCS318 R	Data Analytic s	CO 2	2	2	1	3						1		2
		CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	R – VI												
Course Title			Project	I											
Course code	22BTCS323R	Total credits: 4	L	T	P	S	R	O/F	С						
		Total hours: 120I	P 0	0	8	0	0	0	4						
Pre-requisite	NIL	Co-requisite					NIL								
Programme		lor of Technology i													
Semester				the third year of the program											
Course			skills through individual or group project work in												
Objectives	engineering														
(Minimum 3)		oject management a		nclu	ding v	vorkl	oad m	anageme	ent and						
		meeting project deadlines effectively. 3. Improve presentation skills through seminar presentations and public													
		3. Improve presentation skills through seminar presentations at demonstrations of project outcomes													
CO1		demonstrations of project outcomes. oply IT principles to solve real-world problems.													
CO2		lex projects as a tear	_												
CO2	_	g languages and plat			elon s	oftwa	are and	l hardwa	re solutions						
CO4		nal and team manage			_				io solutions.						
CO5	_	ility skills and profe						Pinoni.							
Unit-No.		tent	Contac				g Out	come	BL						
			Hour		Дес	••••••	g Out	come							
I	This course will be	e conducted	120	Г	emoi	ıstrat	e prof	iciency	2,3,4,5,6						
	largely as an indiv	idual or small					ng lite	-							
	group project unde	er the direct		re	eview	s, pe	rformi	ng							
	supervision of a m	ember of		te	echnic	cal w	ork,								
	academic staff. Th			n	nainta	ining	gprogr	ess							
	topic undertaken v				_		ivering								
	common interests	^				_	reparii	-							
	the student(s) and	•				•	rts, an								
	Students will be re	equired to:				٠.	oroject								
	1. Perform a	literature search		0	utcon	nes e	ffectiv	eiy.							
		current knowledge													
		opments in the													
	chosen tec	chnical area;													
	2. Undertake	detailed technical													
	work in th	e chosen area													
	using one	or more of:													
	a.	theoretical													
	st	udies													
	b.	computer													
		mulations													
	c.	hardware onstruction;													
	3. Produce p	rogress reports or													
	_	professional													
	journal to	establish work													

completed, and to schedule additional work within the time frame specified for the project;
4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;
5. Prepare a formal report describing the work undertaken and results obtained so far; and
6. Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

REFERENCE BOOKS:

R25: "The Craft of Research" by Wayne C. Booth, Gregory G. Colomb, and Joseph M. Williams

R26: "Doing Your Research Project: A Guide for First-Time Researchers" by Judith Bell and Stephen Waters

R27: "How to Write a Thesis" by Umberto Eco

R28: "Effective Project Management: Traditional, Agile, Extreme" by Robert K. Wysocki

R29: "Writing for Computer Science" by Justin Zobel

R30: "The Elements of Style" by William Strunk Jr. and E.B. White

R31: "Python Crash Course" by Eric Matthes (if applicable for coding projects)

R32: "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking" by Foster Provost and Tom Fawcett (if applicable for data science projects).

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply IT principles to solve real-world problems.	1,2,3,4,5,6,7,8,9,10,11,12
2	Contribute to complex projects as a team member.	1,2,3,4,5,6,7,8,9,10,11,12

3	Apply programming languages and platforms to develop software and hardware solutions.	1,2,3,4,5,6,7,8,9,10,11,12
4	Demonstrate personal and team management skills in software development.	1,2,3,4,5,6,7,8,9,10,11,12
5	Cultivate employability skills and professionalism commitment.	1,2,3,4,5,6,7,8,9,10,11,12

Course code	Cours	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
	e		1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO 1	3	3	2	3	2	1	1	2	3	2	2	3
22BTCS32 3R		CO 2	3	3	3	3	2	1	1	2	3	2	2	3
	Proje ct	CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		CO 5	3	3	3	3	3	1	3	2	3	3	2	3

SEMESTER – VI Course Title Techno Professional Skills V																
Course Title				Skil	ls V											
Course code		tal credits: 1	L	T	P	S	R	O/F	C							
		tal hours: 30P	0	0	2	0	0	0	1							
Pre-requisite	NIL	Co-requisite					NII									
Programme		Technology in C														
Semester		II semester of th				_	_									
Course	To reinforce fund		Science	2 & I	Engi	neer	ing co	oncepts 6	ensuring a							
Objectives	strong foundation	_														
(Minimum	2. To enhance probl	-														
3)	3. To foster critical	thinking and creati	vity, pro	omot	ıng a	analy	/tıcal	and rese	earch							
601	abilities.	relop highly skilled and knowledgeable management professional who can deal with														
CO1																
CO2		ous areas and aspects of businesses.														
CO2		elop analytical and research ability as management professional who can be more cient and innovative in practice.														
CO3		cient and innovative in practice. ther knowledge about various development concepts and the theories of development														
CO4																
CO5		ncourage the students towards Non-traditional thinking. Tectively communicate scientific and technical knowledge in a professional n														
Unit-No.	Content	Contact					ıtcon		BL							
Omt-140.	Content	Hour		LCai	11111	g O	itton	ıc								
I	C Programming, Data	6	Develo	on ni	ofic	ienc	v in		2,3							
_	Structure and		impler				-	s and	_,_							
	Algorithms.		data st		_	_		, 4114								
				programming language,												
			enhan		-	_	-	ing								
			skills.	Ū	•			C								
II	Analog and Digita	1 6	Gain t	ındeı	stan	ding	g of a	nalog	2,4							
	Electronic Circuits.		and di	gital	elec	tron	ic cir	cuits,								
			their d	esig	n pri	ncip	les, a	nd								
			practio	cal a _l	plic	catio	ns.									
III	Computer Organization	n 6	Comp	rehe	nd th	ne or	ganiz	ation	2,4							
	and Architecture	,	and ar				•									
	Operating Systems.		includ	_			•									
			I/O de													
			fundar	nent	als c	of op	eratir	ng								
			system													
IV	Database Managemen		^			_		atabase	2,3							
	Systems, Object	t	manag		-			oject-								
	Oriented Programming.		oriente	•	_		_									
								gration								
	7		in soft													
V	Formal Language and	6	Under				_	_	2,4							
	Automata.		autom			-										
			applic				_									
			scienc			cing	theor	etical								
			unders	stand	ıng.											

REFERENCE BOOKS:

- **R33:** "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- **R34:** Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
- **R35:** Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- **R36:** M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- R37: Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- R38: S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- **R39:** Stallings, Computer Organization & Architecture, Pearson.
- **R40:** Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.
- **R41:** C. K. Nagpal, Formal Languages and Automata Theory, Oxford University Press.
- **R42:** Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, Database System Concepts, McGraw Hill.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses.	1,2,3,4,5,9,10,11,12
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice.	1,2,3,4,5,9,10,11,12
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,9,10,11,12
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,9,10,11,12
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,9,10,11,12

Course	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
22BTCS32 4R		CO 1	2	2	3	2	2				3	2	3	3
	Techno Professio nal Skills V	CO 2	3	2	3	2	2				2	2	3	3
		CO 3	3	2	3	3	3				3	2	3	2
		CO 4	3	2	3	1	3				2	2	3	2
		CO 5	3	2	3	3	3				2	2	2	2

		SEMESTER	– VI												
Course Title	CO	RPORATE PROFI	CIEN	CY	FO	R E	NGI	NEE	RS						
		(Communicative	Engl	ish d	& S	oft S	kills	s)							
Course code	22UBPD324R	Total credits: 2		L	T	P	S	R	O/F	С					
		Total hours: 60P		0	0	4	0	0	0	2					
Pre-requisite	22UBPD314R	Co-requisite			ı		ı	NII		•					
	Competent														
	English For														
	Engineers														
Programme	B.Tech in Civil Engi	B.Tech in Civil Engineering/B.Tech in Mechanical Engineering/B.Tech in Computer													
	Science and Engineering/B. Tech in Computer Science and Engineering (B)/B. Tech in Mechanical Engineering (B)/B. Tech in Civil Engineering (B)/B. Tech in														
	in Mechanical Engineering (B)/ B.Tech in Civil Engineering (B)/ B.Tech in														
	Computer Science and Engineering on Cloud Technology and Information Security														
Semester	Winter/ II semester of the third year of the program														
Course	To introduce students with the various tools of effective presentation. To instruct influence once a chapter of entertain the listeners.														
Objectives															
(Minimum		e													
3)	knowledge about how to upload data in social media also how to promote														
	self.														
	4. To find new, innovative ways of developing and managing people.5. To prepare the students for the campus drives & walking interviews.														
			_				_								
	-	dence with the chanc	e to re	eflec	t on	thei	r no	n-ver	bal and v	erbal					
001	communication			1			•	1	1 '44						
CO1	Construct coherent an		eports	, aei	mon	strat	ing a	advan	icea writi	en					
CO2	communication skills	<u>~</u>	.4		C .			44:	1-						
CO2	Apply effective verba and presentations.	i communication stra	negies	s in p	orore	essio	mai s	seum	gs, such a	as meetings					
CO3	Evaluate and analyze	complay technical de	a a li ma	ntc	cho	11000	ina	o hial	a loval of	English					
COS	language comprehens	•	Cume	mis,	SHO	wcas	sing	a mgi	i ievei oi	Liigiisii					
CO4	Demonstrate proficier		ate co	rnor	ate I	Ingl	ich x	zoca h i	ulary and	l language					
CO4	conventions in engine		aic co	трог	aic i	J11g1	1311 \	ocao	diary and	i language					
CO5	Synthesize and comm		concei	nts c	lear	lv ar	nd ne	ersuas	ively in	English					
000	fostering effective col		_	-		-	ia pe	1566	,1 v 01 y 111 ·	engnon,					
Unit-No.	Content	Contact	1				g Oı	ıtcon	1e	BL					
		Hour					5			22					
I	Presentation Skills	12	De	evelo	op th	e ab	ility	to pr	epare	2,3					
	i. Introduction			Develop the ability to prepare and deliver effective 2,3											
	ii. Essential		pre	esen	tatio	ns b	y un	derst	anding						
	characteristic	cs of	_				•	teristics and							
	a good		tec	chnic	ques										
	presentation				-										
	iii. Preparation	of a													
	good														
	presentation														

II	Leadership &	12	Gain insights into leadership	2,3,4
	Management Skills		concepts, styles, and the	
	i. Concepts of		differences between managers	
	Leadership,		and leaders, and learn how to be	
	ii. Leadership		an effective leader.	
	Styles,			
	iii. Manager VS			
	Leader,			
	iv. How to be an			
	Effective Leader,			
	v. Mock/ Practice			
	Session,			
	vi. Doubt Clearing			
	Session.			
III	LinkedIn Profile	12	Understand the importance of a	2
			professional LinkedIn profile	
			and learn how to optimize it to	
			enhance career opportunities.	
IV	Emotional Intelligence	12	Develop emotional intelligence	2,3
			by recognizing and managing	
			emotions effectively, leading to	
			improved interpersonal	
			relationships.	
V	Mock Screening	12	Gain practical experience and	3,5
			feedback through mock	
			screening sessions, enhancing	
			interview skills and confidence.	

T1: Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.

T2: McDowell, Gayle Laakmann. 2008. Cracking the Coding Interview (IndianEdition)

T3: Adair, John. (2013) Develop Your Leadership Skills (Creating Success, 134), Kogan Page

REFERENCE BOOKS:

R43: Picardi, Dr. Carrie. (2021) Leadership Essentials You Always Wanted to Know, Vibrant Publishers **R44:** Whetten D. (2011) Developing Management Skills, Prentice Hall India Learning Private Limited

OTHER LEARNING RESOURCES:

- 1. https://youtu.be/4vetoRA3WUA
- 2. https://youtu.be/bgFNTuRYtKE

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Construct coherent and concise technical reports,	1,2,3,4,5,10,12
	demonstrating advanced written communication skills in	
	English.	
2	Apply effective verbal communication strategies in	1,2,3,4,5,10,12
	professional settings, such as meetings and presentations.	
3	Evaluate and analyze complex technical documents,	1,2,3,4,5,10,12
	showcasing a high level of English language comprehension.	
4	Demonstrate proficiency in using appropriate corporate	1,2,3,4,5,10,12
	English vocabulary and language conventions in engineering	
	contexts.	
5	Synthesize and communicate engineering concepts clearly and	1,2,3,4,5,10,12
	persuasively in English, fostering effective collaboration in a	
	corporate environment.	

Course code	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	P	P	P
	Name		1	2	3	4	5	6	7	8	9	O	О	О
												10	11	12
		CO 1	1	1	1	1	1					3		2
22UBPD32 4R	Corporat e	Co 2	1	1	1	1	1					3		2
	Proficien cy For Engineer	CO 3	1	1	1	1	1					3		2
	s	CO 4	1	1	1	1	1					3		2
		CO 5	1	1	1	1	1					3		2

		SEMESTE	R – VI						
Course Title	CO CURRICULAR ACTIVITIES								
Course code	22UBCC321	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 15P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme	All UG Programmes								
Semester	W	inter/ II semester o				the pi	rograi	m	
Course									nunication
Objectives	1. Foster social and soft skills: Develop interpersonal abilities and enhance communication and collaboration among learners.								
(Minimum 3)	2. Promote holistic development: Encourage overall growth by engaging students in								s in
	diverse extracura	ricular activities and	experien	ces.					
	3. Cultivate 360-degree learning: Implement a comprehensive approach to education							tion that	
	integrates acade	nics with practical e	xperience	es and	d skill	devel	opme	nt.	
CO1	Active participation in club activities: Students engage in various clubs like dance, music,								music,
	and photography, for	-							
CO2	Representation in competitions: Students represent the institution at inter-university, state								y, state,
	and national competitions, showcasing their skills.								
CO3	Exposure to expert guidance: Learners benefit from workshops conducted by renowne							wned	
	personalities, enhance								
CO4	Skill development through workshops: Students gain practical insights and expertise in their								
	fields of interest through hands-on workshops.								
CO5	Overall growth and o	_	ourse faci	litates	s the h	olistic	deve	lopment o	f students,
	nurturing their talents and capabilities.								
Unit-No.	Con	tent	Contac	t	Lea	ırning	g Out	come	BL
			Hour						
I	AdtU encourages a	· ·	15		o-curi			activities	
	,	gular curriculum				ance students' practical			
	intended to meet learner's interest,				application of academic				
	These activities are			concepts, critical skills					
	the social and soft			development (problem-					
	a holistic devel		solving, communication),						
	learners, Keeping		foster personal growth (confidence, self-						
	degree learning				ence		self-		
	students one ones							to appin1	
	students are enga	nged in different		a	waren	ess), j	•	through	
	activities headed	nged in different under different		a' re	waren espons	ess), _J sibility	7	through	
	activities headed clubs viz.	nged in different under different Dance, music,		a re	waren espons ommu	ess), _] sibility nity	eng	through agement,	3
	activities headed clubs viz. photography, drama	nged in different under different Dance, music, a, literary etc., The		a reco	warenespons ommu nd cul	ess), _] sibility nity tivate	eng	through agement, work and	3
	activities headed clubs viz. photography, drama students are encour	nged in different under different Dance, music, a, literary etc., The aged to participate		ar re co an le	waren espons ommu nd cul eaders	ess), posibility nity tivate hip	eng team	through agement, work and abilities,	3
	activities headed clubs viz. photography, drama students are encour in regular club acti	nged in different under different Dance, music, a, literary etc., The aged to participate vities, workshops,		av reconstruction and leaves provided the second and leaves pr	waren espons ommu nd cul eaders repari	ess), j sibility nity tivate hip ng the	eng teamv	through agement, work and abilities, r holistic	3
	activities headed clubs viz. photography, drama students are encour in regular club actic competitions as per	nged in different under different Dance, music, a, literary etc., The aged to participate vities, workshops, r their interest and		ar reconstruction and leaves are second and	waren espons ommu nd cul eadersi reparin	ess), positive stivate thip in the in	eng teamv em for acade	through agement, work and abilities,	3
	activities headed clubs viz. photography, drama students are encour in regular club actic competitions as per hobbies, The stude	nged in different under different Dance, music, a, literary etc., The aged to participate vities, workshops, their interest and nt members of the		ar reconstruction and leaves are second and	waren espons ommu nd cul eaders repari	ess), positive stivate thip in the in	eng teamv em for acade	through agement, work and abilities, r holistic	3
	activities headed clubs viz. photography, drama students are encour in regular club acti competitions as per hobbies, The stude club are trained r	nged in different under different Dance, music, a, literary etc., The aged to participate vities, workshops, r their interest and nt members of the epresent AdtU in		ar reconstruction and leaves are second and	waren espons ommu nd cul eadersi reparin	ess), positive stivate thip in the in	eng teamv em for acade	through agement, work and abilities, r holistic	3
	activities headed clubs viz. photography, drama students are encour in regular club actic competitions as perhobbies, The stude club are trained revarious inter Univ	nged in different under different Dance, music, a, literary etc., The aged to participate vities, workshops, r their interest and nt members of the epresent AdtU in ersity student and		ar reconstruction and leaves are second and	waren espons ommu nd cul eadersi reparin	ess), positive stivate thip in the in	eng teamv em for acade	through agement, work and abilities, r holistic	3
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platform to learn from experts in the	
respective fields.	

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Active participation in club activities: Students engage in various clubs like dance, music, and photography, fostering their interests and talents.	1,2,3,4,5,6,10,12
2	Representation in competitions: Students represent the institution at inter-university, state, and national competitions, showcasing their skills.	1,2,3,4,5,6,10,12
3	Exposure to expert guidance: Learners benefit from workshops conducted by renowned personalities, enhancing their knowledge and skills.	1,2,3,4,5,6,10,12
4	Skill development through workshops: Students gain practical insights and expertise in their fields of interest through hands-on workshops.	1,2,3,4,5,6,10,12
5	Overall growth and development: The course facilitates the holistic development of students, nurturing their talents and capabilities.	1,2,3,4,5,6,10,12

Course	Course	С	PO	PO	РО	PO	РО	РО	PO	РО	PO	PO1	PO1	PO1
code	Name	О	1	2	3	4	5	6	7	8	9	0	1	2
	СО	CO 1	2	2	2	1	2	2				2		2
22UBCC 321	CURRICUL AR ACTIVITIE	CO 2	2	2	2	1	2	3				2		2
	S	CO 3	1	1	2	1	2	2				3		3
		CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

		SEMESTER -	VI							
Course Title		EXTRA CURRIC	ULAR A	CTI	IVIT	TIES				
Course code	22UBEC321	Total credits: 1	L	T	P	S R	O/F	C		
		Total hours: 60P	0	0	0	4 0		1		
Pre-requisite	NIL	Co-requisite				NI	L			
Programme		All UG P								
Semester			e third year of the program							
Course		and soft skills: Foster		uisiti	on o	of interpo	ersonal ski	lls and		
Objectives	_	ent abilities among lea								
(Minimum 3)		ic development: Enco	_					eted		
	•	nd academics, nurturii	-		_					
		epth expression: Provide						culate their		
CO1	_	ions clearly and critica			_					
	Learn to a plan so that	· ·	ngiui coi	ıırıbı	uuon	is, main	tain a com	iiiitinent,		
CO2	and manage their time Transform passionate s		rate land	orahi.	n or	d puran	intorosts 1	havond		
	their academics.	tuuciits who uciiionsi	iait itau	CISIII	p an	a parsac	micresis	oeyona		
	Learn to participate in	various co-curricular	activities	lead	ling	to their	multifacete	h		
	personality developme		activities	read	mg	to then	mannacca	Zu		
CO4	Express their ideas, vie		on and a	nalvs	is cl	early in	the topic o	of their		
	interest.	on so, in sop in constant	311 W110 W		.15 01		une topie o			
	Demonstrate and pract	ices different activities	s, by Inte	egrati	ing l	earning	experience	es by		
	demonstrating transfer		., . ,	6	0	8	1	, J		
Unit-No.	Cont		Contac	et :	Lea	rning O	utcome	BL		
			Hour			J				
I	AdtU encourages a	range of activities	60	S	Stude	ents de	velop a	2,3		
	outside the regular cu	rriculum intended to		V	vell-	rounded	l			
	meet learner's interes	*		p	erso	nality, i	ncluding			
	are aimed to develop				effec		planning,			
	skills and promote a	•		16	eade	rship	skills,			
	to the learners, Keep	ing in mind the 360				.:	:			
				_		cipation	in			
I	_	odology the students		d	liver	se a	activities,			
	are engaged in differ	ent activities headed		d	liver :lear	se a	activities, ssion of			
	are engaged in differ under different clubs	ent activities headed viz. Dance, music,		d c io	liver lear deas	se a	activities, ssion of tegration			
	are engaged in differ under different clubs photography, drama,	ent activities headed viz. Dance, music, literary etc., The		d c ic	liver lear deas of	se a expres	activities, ssion of tegration learning			
	are engaged in differ under different clubs photography, drama, students are encourage	ent activities headed viz. Dance, music, literary etc., The ged to participate in		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in differ under different clubs photography, drama, students are encourage regular club acti	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops,		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning			
	are engaged in differunder different clubs photography, drama, students are encourage regular club acticompetitions as per	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained representations.	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained representative university students.	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various nt and national level		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained represent inter University student competitions, Renew	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various nt and national level ed personalities are		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained representate University stude competitions, Renew invited to conduct we	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various nt and national level ed personalities are orkshops that benefit		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained represent inter University stude competitions, Renew invited to conduct we the members and students.	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various nt and national level ed personalities are orkshops that benefit lents by giving them		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			
	are engaged in different clubs photography, drama, students are encourage regular club acticompetitions as perhobbies, The student are trained representate University stude competitions, Renew invited to conduct we	ent activities headed viz. Dance, music, literary etc., The ged to participate in vities, workshops, their interest and members of the club t AdtU in various nt and national level ed personalities are orkshops that benefit lents by giving them		d c id o e	liver clear deas of expen	se a expres, and in riences,	activities, ssion of tegration learning fostering			

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,6,10,12							
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,6,10,12							
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,6,10,12							
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,6,10,12							
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,6,10,12							

Course	Course	С	PO	PO	PO	PO	PO	РО	РО	PO	РО	PO1	PO1	PO1
code	Name	О	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	2	1	2	2				2		2
22UBEC 321	EXTRA CURRICUL	CO 2	2	2	2	1	2	3				2		2
	AR ACTIVITIE	CO 3	1	1	2	1	2	2				3		3
	S	CO 4	2	2	2	1	2	2				2		2
		CO 5	1	1	1	1	2	1				1		3

	T	SEMESTE								
Course Title			ata Scie			~	_	0.75	1 .	~
Course code	22BTCS325R	Total credits: 3	L	T	P	S	R	O/F		$\frac{C}{2}$
Due ne cuicite	NIST	Total hours: 45T	2	0	1	0	0 N121	0		3
Pre-requisite	Nil	Co-requisite	\ \aiomaa !	9- TC	- i		Nil			
Programme		Computer S								
Semester Course	1 Davidon Duofi	VI semester of the third year of the program 1. Develop Proficiency in Key Data Science Tools and Programming Languages.								
Objectives	1. Develop Profi	1. Develop Floriciency in Key Data Science Tools and Flogramming Languages.								
(Minimum 3)	2. Understand an	nd apply Fundamenta	l Statisti	cal a	nd Ma	chine	Lear	ning Met	hods.	
(William 3)	2 - C-1/4 - C-1/-	1 This . 1-1 1 D	. 1. 1 C	. 1	- 01-:11		Data	D.: (7 4	
	3. Cultivate Criti	ical Thinking and Pro	obiem-so)IVIII	g Skill	s in a	Data	-Driven C	_onte	Xι.
CO1	Master Core Data S	Science Concepts and	l Techni	ques.						
CO2			D . 0							
	Develop Proficienc	y in Programming fo	or Data S	cien	ce.					
CO3										
		arning and Predictive								
CO4	Enhance Skills in L	Data Wrangling and V	/ isualiza	ition.						
CO5	Evacuta a Canstone	e Data Science Projec	ot.							
	Execute a Capstone	Data Science Projec	JI.							
Unit-No.	Cor	ntent	Contac	et	Lea	rnin	g Out	come	В	BL
			Hour			•	,			
I	Foundations of	Data Science:		A	Apply	da	ıta	analysis		
	Overview of d	lata science, its		t	echniq	ues	to	interpret,		
		application across						ake data-	3 4	4, 5,
		ntroduction to the	7	C	lriven	decisi	ons			6
	data science	workflow: data								O
		ng, analysis, and								
***	visualization.	1 1 D 4		-	\ <u>.</u> 1		1	! 1 - 4 -		
II	Statistical Metl				-			anipulate statistical		
	_	Essential statistics probability theory,			latasets nethod		ing : to	derive		
		rization, and						thts and		
	visualization	techniques.	8					naking.	4,	5, 6
		programming with				40010	1011 11			
		data manipulation								
	using Pandas, Nur									
III	Machine Learnin			I	Develo	p, in	nplem	ent, and		
	Supervised learning			e	valuat	e ma	chine	learning		
	(regression, decisi	· ·					lve r	eal-world		
	unsupervised learn	_	10	r	roblen	ns.			4	5, 6
	(clustering, PCA),		10						_ - ,	٥, ٥
	evaluation metrics									
	machine learning	_								
TX7	implementation us			1	/I o ~+ -			odrice 1		
IV		Science Concepts:			Master	1100		advanced		
	Deep learning with natural language p				_			analysing otimizing		
	and introduction to		12		ompie nodels		ta, oj nd	otimizing deriving		, 6
		Hadoop and Spark.	14		ctiona					, 0
	Real-world applic			"	CHOHA	J10 11	.51 <u>5</u> 110	J.		
	studies.	and the cube								
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V Capstone Project in Data Science: Application of data science processes to a real-world problem. Project phases include problem identification, data acquisition, pre- processing, modeling, analysis, and presentation of results. Practical 1 Data Collection and Cleaning 3 Apply techniques to gather and pre-process data for analysis. Practical 2 Data Visualization Create visual representations to explore and present data insights. Practical 3 Introduction to Data Science Workflow Statistics and Visualization 3 Understand and apply the steps in the data science workflow. Practical 4 Descriptive Statistics and Visualization 3 Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics of Statistics and Visualized of Statistics and Visualized of Statistics and Visualized of Statistics of		,			
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problem. problem. problem. problem.		processes to a real-world problem.		data science project	
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Practical 8 Clustering with K-Means Apply K-Means clustering for unsupervised learning tasks. Practical 9 Decision Trees and Random Forest 3 Construct and compare decision tree and random forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep	Practical 7	Linear Regression	3	·	
Practical 8 Clustering with K-Means Apply K-Means clustering for unsupervised learning tasks. Practical 9 Decision Trees and Random Forest decision tree and random forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep					4
3 for unsupervised learning tasks. Practical 9 Decision Trees and Random Forest 3 Construct and compare decision tree and random forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep					
Practical 9 Decision Trees and Random Forest 3 Construct and compare decision tree and random 4 forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep	Practical 8	Clustering with K-Means			
Practical 9 Decision Trees and Random Forest 3 Construct and compare decision tree and random forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep			3	1	4
decision tree and random forest models. Practical 10 Deep Learning with TensorFlow Develop and evaluate deep					
Practical 10 Deep Learning with TensorFlow Develop and evaluate deep	Practical 9	Decision Trees and Random Forest	3		
Practical 10 Deep Learning with TensorFlow Develop and evaluate deep				decision tree and random	4
				forest models.	
2 looming models using 4	Practical 10	Deep Learning with TensorFlow	_	Develop and evaluate deep	
S learning models using 4			3	learning models using	4
TensorFlow.					

- T1 Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking, Foster Provost and Tom Fawcett, 1st Edition, 2013.
- T2 Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython", Wes McKinney, 2nd Edition, 2017.
- T3 Pattern Recognition and Machine Learning", Christopher M. Bishop, 1st Edition, 2006.

REFERENCE BOOKS:

- R1 An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, and Robert Tibshirani, 2nd Edition, 2021.
- R2 Machine Learning: A Probabilistic Perspective, Kevin P. Murphy, 1st Edition, 2012.
- R3 Data Mining: Practical Machine Learning Tools and Techniques, Ian H. Witten, Eibe Frank, Mark A. Hall, and Christopher J. Pal, 4th Edition, 2016.
- R4 Big Data: Principles and Best Practices of Scalable Realtime Data Systems, Nathan Marz and James Warren, 1st Edition, 2015

Additional Resources:

• SKaggle - https://www.kaggle.com/

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Master Core Data Science Concepts and Techniques.	1, 2, 3, 4, 10, 12							
2	Develop Proficiency in Programming for Data Science.	1, 2, 3, 4, 10, 12							
3	Apply Machine Learning and Predictive Analytics.	1, 2, 3, 4, 5, 10, 12							
4	Enhance Skills in Data Wrangling and Visualization.	1, 2, 3, 4, 10, 12							
5	Execute a Capstone Data Science Project.	1, 2, 3, 4, 5, 10, 12							

Course code	Cours	CO	РО	РО	РО	РО	PO	PO	РО	РО	РО	PO1	PO1	PO1
	e Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	3						1		2
	Data	CO 2	2	2	1	3						1		2
22BTCS32 5R	Data Scienc e	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTER	– VII									
Course Title	Software Engineering											
Course code	22BTCS411R	Total credits: 3	L	T	P	S	R	O/F	C			
		Total hours: 43	3	0	0	0	0	0	3			
		45T+30P										
Pre-requisite	Basic Computer	Co-requisite					Nil					
	Science											
Programme	TH	B.Tech CSE										
Semester		SEMESTER OF FO										
Course	1. To help students		ries,metl	hods,	and 1	techn	ologi	es applied	d for pression			
•	nsoftware developme											
	2.To discussthe cond											
	3. To make proper d				pment	wor	K					
CO1	Demonstrate ethical	software developmen	nt practi	ces								
CO2	Apply systems devel	opment lifecycle pha	ases effe	ctivel	y.							
CO3	Elicit, analyze, and s				•	ively						
CO4	Create and evaluate	standard procedures	and docu	ıment	tation							
CO5	Collaborate producti	vely in interdisciplin	ary soft	ware j	projec	t tear	ns.					
Unit-No.	Con	tent	Conta	ct	Lea	rnin	g Out	come	BL			
			Hour	•								
I	Introduction:			C	Compa	are	and	contrast				
	Lifecyclemodels			v	arious	S		software				
	Function oriented	software design:	13	d	levelo	pmen	t lif	e cycle	1,2			
	Structured analysi	is and structured		n	nodels	s an	id st	tructured				
	design.			d	lesign	techi	niques	S.				
II	•	ents, analysis and			Analyz		nd d	ocument				
	^	ormal and formal			oftwa		_	irements				
	specification.		12		sing		forma		1,2			
					ormal		spec	rification				
					nethoo							
III	ObjectOrientedDes	C			Design		·	-oriented				
	User interface des	0			ystem			p user				
	design primitives,		_					coding	1.0			
	management system	n and the	7					conduct	1,2			
	XWindows system Coding and Testing			u	ınit tes	sung.						
	Coding and Testing Codingstandardand	•										
IV	Projectmanagement	<u>~</u>		F	Estima	te	r	esources,	-			
11		cheduling, risk						manage				
	management an	•	6		isks,	and		nplement	1,2			
	management.	d comiguration			onfig			ритен	1,2			
					_			rojects.				
V	Softwarereliabilitya	andqualityassurance						metrics,	1			
Ť	Reliability metri				rowth		nodel					
	modelling, ISO-900	C	5		uality			ssurance	1,2			
	, 12 3 700	,						SO-9000	,			
					nd CN							
	1		l									

- $\textbf{T1}. \ An \ Integrated Approach to Software Engineering by Jalote. Narosa Publishing House.$
- T2. SoftwareEngineeringbyR.Mall,PHI.

REFERENCE BOOKS:

R1. SoftwareEngineeringbyR.S.Pressman, McGraw Hill

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Demonstrate ethical software development practices	1,2,3,4,5,9,11 and 12							
2	Apply systems development lifecycle phases effectively.	1,2,3,4,5,9,11 and 12							
3	Elicit, analyze, and specify software requirements collaboratively	1,2,3,4,5,9,11 and 12							
4	Create and evaluate standard procedures and documentation.	1,2,3,4,5,9,11 and 12							
5	Collaborate productively in interdisciplinary software project teams.	1,2,3,4,5,9,11 and 12							

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	3	2	2				3		3	3
AADE GG 44	Software	CO 2	3	2	3	2	2				2		3	3
22BTCS41 1R	Engineeri	CO 3	3	2	3	3	3				3		3	2
	ng	CO 4	3	2	3	1	3				2		3	2
		CO 5	3	2	3	3	3				2		2	2

		SEMESTEI	R – VII						
Course Title		PE- IV: Data H	landling	and '	Visua	lizati	on		
Course code	22BTCS414R	Total credits: 5	L	T	P	S	R	O/F	C
		Total hours: 40 45T+30P	3	0	4	0	0	0	5
Pre-requisite	Basic	Co-requisite			•		Nil		
	Programming								
	knowledge								
Programme			3.Tech C						
Semester	7TH	SEMESTER OF I	FOURT	HYE	AR ()F PI	ROGE	RAM	
Course Objectives (Minimum 3)	Develop profice visualization.	ding of the signification diency in using R	program	ning	and	Pytho	on for	data an	alysis and
	, , ,								
CO1	Understand the imp decision-making pr	ortance of data visuocesses.	alization	in IT	appli	catio	ns and	its role in	ı
CO2	Demonstrate profic visualization tasks.	iency in using R pro	grammir	g and	d Pyth	on fo	r data	analysis a	and
CO3	Utilize data visualiz customized visualiz	cation libraries like g ations.	ggplot2 (l	R) an	d Mat	plotli	b (Pyt	thon) to ca	reate
CO4	Design clear and peand storytelling	rsuasive visualizatio	ons using	princ	ciples	of ef	fective	e data pres	sentation
CO5	Utilize interactive of	ata visualization too	ols like C	ogno	s to cı	reate (dynam	nic visuali	zations.
Unit-No.	Con	tent	Contac Hour	t	Lea	arnin	g Out	come	BL
I	data visualization Overview of R data analysis and v Introduction to libraries: ggplot2 ((Python). Basic plotting tec representation in F	e importance of in IT applications. programming for visualization. data visualization (R) and Matplotlib chniques and data and Python.	12	o b	f data asic	a vist plotti	ıalizat	portance tion, and chniques on.	1,2 and 3

III	Advanced Data Visualization Techniques: Advanced Features of ggplot2 for Customized Plots in R. Customizing Plot Aesthetics and Themes in ggplot2 Introduction to Interactive Data Visualization Tools: Cognos. Creating Interactive Visualizations using Cognos. Hands-on Exercises: Advanced Plotting Techniques and Interactive Visualizations. Mans Geografial Data	12	Utilize advanced features of ggplot2 and interactive tools like Cognos for customized and interactive visualizations. Create geospatial	3
	Maps, Geospatial Data Visualization, Export Features: Introduction to Folium. Maps with Markers, Choropleth Maps. Export Feature – Data Visualization. Generating a PNG picture. Generating PDF documents Multiple graphs plotting and export. Inserting subfigure Hypothesis and Gradient Descent. Understanding Hypothesis. Implementation of hypothesis in Python. Gradient Descent Implementation	8	visualizations using Folium and export visualizations as images and documents.	1,2,3
IV	Visualization by using Seaborn Library: Relational plot: Dist Plot, Line Plot, Lmplot. Categorical plot: Stripplot, Swarmplot, Barplot, Countplot, Boxplot, Violinplot, Stripplot Distribution plot: Joinplot, Distpot, Pairplot, Rugplot. Regression plot: Simple Linear plot with additional parameters (hue and markers), Setting size and color of the plot, Displaying multiple plots, Size and aspect ratio of plots. Matrix plot: Heatmaps, Cluster Maps. Style and Color: Set the background to be white, Set the background to be darkgrid, Set the background to be whitegrid. Remove axes spine: Despine Size and aspect: Non grid plot, Grid type plot Scale and Context: Poster,	4	Implement various types of plots and customize visualizations using Seaborn in Python.	1,2,3,4

	paper, notebook and talk			
V	Application of Data Visualization in Engineering: Case studies demonstrating data visualization. Visualizing datasets & Creating dashboards for analysis Real-world applications and projects.	4	Apply data visualization techniques to real-world engineering problems and create dashboards for data analysis.	3,5,6

T1: Data Visualization with R" by Carson Sievert and Chris Parmer

T2: Python Data Visualization Cookbook" by Igor Milovanović

REFERENCE BOOKS:

R1: Interactive Data Visualization for the Web" by Scott Murray

R2: Storytelling with Data: A Data Visualization Guide for Business Professionals" by Cole NussbaumerKnaflic.

OTHER LEARNING RESOURCES:

- 1. <u>IBM Cognos Analytics</u>
- 2. R Programming Tutorial

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the importance of data visualization in IT applications and its role in decision-making processes.	1,2,3,4,10 and 12
2	Demonstrate proficiency in using R programming and Python for data analysis and visualization tasks.	1,2,3,4,10 and 12
3	Utilize data visualization libraries like ggplot2 (R) and Matplotlib (Python) to create customized visualizations.	1,2,3,4,5,10 and 12

4	Design clear and persuasive visualizations using principles of effective data presentation and storytelling	1,2,3,4,10 and 12
5	Utilize interactive data visualization tools like Cognos to create dynamic visualizations.	1,2,3,4,10 and 12

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	3						1		2
22DECG 44	PE- IV: Data	CO 2	2	2	1	3						1		2
22BTCS41 4R	Handling and	CO 3	3	3	3	3	3					1		3
	Visualizati on	CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTEI										
Course Title		Professional Ele						1				
Course code	22BTCS414R	Total credits: 5	L	T	P	S	R	O/F	C			
		Total hours: 45 45T+30P	3	0	4	0	0	0	5			
Pre-requisite	Basic	Co-requisite					Nil					
	Programming											
	knowledge	_		70.7								
Programme	701	I SEMESTER OF 1	B.Tech C		A D. C	VE DI	OCT) A N/I				
Semester Course		andamental problem							on			
Objectives	1. Introduce the fo	andamentai problem	s of Coll	iputei	V 1510	ni and	ı ımag	ge Torman	011.			
(Minimum 3)		tanding of technique				ncep	ts and	algorithn	ns used in			
(computer vision	n to facilitate further	study in	this a	area.							
	 Provide pointer 	rs into the literature	and exer	cise a	ı proje	ect ba	sed o	n a literat	ure search			
	and one or mor	e research papers.										
CO1												
COI	Identify basic con	cepts, terminology,	theorie	s, mo	dels	and	metho	ds in the	e field of			
	computer vision.											
CO2												
CO2	Describe known pri	inciples of human vi	sual svst	em ar	nd cor	npute	r visio	n system.				
	1					Ι						
CO3	D	· · · · · · · · · · · · · · · · · · ·	-1-414	14	1 .			<i>.</i> :	4.4			
	and detection of oth	of computer vision re	erated to	mum	-scare	repr	esenta	nion, eage	detection			
	and detection of ou	iei primitive.										
CO4	Use computer vis	sion algorithm for	3D co	nstru	ction,	ster	eo, n	notion an	d object			
	recognition.		amidan minainlas analaina a 11 1 1 C									
CO5	^ ^	•	ognition principles, applying machine learning fo									
				valuating performance metrics, and utilizing								
Unit-No.		ts for practical comp	Contac				a Out	aomo	BL			
Umt-No.	Con	itent	Hour	I	Lea	ırımı	g Out	come	DL			
I	Introduction: Ima	ige Processing &	Hour		Inders	tand		the				
_		What is Computer		I			s of c	computer				
	Vision - Low-	_						e diverse				
	High-level. Div	verse Computer		aj	pplica	tions	such	as object				
	Vision Applicat				_			medical				
		Biometrics, Object	7	ir	nage a	analy	sis.		1			
	•	-										
	•	·										
TT		•		D	escril	e im	age f	ormation				
				I				•				
	Orthographic	& Perspective	10	m	ionoc	urar	anu t	oinocular	1,2			
	Projection, Cam		10		ystem		anu t	camera	1,2			
II	High-level. Div Vision Applicat Image Analysis, I Recognition, Tr Image Analysis Image Retrieva Processing, Mul Reality and Augm Image Forma Monocular in	verse Computer tions: Document Biometrics, Object racking, Medical , Content-Based 1, Video Data Itimedia, Virtual tented Reality. The property of the content of the cont		aj re ir D	oplica ecogn mage a Describ	itions ition analys	such and sis.	as object medical ormation ncluding				

III	imaging systems, Multiple views geometry, Structure determination, shape from shading, Depth from Defocus, Construction of 3D model from images. Image Processing and Feature Extraction: Image preprocessing, Image representations (continuous and discrete), Edge detection. Motion Estimation: Regularization theory, Optical computation, Stereo Vision, Motion estimation, Structure from motion.	10	Implement image preprocessing techniques, edge detection, and motion estimation methods like optical flow and stereo vision.	2,3
IV	Shape Representation and Segmentation: Contour based representation, Region based representation, Deformable curves and surfaces, Snakes and active contours, Level set representations, Fourier and wavelet descriptors, Medial representations, Multi resolution analysis	8	Apply various shape representation and segmentation techniques including contour-based, region-based, and deformable models like snakes and level sets.	2,3
V	This unit covers principles and techniques of object recognition and the application of machine learning in computer vision. Topics include feature extraction methods for object detection, classification algorithms, and training of recognition models. Students will explore supervised and unsupervised learning techniques, neural networks, and deep learning architectures specifically designed for image analysis. The unit also addresses the evaluation of model performance using various metrics and validation techniques, providing hands-on experience with popular machine learning frameworks and libraries.	10	Understand and apply object recognition techniques and machine learning algorithms in computer vision applications.	1,2,3,4

- T1:Szeliski R., "Computer Vision: Algorithms and Applications", Springer, 2010.
- T2. Richard Szeliksy., "Computer Vision: Algorithms and Applications", Springer, 2020.
- T3. Davies, E.Roy., "Computer and machine vision: theory, algorithms, practicalities" Academic Press, 2017.

REFERENCE BOOKS:

R1: "Concise computer vision" by R. Klette, Reinhard, Springer, London, 2014.

- R2. "Digital Image Processing", by R. Gonzalez and R. Woods, 4th edition, Pearson, 2017.
- R3. "Computer Vision: Advanced Techniques and Applications" , by S. Holden, CLANRYE International, 2019.

OTHER LEARNING RESOURCES:

- 1. https://nptel.ac.in/courses/117105079
- 2. https://nptel.ac.in/courses/106105216/

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Identify basic concepts, terminology, theories, models and methods in the field of computer vision.	1,2,3,4,5,10 and 12
2	Describe known principles of human visual system and computer vision system.	1,2,3,4,5,10 and 12
3	Describe methods of computer vision related to multi-scale representation, edge detection and detection of other primitive.	1,2,3,4,5,10 and 12
4	Use computer vision algorithm for 3D construction, stereo, motion and object recognition.	1,2,3,4,5,10 and 12
5	Develop proficiency in object recognition principles, applying machine learning for detection, training deep learning models, evaluating performance metrics, and utilizing relevant frameworks for practical computer vision applications.	1,2,3,4,5,10 and 12

Course code	Course Name		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO												
	Professio	1	3	3	3	2	3					1		3
	nal	CO												
22DTCC 44	Elective-	2	2	2	2	2	2					1		2
22BTCS41	IV:	CO												
4R		3	3	2	3	2	3					1		3
	Compute	CO												
	r Vision	4	3	3	3	2	3					1		3
		CO												
		5	3	3	3	3	3					1		3

		SEMESTER	R – VII						
Course Title		PE-V: P	Predictiv	e An	alysis				
Course code	22BTCS416R	Total credits: 5	L	T	P	S	R	O/F	C
		Total hours: 40	3	0	4	0	0	0	5
		45T+30P		U		U		U	3
Pre-requisite	Basic	Co-requisite					Nil		
	Programming								
D	knowledge) T 1 6	nar.					
Programme	7771		B.Tech (LAD (VE DI	DOCT) A B/f	
Semester Course		I SEMESTER OF I							
Objectives		rize the students with					Anary	SIS TOOIS	
	Discretives 2. Tools that can be used for education in the desired form of the desired form of the desired form. 3. To make student handle data					g.			
(William 3)	5. TO make st	udent nandie data wi	illi vario	us ine	ters				
CO1									
COI	Understand and crit	tically apply the cond	cepts and	d metl	nods o	of Pre	dictive	e analytic	S.
CO2	Understand and ap	hat kir	nds of da	ta can be					
	_	of patterns can be mi			.,	-b, ''	ant MI	O1 Ga	
CO3		•			• . •				1 .
	11 0	ysing how to use fu					ng val	ues, use	advanced
CO4	_	ndle sequence data a	_			-			
CO4 CO5		testing of hypothesis							
		BM Watson Studio v							
Unit-No.	Con	ntent	Contac Hour		Lea	arnin	g Out	come	BL
I			8		Inders	rtand	n	redictive	
1	ANALYTICS OV	VERVIEW	0		nalysi			inciples,	
					redict		mode	-	
	What is Predictive	Analysis, how			rearet neir		plication	-	
	predictive model v	works, why			ansfo				
	predictive modeling	ng, what are the			uture i	•	_		
	models in Predicti	ve Analysis.				υ			1,2
	How Predictive an	alutice:							
	Transforming data	-							
	insights, Analytics								
	Present & Future,								
	Predictive enterpri								
II	Statistical Analys	sis	8	Г	D efine	stati	stics, i	ts types,	
						-		such as	
	Define Statistics a							ode, and	
	Measures of Centr			arious		measui	res of		
	Median and Mode			d	ispers	sion.			
	Dispersion: Absol								1,2
	measures of disper	-							
	-	n, Mean Deviation,							
	Standard Deviatio								
	Variation, Momen	its, Skewness,							
	Kurtosis.								
				1					

III	DATA MINING What is a Data Mining applications? Strategy for data mining: CRISP- DM, Steps of Data Mining, Stages and tasks in CRISP-DM, Life Cycle of a Data Mining Project, Skills Needed for Data Mining. Identify nodes and streams, The framework of a Data — mining project, Brief the unit of analysis, Explain the type of dialog box.	8	Explain data mining applications, strategy using CRISP-DM, stages in a data mining project, and required skills.	2,3
IV	UNIT OF ANALYSIS Concepts of Unit of analysis (Distinct, Aggregate, SetToFlag), Integrate data, CLEM Expression, Role of Relationship between two fields, Identifying the modeling objective.	8	Define unit of analysis concepts (distinct, aggregate, SetToFlag), integrate data using CLEM Expression, and identify modeling objectives.	2,3
V	PREDICTIVE ANALYTICS WITH IBM WATSON STUDIO Understanding of IBM Cloud, IBM Watson Studio, Watson studio Components, Creating a Machine Learning Model, Data preparation, Watson Machine learning, Data Refinery, Watson Studio Neural Network Modeler, IBM Watson Studio jobs, Use case with AutoAI.	8	Utilize IBM Watson Studio for machine learning model creation, data preparation, Watson Machine Learning, Data Refinery, Neural Network Modeler, and AutoAI use cases.	1,2,5,6

T1: Predictive Analytics Mesmerizing & fascinating by ERIC SIEGEL

REFERENCE BOOKS:

- R1: "Applied Predictive Modeling" by Max Kuhn and KjellJohnsonDatabase Management Systems
- R2: "Machine Learning: A Probabilistic Perspective" by Kevin P. Murphy
- R3: "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die" by Eric Siegel

OTHER LEARNING RESOURCES:

- 4. https://www.ibm.com/topics/predictive-analytics
- $5. \quad \underline{https://www.simplilearn.com/what-is-predictive-analytics-article}$

6. https://www.ibm.com/products/watson-studio

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and critically apply the concepts and methods of Predictive analytics.	1,2,3,4,5,10 and 12
2	Understand and apply IBM SPSS Modeler in Data Mining, what kinds of data can be mined, what kinds of patterns can be mined.	1,2,3,4,5,10 and 12
3	Applying and analysing how to use functions, deal with missing values, use advanced field operations, handle sequence data and improve efficiency.	1,2,3,4,5,10 and 12
4	Get exposed to the testing of hypothesis and solving assumptions	1,2,3,4,5,10 and 12
5	Understanding of IBM Watson Studio with Machine Learning Model.	1,2,3,4,5,10 and 12

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	1	1					1		2
22DTCC41	PE-V: Predicti	CO 2	3	3	3	3	2					2		3
22BTCS41 6R	ve Analysi	CO 3	3	2	3	3	3					2		3
	s	CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

		SEMESTER	- VII								
Course Title		PE-V: Soci	al Netw	ork A	Analy	sis					
Course code	22BTCS416R	Total credits: 3	L	T	P	S	R	O/F		C	
		Total hours: 40	2	1	0	0	0	0	3		
		45T+30P									
Pre-requisite	Nil	Co-requisite					Nil				
Programme			.Tech (
Semester		SEMESTER OF F									
Course		 To understand the concept of semantic web and related applications. To learn knowledge representation using ontology. 									
Objectives		• 1		_							
(Minimum 3)		and human behavior i			and r	elated	comi	munities.			
		sualization of social r				C	-4	11	C	4	
		cess to a variety of de	-					ks and so	пwa	ire to	
	Carculate th	em, and have the abi	шу ю п	nerpr	et the	resui	ıs.				
CO1	Understand the	limitations of the cur	rant wa	h and	the re	tions	la bak	aind the			
(01		the Semantic Web ar				uiona	ie ner	mu me			
	development of	the Semantic Web at	ila boci	ai vv C	υ.						
CO2	Demonstrate pr	oficiency in ontology	-based l	know	ledge	repre	sentat	ion for th	e		
	Semantic Web,	using ontology langu	ages su	ch as	RDF	and C	WL.				
CO3	Evitaget and and	lyga the avalution of	vyah aa		itiaa	facen :	vyo h o	mahirraa a	1r		
COS		lyze the evolution of ection algorithms, and									
	social networks	~	i Evaiua	ile coi	IIIIIuII	nty Su	luctui	es ili uyila	annc	,	
	Social networks	•									
CO4	Analyze and pro	edict human behavior	within	socia	l com	munit	ies, n	nanage us	er da	ata	
	securely, and ac	ldress privacy concer	ns.								
CO5	Apply graph	theory, centrality r	nageura	s c1	netari	na ta	achnic	uiae and	1 176	arious	
CO3		ethods to analyze and				-		ques, and	1 V	arious	
Unit-No.		tent	Contac					come	-	BL	
OIII 110.	Con	atent	Hour		LCC	•••••	s Out	come	-	DL	
I	INTRODUCTION	ON	11041		Inders	stand	the	evolution			
_								web to			
		Semantic Web:		tł	ne Se	emant	tic V	Veb and			
		current Web -		S	ocial	Web,	and a	pply key			
	_	Semantic Web –		C	oncep	ts in	social	network			
	_	ne Social Web –		a	nalysi	s t	0 6	electronic			
	Social Netw	•		d	iscuss	sion	netwo	orks and			
	•	Social Network		О	nline	comn	nuniti	es.		1	
		y concepts and	15							1	
		twork analysis – ces for network									
		onic discussion									
	networks, Blog										
	` · · · · · · · · · · · · · · · · · · ·	- Web-based									
		ications of Social									
	Network Analysi										

II	MODELLING, AGGREGATING AND KNOWLEDGE REPRESENTATION Ontology and their role in the Semantic Web: Ontology-based knowledge Representation — Ontology languages for the Semantic Web: Resource Description Framework — Web Ontology Language — Modelling and aggregating social network data: State-of-the-art in network data representation — Ontological representation of social individuals — Ontological representation of social	7	Explain the role of ontology in the Semantic Web and apply ontology languages (RDF, OWL) for modeling social individuals and relationships, and advanced data representation techniques.	3
III	relationships – Aggregating and reasoning with social network data – Advanced representations. EXTRACTION AND MINING		Extract and analyze web	
	COMMUNITIES IN WEB SOCIAL NETWORKS Extracting evolution of Web Community from a Series of Web Archive – Detecting communities in social networks – Definition of community – Evaluating communities – Methods for community detection and mining – Applications of community mining algorithms – Tools for detecting communities social network infrastructures and communities – Decentralized online social networks – Multi-Relational characterization of dynamic social network communities.	6	community evolution from archives, employ community detection algorithms, and evaluate community structures in dynamic social networks.	5
IV	PREDICTING HUMAN BEHAVIOR AND PRIVACY ISSUES Understanding and predicting human behavior for social		Predict human behavior in social networks, manage user data, address privacy concerns, and implement trust models and security measures in online social	4

	communities — User data management — Inference and Distribution — Enabling new human experiences — Reality mining — Context — Awareness — Privacy in online social networks — Trust in online environment — Trust models based on subjective logic — Trust network analysis — Trust transitivity analysis — Combining trust and reputation — Trust derivation based on trust comparisons — Attack spectrum and counter measures.	6	environments.	
V	VISUALIZATION AND APPLICATIONS OF SOCIAL NETWORKS Graph theory – Centrality – Clustering – Node-Edge Diagrams – Matrix representation – Visualizing online social networks, visualizing social networks with matrix-based representations – Matrix and Node-Link Diagrams – Hybrid representations – Applications – Cover networks – Community welfare – Collaboration networks – Co- Citation networks	6	Apply graph theory, centrality measures, and clustering techniques to visualize and interpret online social networks, using various visualization methods for collaboration, co-citation, and community welfare applications.	3

- T1 Peter Mika, —Social Networks and the Semantic Web, First Edition, Springer 2007.
- **T2** BorkoFurht, —Handbook of Social Network Technologies and Applications, 1st Edition, Springer, 2010

REFERENCE BOOKS:

- **R1** Guandong Xu ,Yanchun Zhang and Lin Li,-Web Mining and Social Networking Techniques and applications, First Edition, Springer, 2011.
- **R2** Dion Goh and Schubert Foo,-Social information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively, IGI Global Snippet, 2008.

R3 Max Chevalier, Christine Julien and Chantal Soulé-Dupuy, Collaborative and Social Information Retrieval and Access: Techniques for Improved user Modelling, IGI Global Snippet, 2009.

R4John G. Breslin, Alexander Passant and Stefan Decker, -The Social Semantic Web, Springer, 2009.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the limitations of the current web and the rationale behind the development of the Semantic Web and Social Web.	1,2,3,4,5,6,10 and 12
2	Demonstrate proficiency in ontology-based knowledge representation for the Semantic Web, using ontology languages such as RDF and OWL.	1,2,3,4,5,6,10 and 12
3	Extract and analyze the evolution of web communities from web archives, apply community detection algorithms, and evaluate community structures in dynamic social networks.	1,2,3,4,5,6,10 and 12
4	Analyze and predict human behavior within social communities, manage user data securely, and address privacy concerns.	1,2,3,4,5,6,10 and 12
5	Apply graph theory, centrality measures, clustering techniques, and various visualization methods to analyze and interpret social networks.	1,2,3,4,5,6,10 and 12

Course code	Cours e Name		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	1	1	1	2				1		2
44D #CC 44	PE-V: Social	CO 2	3	3	3	3	2	2				2		3
22BTCS41 6R	Netwo rk	Co 3	3	2	3	3	3	2				2		3
	Analys is	CO 4	2	2	2	2	2	3				2		2
		Co 5	2	2	3	2	2	2				2		3

		SEMESTE	R – VII							
Course Title			Projec	t II						
Course code	22BTCS412R	Total credits: 6	L	T	P	S	R	O/F		C
		Total hours: 156	0	0	12	0	0	0	6	
		45T+30P								
Pre-requisite	Nil	Co-requisite					Nil			
Programme			. Tech.							
Semester		SEMESTER OF								
Course	•	he knowledge, ski	lls and	attit	udes	of a	prof	essional	Co	mputer
Objectives	engineering pro									
(Minimum 3)		onfident in designi		ineeri	ng so	olution	ns to	complex	SC	oftware
	problems utilisi	ing a systems approa	ach.							
701										
CO1		s for real-world pro	oblem-so	olving	using	g prog	gramn	ning langi	ıage	es and
	network solutions.	1								1 1
CO2	_	olex projects as a tea	am mem	iber, d	emon	stratıı	ng eff	ective per	son	al and
002	team management.	' 1'11 .	1		Cı		1 1		1	, 1
CO3		ning skills to creat	e and	assess	SOITV	ware,	naray	ware, and	ne	etwork
CO4	solutions	4	alu:11a a a		i		C 4			
CO4	Apply personal and	team management	skills as	a proi	essioi	nai so	nware	e develope	er.	
CO5	Cultivate employab	ultivate employability skills and uphold professionalism in software developmen								
		my smis und upne	ra prore	5510116		551	.,,	oc (cropin		•
Unit-No.	Con	itent	Conta	ct	Lea	arnin	g Out	come		BL
			Hou	r						
I	This course wi	ll be conducted		Γ	his co	ourse	is des	signed as		
		dividual or small		a	n in	dividu	ıal c	or small		
		under the direct		_	_			nder the		
	•	a member of		-				academic		
		he specific project						ll embark		
	_	will reflect the			_	-	_	ned with		
		and expertise of					_	pervisors'		
	the student(s)	and supervisor.			ommo		intere			
	Students will be re	equired to:			xperti		The	course		
	1 Danfanna	. 124			ntails		evera	2		
		a literature search			_	nents		firstly,		
		current knowledge elopments in the	156		onduc	_		thorough to review	3,	,5 and
		chnical area;	150							6
		detailed technical				ı kıı pmen	owled	lge and n their		
		the chosen area			hosen	_	chnica			
		or more of:						nts will		
	using one	theoretical studies			ngage	•	in	detailed		
	0	computer					ork,			
		mulations			neoret		oik,	studies,		
	0	hardware					imula	tions, or		
		onstruction;			ardwa			struction		
						propriate				
	3. Produce p	a professional		to		_	_	t goals.		
		o establish work				_		course,		
	Journal to	o comonon work		1	mouş	SHOUL	ше	course,	1	

- completed, and to schedule additional work within the time frame specified for the project;
- 4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;
- 5. Prepare a formal report describing the work undertaken and results obtained so far; and

Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.

students will document their progress through regular progress reports or a professional journal, ensuring they stay on track within the project's specified timeframe.

Furthermore, students will deliver seminar presentation to communicate their understanding of the general area of work and highlight their specific contributions to the field. They will also prepare a formal report detailing the scope of their work, methods employed, and results obtained thus far. Finally, the course culminates in a forum where students will present their work through poster presentations and demonstrations, operational showcasing hardware and software utilized developed or during their project. This integrated approach equips students not only with technical skills but also with essential communication and presentation abilities necessary for effectively sharing their research findings in an academic and professional context.

SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply IT principles for real-world problem-solving using programming languages and network solutions.	1,2,3,4,5,6,7,8,9,10,11 and 12
2	Contribute to complex projects as a team member, demonstrating effective personal and team management.	1,2,3,4,5,6,7,8,9,10,11 and 12
3	Develop programming skills to create and assess software, hardware, and network solutions	1,2,3,4,5,6,7,8,9,10,11 and 12
4	Apply personal and team management skills as a professional software developer.	1,2,3,4,5,6,7,8,9,10,11 and 12
5	Cultivate employability skills and uphold professionalism in software development.	1,2,3,4,5,6,7,8,9,10,11 and 12

Course code	Cours e		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
	Name													
		CO 1	3	3	2	3	2	1	1	2	3	2	2	3
22DTCC41	Duaisa	CO 2	3	3	3	3	2	1	1	2	3	2	2	3
22BTCS41 2R	Projec t-II	CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		Co 5	3	3	3	3	3	1	3	2	3	3	2	3

		SEMESTER –	VII											
Course Title		Summer												
Course code	22BTCS413R	Total credits: 3	L	T	P	S	R	O/F	C					
		Total hours:	0	0	0	0	0	0	2					
		45T+30P												
Pre-requisite	Nil	Co-requisite					Nil							
Programme		B. Tech. CSE												
Semester		7TH SEMESTER OF FOURTH YEAR OF PROGRAM Equip students with practical experience in their field of study ensuring they are												
	• •	Equip students with practical experience in their field of study, ensuring they are												
Objectives		prepared to transition smoothly into industry roles by mastering modern tools,												
(Minimum 3)		technologies, and industry-standard practices.												
		and documentation, as well as office etiquette, to ensure they can effectively navigate and contribute to professional environments.												
		•		iono1	on d	l a+1a	i o o 1	maam amail	ilitiaa in					
	_	understanding of pouraging students to a						•						
	regulations.	ouraging students to a	unere	io inc	iusii y	Dest	pract	ices, proc	esses, and					
		lity to work effectively	v in te	ams	esneo	rially	withi	n multidi	scinlinary					
		·			_	-								
	_	contexts, emphasizing collaboration, communication, and the integration of diverse perspectives and expertise.												
		essional work ethic cl	haracte	erized	l by p	orodu	ctivit	y, consist	ency, and					
	punctuality, prep	paring students to meet	the de	manc	ls and	expe	ctatio	ns of the	industry.					
		ls and technologies	in re	al-wo	orld	scena	rios	to solve	complex					
	engineering problem	S.												
CO2	Analyse industry-sta	ndard reporting metho	ds to n	rodu	ce tec	hnica	1 doci	iments ac	lhering to					
	professional guidelin		as to p	. rouu		1111100	400	arriorris de	mering to					
	_	sing design, developm	ent, ar	nd tes	ting r	oracti	ces al	igned wit	h current					
	industry standards.		,		01			U						
CO4	Demonstrate effective	ve communication, tea	amwoi	k, ar	nd int	erper	sonal	skills in	a multi-					
	disciplinary team env	vironment.				-								
CO5	Evaluate professiona	al and ethical respons	ibilitie	s to	make	info	rmed	decision	s in					
	engineering practices	s.												
Unit-No.	Con	tent	Conta	ct	Lea	rnin	g Out	come	KL					
			Hour	•										
I	Summer intern	ship shall be												
	at least 90 hou	rs during the												
	summer vacation	on only.												
	Department/Ins	titute will												
	help students	to find an												
	appropriate													
	company/indus													
	ion for th	ne summer												
	internship.													
	The student mu	ıst fill up and												
	get approved	a Summer												
	help students appropriate company/indus ion for th internship. • The student mu	to find an try/organizat ne summer ust fill up and												

- by the company and provide it to the Coordinator of the department within the specified deadline.
- Students shall commence the internship after the approval of the department Coordinator. Summer internships in research centers is also allowed.
- During the entire period of internship, the student shall obey the rules and regulations of the company/industry/organizat ion and also those of the University.
- Due to inevitable reasons, if the student will not able to attend the internship for few days with the permission of the supervisor, the department Coordinator should be informed via email and these days should be compensated later.
- The student shall submit two documents to the Coordinator for the evaluation of the summer internship:
 - Summer Internship Report
 - Summer Internship Assessment Form
- Upon the completion of summer internship, a hard copy of "Summer Internship Report" must be submitted to the Coordinator by the first day of the new term.
- The report must outline the experience and observations gained through practical internship, in accordance with the required content and the format described in this guideline. Each report

	will be evaluated by a
	faculty member of the
	department on a
	satisfactory/unsatisfactory
	basis at the beginning of the
	semester.
	If the evaluation of the
	report is unsatisfactory, it
	shall be returned to the
	student for revision and/or
	rewriting. If the revised
	report is still unsatisfactory
	the student shall be
	requested to repeat the
	summer internship.
1	

REFERENCE BOOKS:

OTHER LEARNING RESOURCES:

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply modern tools and technologies in real-world scenarios to solve complex engineering problems.	1,2,3,4,5,6,9,10 and 12
2	Analyse industry-standard reporting methods to produce technical documents adhering to professional guidelines.	1,2,3,4,5,6,9,10 and 12
3	Develop solutions using design, development, and testing practices aligned with current industry standards.	1,2,3,4,5,6,9,10 and 12
4	Demonstrate effective communication, teamwork, and interpersonal skills in a multi-disciplinary team environment.	1,2,3,4,5,6,9,10 and 12
5	Evaluate professional and ethical responsibilities to make informed decisions in engineering practices.	1,2,3,4,5,6,8,9,10 and 12

Course	Course		PO PO	PO	PO1	PO1	PO1							
code	Name		1	2	3	4	5	6	7	8	9	0	1	2
		CO												
		1	3	3	3	3	3	3			2	1		2
		CO												
		2	2	2	3	3	2	2			2	1		2
44DECC 44	Summe	CO												
22BTCS41	r	3	2	2	3	2	2	2			2	1		2
3R	Interns	CO												
	hip	4	3	3	3	3	3	3			2	3		2
		CO												
		5	2	2	2	2	2	2		3	2	1		2
		AV	2.4	2.4	20	2.6	2.4	2.4		2	2	1.4		2
		G	2.4	2.4	2.8	2.6	2.4	2.4		3	2	1.4		

		SEMESTE	R – VII							
Course Title		Techno I	Profession	nal Sl	kills \	VI				
Course code	22BTCS125R	Total credits: 1	L	T	P	S	R	0/.	F	C
		Total hours: 26	0 () [2	0	0	0		1
		45T+30P								
Pre-requisite	Nil	Co-requisite		~~~			Nil			
Programme			. Tech. (<u> </u>	EDI	2001			
Semester		7TH SEMESTER OF FOURTH YEAR OF PROGRAM To have a detailed revision of Computer Science & Engineering concents learnt so								
Course	far.	. To have a detailed revision of Computer Science & Engineering concepts learnt so								
Objectives (Minimum 3)										
	in real-life situa	_	belefiee 6	C Llig	,IIICCI	mg c	опсер	to to s	OIVC	problems
	III Tour III o situe	ations.								
CO1	Develop highly ski	illed and knowledge	able man	agem	ent p	rofes	sional	who	can	deal with
		spects of businesses			•					
CO2		and research abilit	y as man	agem	ent p	rofes	sional	who	can	be more
	efficient and innova									
CO3	Gather knowledge	about various develo	opment co	ncept	ts and	l the t	heori	es of d	leve]	lopment.
004		1 37	11.1	.1 . 1 .						
CO4	Encourage the stude	ents towards Non-tra	adıtıonal t	thinki	ng.					
CO5	Effectively commu	nicoto scientific and	tochnical	knov	vlodo	o in o	profe	occiona	1 m	onnor
CO3	Effectively communicate scientific and technical knowledge in a professional manner.									
TI 24 NI	C					•	- 04			DI
Unit-No.	Con	ntent	Contac			rnin	g Out	come		BL
		ntent	Contact Hour	t	Lea					BL
Unit-No.	C Programming, I	ntent	Contac	t St	Lea	ts	will	beco		BL
		ntent	Contact Hour	t St pr	Lea cuden	ts ·	will ii	beco	me C	BL
	C Programming, I	ntent	Contact Hour	St pr pr	Lea	ts sent	will ir g, r	beco n master	me C	BL
	C Programming, I	ntent	Contact Hour	St pr pr ad	Lea ruden roficie rogran	ts ent nmin	will ir g, r featur	beco n master	me C ing	BL
	C Programming, I	ntent	Contact Hour	St pr pr ad pc	Lea roficie rogran lvanc	ts vent mmin ed s and	will ir g, r featur	becon naster res l handli	me C ing	BL
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an	Lea rudent roficie rogran lvanc pinter	ts ent mmin ed s and mple	will in g, in feature I file	becon naster res l handli	me C ing ike ng,	BL
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an str	Lea roficie rogran lvanc pinter ad i	ts ent ent ed s and mpler	will ir g, r featur l file menti	becon master res l handli	me C ing ike ng, lata	BL 2,3
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an str lir	Lea cudent coficie cogran lvanc ointer and i ructur	ts yent mmin ed s and mpleres stists,	will g, r featur l file menti	becon master res l handli ng d	me C ing ike ng, lata iys,	
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an str lir	Lease de Lea	ts ment min ed s and mpleres solists, and	will g, r featur l file menti	becon master res l handli ng d as arra s, queu ns. Th	me C ing ike ng, lata iys,	
	C Programming, I	ntent	Contact Hour	St pr ad pc an strictre wi	Lease de Lea	ts ment mmin ed s and mpler res sulists, and al	will g, r featur l file menti uch a stacks graph	becon master res l handli ng d as arra s, queu ns. Th	me C iing iike ng, lata lys, nes, ney ply	
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an striction win fu fo	Lea coficie cograndivance pinter ind individual ructural nked lees, ill indament sort	ts ment min ed s and mpler es si and almental ting,	will g, r featur l file menti uch a stacks graph so al	becon master res l handling d as arra s, queu ap. Igorith	me C iing iike ng, lata lys, nes, ney ply	
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an striction win fu fo	Lea coficie cograndivance pinter ind individual ructural nked lees, ill indament sort	ts ment min ed s and mpler es si and almental ting,	will g, r featur l file menti uch a stacks graph so al	becon master res l handli ng d s arra s, queu ns. Th ap	me C iing iike ng, lata lys, nes, ney ply	
	C Programming, I	ntent	Contact Hour	St pr pr ad pc an stricted win fu fo had de	Lease de la contraction de la	ts ment and mental ting, ena	will g, r featur l file menti uch a stacks graph so al searcl abling	becon master res l handli ng d as arra s, queu ap, ap lgorith hing, a them	me C iing iike ng, lata lys, nes, ney ply	
I	C Programming, E Algorithms	Data Structure and	Contact Hour 6	St pr pr ad po an strict tree win fu de or	Lease Ludent coficie cogram livance internated in the community of the com	ts ment min ed s and mpler es stand almental ting, en acced proceeds	will g, r featur l file menti uch a stacks graph so al search abling	becon master res l handli ng d as arra as, queu ns. Th appligorith ning, a them nt a ms.	me C iing iike ng, lata lays, less, ney ply lams and	
	C Programming, E Algorithms Analog and D	ntent	Contact Hour	St pr pr ad po an stricted wind for had de op	Lease tudent officies of the content	ts min ed s and mpler es su and almental ting, enable ed protection of the ed protection of t	will g, r featur featur l file menti uch a stacks graph so al searcl abling efficie cograr	becon master res I handli ng das arra s, queuns. The application of them in the arrange of them in the arrange of them in the arrange of them in the arrange of them in the arrange of them in the arrange of the arrang	me C ing ike ng, lata lays, les, les, les, lata lays in to land a	
I	C Programming, E Algorithms	Data Structure and	Contact Hour 6	St pr pr ad pc an strict tree win fo had de op St the	Lease de la contraction de la	ts min ed s and mpler res so and almental ting, enable red properties with the solution of the	will g, r featur l file menti uch a stacks graph so al search abling efficie cograr will dersta	becon master res I handling das arras, queuns. The application of the man and ans.	me C ing ike ng, lata lys, nes, ney ply lams and a to and	
I	C Programming, E Algorithms Analog and D	Data Structure and	Contact Hour 6	St pr pr ad po an strict tree wind for had de op	Lease tudent of cogram of the	ts minimed sand mpler res surface and almental ting, g, end points veed proper to the control of	will g, r featur l file menti uch a stacks graph so al search abling efficie rograr will dersta	becon master res I handling das arra applement, a them nt a ms. gain anding dig	me C ing ike ng, lata lays, nes, ney ply ims and a to and a f of ital	2,3
I	C Programming, E Algorithms Analog and D	Data Structure and	Contact Hour 6	St pr pr ad pc an stricted wind for had de op St the an election	Lease de la control de la cont	ts min ed s and mpler res silists, and almental ting, g, enable red protes with the control of t	will g, r featur l file menti uch a stacks graph so al search abling efficie rograr will dersta and learr	becon master res I handling das arras, queuns. The application of the ming, and them into a mis. gain anding digning	me C ing ike ng, lata lys, nes, ney ply ams and a to and a fof ital the	
I	C Programming, E Algorithms Analog and D	Data Structure and	Contact Hour 6	St pr pr ad pc an strict tree wife fu de op	Lease tudent of cogram of the	ts minimed s and mplemental ting, g, enable ting, ted protes with the mics, on a mics, and	will g, r featur featur l file menti uch a stacks graph so al search abling efficie rograr will dersta and learr nd d	becon master res I handling das arras, queues. The apple of them into a mis. I gain anding digming esign	me C ing ike ng, lata lays, nes, ney ply ims and to and a c of ital the of	2,3
I	C Programming, E Algorithms Analog and D	Data Structure and	Contact Hour 6	St pr pr ad po an strict wing fu fo had de op St the an ele op fu	Lease de la control de la cont	ts minimed s and mental ting, enable tis very gh un anics, on a mental ting.	will g, r featur featur l file menti uch a stacks graph so al searcl abling efficie cograr will dersta and learr nd d	becon master res I handling das arras, queuns. The application of the ming, and them into a mis. gain anding digning	me C ing ike ng, lata lays, les, lata lays, lata lays and lata lays and lata lata lata lata lata lata lata lat	2,3

	1			
			as well as digital concepts	
			like binary numbers, logic	
			gates, and sequential logic	
			circuits. This knowledge	
			will equip them to analyze,	
			design, and troubleshoot	
			electronic systems.	
III	Computer Organization and	6	Students will understand	
	Architecture, Operating Systems		computer systems'	
			structure and functioning,	
			including the CPU,	
			memory, and I/O devices,	
			and will analyze	
			instruction sets and	
			performance optimization	
			techniques. They will also	2,3
			explore operating system	2,3
			concepts like process and	
			J	
			storage management,	
			equipping them to manage	
			system resources	
			efficiently.	
IV	Database Management Systems,	6	Students will develop a	
	Object Oriented Programming		strong foundation in	
			database design, SQL, and	
			ensuring database integrity	
			and security, while also	
			gaining proficiency in	
			object-oriented	
			programming principles	2,3
			such as classes,	
			inheritance, and	
			polymorphism. This unit	
			prepares them to design	
			robust software systems	
			and manage complex	
			databases effectively.	
V	Formal Language and Automata	4	Students will understand	
			the theoretical foundations	
			of computer science	
			through formal languages,	
			grammars, and automata	
			theory, analyzing different	2,3
			types of automata such as	-
			finite automata and Turing	
			machines. This knowledge	
			provides a deep	
			understanding of	
			and standing of	296

computation limits and the
formal frameworks
underpinning
programming languages
and algorithms.

REFERENCE BOOKS:

- **R1.** "Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- **R2**. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.
- **R3.** Charles K. Alexander and Matthew N. O. Sadiku, Fundamentals of Electric Circuits, 7th Edition, McGraw Hill; Standard Edition.
- **R4.** M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- **R5**. Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- R6. S. Sridhar, Design and Analysis of Algorithms, Oxford University Press.
- **R7**. Stallings, Computer Organization & Architecture, Pearson.
- R8. Silberschatz, Galvin and Gagne, Operating System Concepts, Willey.
- R9. C. K. Nagpal, Formal Languages and Automata Theory, Oxford University Press.
- R10. Abraham Silberschatz, Henry F. Korth, and S. Sudarshan, Database System Concepts, McGraw Hill.

OTHER LEARNING RESOURCES:

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Develop highly skilled and knowledgeable management professional who can deal with various areas and aspects of businesses	1,2,3,4,5,6,7,8,9,10,11 and 12							
2	Develop analytical and research ability as management professional who can be more efficient and innovative in practice	1,2,3,4,5,6,7,8,9,10,11 and 12							
3	Gather knowledge about various development concepts and the theories of development.	1,2,3,4,5,6,7,8,9,10,11 and 12							
4	Encourage the students towards Non-traditional thinking.	1,2,3,4,5,6,7,8,9,10,11 and 12							
5	Effectively communicate scientific and technical knowledge in a professional manner.	1,2,3,4,5,6,7,8,9,10,11 and 12							

Course	Course		PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO
code	Name		1	2	3	4	5	6	7	8	9	10	11	12
		СО												
		1	3	3	3	2	3	1	1	1	1	1	1	1
		CO												
		2	2	2	2	2	2	1	1	1	1	1	1	1
	Techno	CO												
22BTCS1	Professio	3	3	2	3	2	3	1	1	1	1	1	1	1
25R	nal Skills	CO												
	VI	4	3	3	3	2	3	1	1	1	1	1	1	1
		CO												
		5	3	3	3	3	3	1	1	1	1	1	1	1
		AV	20	2.6	20	2.2	2.8	1	1	1	1	1	1	1
		G	2.8	2.6	2.8	2.2	2.8	1	1	1	1	1	1	1

~	SEMESTER – VII Artificial Intelligence								
Course Title	*********					~			~
Course code	22BTCS413R	Total credits: 3	<u>L</u>	T	P	S	R	O/F	C
D	NISI	Total hours: 45T	2	0	2	0	0	0	3
Pre-requisite	Nil	Co-requisite	laismas (9_ T7-			Nil		
Programme		Computer S					~~~		
Semester	1 I Indonesiand the fire	VII semester of the						laina laonn	
Course Objectives		ndamentals of artific		_	nce, mc	iuaiii	g mac	mme leari	iiiig,
		eural networks, and natural language processing. Explore real-world applications such as computer vision, autonomous vehicles, virtual							
	assistants, and healt		as comp	atter	vision,	auton	omou	is venicles	s, viituai
	·	l implications of AI	technolo	ories	s inclu	ding k	nias in	algorithn	ns
		nd the impact on em					145 11	uigoiiuii	,
CO1		concepts, including					ıral ne	etworks.	
001		concepts, mercang	111110111110	Tour	iiiig ui	14 1100		otworks.	
CO2	Apply AI technique	s to solve real-world	d probler	ns e	ffective	ely.			
CO3	Davalon shothet us	ng IBM Watson ser	vice						
		olving abilities with		oud :	service	•			
CO5	F	<u> </u>							
	Apply EDA to real-	world data.							
Unit-No.	Con	tont	Contac	.	Loo	min	· Out	come	BL
Omt-No.	Con	tent	Hour		Lea	11.111118	z Out	come	BL
I	Introduction to A	I:			Unders	tand	bas	sic AI	
	fundamental conc	epts of Artificial		١.	concep	ts, al	gorith	ıms, and	
	Intelligence (AI).	define AI and			applica	tions	to	solve	
		orical evolution,			simple	probl	ems.		
	highlighting its pr								
	various societal d		7						2,3, 4
		types of AI,	•						_,-,-,
	distinguishing bet								
	tailored for spe General AI, whice								
	human intelligence								
	numan memgenee								
II	Advanced Pyth	on and Data			Develo	p adv	ance	d Python	
	Visualization:				skills	to cr	eate	complex	
	Introducing Nur	npy: learn the			data	visua	lizatio	ons for	
	NumPy attribute a						ommi	unication	
		ng Pandas for data		١.	of insig	ghts.			
	manipulation and								
	Series, data frame	_	8						4, 5, 6
	like cleaning, filte								
	datasets efficiently								
	Matplotlib: creat	ations, and depict							
	data trends, d	_							
	relationships effect	· ·							
	131uttonompo entec								
III	Introduction to M	Tachine Learning		-	Unders	tand	and	apply	
	and Algorithms:	3			basic	mach		learning	
								lyze data	
	Understanding M		10		and sol	ve pro	oblem	ıs.	2, 3, 4
	exploring its def								
	principles and le								
	types of machine	e learning tasks,							

	including supervised, unsupervised,			
	and reinforcement learning.			
	Supervised Learning: Linear Regression, Logistic			
	Linear Regression, Logistic Regression:			
	Unsupervised Learning:			
	K-Means Clustering			
	Additional Algorithms:			
	Decision Trees, k-nearest Neighbors			
	(kNN), Random Forest			
IV	IBM Watson for Machine		Utilize IBM Watson to	
	Learning and Bot Creation:		develop machine learning	
	Introduction to IBM Watson:		models and create	
	explore Watson Studio, IBM's		intelligent bots for various	
	integrated environment for data		applications.	
	scientists, developers, and domain			
	experts, to build and deploy ML models.	12		3, 4, 5
	Creating Bots using Watson			
	Assistant: learn the basics of Watson			
	Assistant, including intents, entities,			
	dialog flows, and integration			
	capabilities.			
V	IBM Natural Language		Apply IBM NLP	
	Processing (NLP):		techniques to analyze,	
			interpret, and extract	
	Introduction to NLP: learn the		insights from textual data.	
	basics of natural language			
	processing, and IBM's NLP services,	8		3, 4, 5
	such as Watson Natural Language			
	Understanding (NLU) and Watson			
	Discovery, for extracting insights			
	from unstructured text data.			
Practical Con	nponent		<u> </u>	
Practical 1	Introduction to NumPy	3	Apply NumPy arrays and	3
	ĺ		operations for efficient	
			numerical computing.	
Practical 2	Data Manipulation with Pandas		Use Pandas to manipulate	
		3	and analyze datasets,	3
			including cleaning,	
D (1.10	D (X7 12 22 24 34 4 4 22	2	filtering, and merging.	
Practical 3	Data Visualization with Matplotlib	3	Create customized plots to	
			visualize data trends, distributions, and	4
			relationships.	
Practical 4	Linear Regression with Supervised		Implement and evaluate	
i racucai 4	Learning Linear Regression with Supervised	3	linear regression models	4
			for predictive analytics.	·
Practical 5	Logistic Regression with Supervised	3	Apply logistic regression	
	Learning	-	for binary classification	4
			tasks.	

Practical 6	K-Means Unsupervised	Clustering I Learning	with	3	Perform clustering analysis to group data points based on similarities.	4
Practical 7	Decision Tre	es for Classifica	tion	3	Construct decision trees and interpret results for decision-making.	4
Practical 8		tering analysis t ased on similarit		3	k-Nearest Neighbors (kNN) Algorithm	4
Practical 9	Random F Learning	orest for En	nsemble	3	Build and assess random forest models for improved predictive accuracy.	4
Practical 10	Building a Assistant	Chatbot with	Watson	3	Create a functional chatbot using Watson Assistant, integrating intents, entities, and dialog flows.	4

- T1 Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig
- T2 Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth
- T3 Hands-On Artificial Intelligence for IBM Watson: Explore the Power of AI to Innovate and Transform Business Processes" by Dr. Harish Garg
- T4 AI and Machine Learning" by Christopher M. Bishop

REFERENCE BOOKS:

R1 Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig

R2 Artificial Intelligence: Foundations of Computational Agents" by David L. Poole and Alan K. Mackworth

R3 Hands-On Artificial Intelligence for IBM Watson: Explore the Power of AI to Innovate and Transform Business Processes" by Dr. Harish Garg

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand key AI concepts, including machine learning and neural networks.	1, 2, 3, 4, 10, 12					
2	Apply AI techniques to solve real-world problems effectively.	1, 2, 3, 4, 10, 12					
3	Develop chatbot using IBM Watson service.	1, 2, 3, 4, 5, 10, 12					
4	Enhance problem-solving abilities with IBM Cloud service.	1, 2, 3, 4, 10, 12					

5		1, 2, 3, 4, 10, 12
	Apply EDA to real-world data.	

Course code	Course Name		PO1 *	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2
		CO 1	2	2	1	3						1		2
	A - 4262 - 2 - 1	CO 2	2	2	1	3						1		2
22BTCS41 3R	Artificial Intellige nce	CO 3	3	3	3	3	3					1		3
		CO 4	3	3	3	3						1		3
		CO 5	3	3	3	3	3					1		3

		SEMESTE	R – 8						
Course		PE-VI: Natural	l Langua	ge Pr	ocessing	5			
Title									
Course cod	le 22BTCS127R T	Total credits: 3	L	T	P	S	R	O/F	С
	Г	Total hours: 45T	3	0	0	0	0	0	3
Pre-	Nil	Co-requisite				Ni	l		
requisite									
Programm	e Bachelo	r of Technology in (Compute	r Scie	nce and	Engi	neering	Ţ	
Semester		8th semester of four	rth year	of the	prograi	nme			
Course	1. Explore human lang	uage processing pa	radigms,	NLF	phases	, and	text	representat	ion i
Objectives	computers.				•			•	
(Minimum	2. Learn to leverage ling	guistic resources like	corpora	, Tree	Bank,	and to	ols su	ch as GAT	E and
3)	NLTK for NLP tasks.		-						
	3. Acquire proficiency in	language modeling, p	arsing, s	emant	ics, and	discou	rse		
	analysis, applying them to	real-world NLP app	lications.						
CO1	Define human languages	and NLP paradign	ns, apply	ing o	comprehe	ension	skills	to identif	y text
	representation schemes.				_				
CO2	Evaluate linguistic resou	rces, demonstrating	XML r	nanag	ement p	roficie	ency u	sing GAT	E and
	NLTK.								
CO3	Construct word recognition	on systems using regi	ular expr	ession	s and Fi	nite S	tate Au	tomata, ap	plying
	N-gram models with profi	ciency.							
CO4	Analyze natural language	structures, employing	g context	-free g	grammar	s for s	yntactio	parsing	
CO5	Justify NLP applications	, integrating semant	tic analy	sis an	d discou	irse re	esolutio	on techniqu	ies fo
	diverse tasks.								
Unit-	Content								
No.	Content		Contac	+	Lea	rnino	Outco	me	RI.
			Contac	t	Lea	rning	Outco	me	BL
	Introduction to Natural Lan		Hour						BL
	Introduction to Natural Lang			Le	arn fur	ndame	ntals	of NLP,	BL
	Introduction to Natural Lan		Hour	Le	arn fur	ndame tex	ntals t p	of NLP, rocessing,	
	Introduction to Natural Lang		Hour	Le ind lar	arn fur cluding iguage	ndame tex mod	ntals t p els,	of NLP, rocessing, sentiment	BL 2,3
	Introduction to Natural Lans		Hour	Le ind lar an	arn fur cluding guage alysis, a	ndame tex mod	ntals t p els,	of NLP, rocessing, sentiment learning	
	Introduction to Natural Lang		Hour	Le ind lar an ap	arn fur cluding iguage alysis, a	ndame tex mod and n	ntals t p els,	of NLP, rocessing, sentiment	
		guage Processing	Hour 12	Le inc lar an ap un	arn fur cluding aguage alysis, a plication derstand	ndame tex mod and n s for	ntals t p els, nachine natural	of NLP, rocessing, sentiment learning language	
	Introduction to Natural Lang	guage Processing	Hour	Lee ince lar an appun	arn fur cluding iguage alysis, a plication derstand	ndame tex mod and n s for ing of lin	ntals t p els, nachine natural	of NLP, rocessing, sentiment learning language	
		guage Processing	Hour 12	Le ind lar an ap un Ma	arn fur cluding iguage alysis, a plication derstand aster use d too	ndame tex mod and n s for ing of lin	ntals t p els, nachine natural guistic for	of NLP, rocessing, sentiment learning language resources analyzing,	2,3
		guage Processing	Hour 12	Le ind lar an ap un Ma	arn fur cluding aguage alysis, a plication derstand aster use d too occessing,	ndame tex mod and n s for ing of lir ls	ntals t p els, nachine natural guistic for	of NLP, rocessing, sentiment learning language resources analyzing, erstanding	
		guage Processing	Hour 12	Lee ince lar an appun Man pro-	arn fur cluding aguage alysis, a plication derstand aster use d too occessing,	ndame tex mod and n s for ing of lir ls	ntals t p els, nachine natural guistic for	of NLP, rocessing, sentiment learning language resources analyzing,	2,3
II	Linguistic Resources and To	guage Processing	12 10	Lee ind lar an ap un Man pro-	arn fur cluding aguage alysis, a plication derstand aster use d too occessing, aguage iciently.	ndame tex mod and n s for ing of lir ls and data	ntals t p els, nachine natural guistic for i unde	of NLP, rocessing, sentiment learning language resources analyzing, erstanding vely and	2,3
II		guage Processing	Hour 12	Lee ince lar an appun Man pro-	arn fur cluding aguage alysis, a plication derstand aster use d too occessing, aguage iciently.	ndame tex mod and n s for ing of lin ls and data	ntals t p els, nachine natural guistic for i unde	of NLP, rocessing, sentiment learning language resources analyzing, erstanding vely and rechniques	2,3

IV

V

Syntax and Parsing

Semantics, Discourse, and Applications

theories,

and their

2,4

4,5

utilizing language models for text

Learn principles of syntax and techniques for parsing sentences

to analyze grammatical structure

semantic

analysis,

practical applications in natural

analysis and generation.

and dependencies.

Explore

discourse

8

8

			language generation	understanding	and	
Pract al	e NA	30				1,2, 3,4

T1 Daniel Jurafsky and James H Martin. Speech and Language Processing, 2e, Pearson Education, 2009

REFERENCE BOOKS:

R1 James A.. Natural language Understanding 2e, Pearson Education, 1994

R2 Bharati A., Sangal R., Chaitanya V.. Natural language processing: a Paninian perspective, PHI, 2000

R3 Siddiqui T., Tiwary U. S.. Natural language processing and Information retrieval, OUP, 2008

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 11, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 11, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 9, 10, 11, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 9, 10, 11, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 9, 10, 11, 12

Course code	Cours	CO	PO	PO1	PO1									
	e	S	1	2	3	4	5	6	7	8	9	0	1	2
	Name													
		CO												
		1	3	3	1	2							2	2
		CO												
		2	3	3	1	2	2						2	1
22BTCS12	NLP	CO												
7R	NLP	3	2	2	3	2	2				1	2	1	3
		CO												
		4	2	2	3	2	2				1	1	1	2
		CO												
		5	2	2	2	1	2				1	1	1	2

		SEMESTE	R – 8										
Course		PE-VI: Speech	and Vid	eo Pı	ocessin	g							
Title													
Course cod	le 22BTCS127R	Total credits: 3	L	T	P	S	R	O/F	C				
		Total hours: 45T	3	0	0	0	0	0	3				
Pre-	Nil	Co-requisite	,		•	Ni	1						
requisite													
Programm	e Bache	elor of Technology in (Compute	r Sci	ence an	d Engi	neerin	g					
Semester		8th semester of four	ourth year of the programme										
Course	Grasp the basics o	f speech production, per	rception,	and d	ligital si	gnal pr	ocessir	ng technique	es for				
Objectives	analysis and synth	esis.											
(Minimum	2. Explore automatic	speech recognition syst	tems, inc	ludin	g HMM	and de	ep lear	ning approa	iches,				
3)	for accurate speec	n recognition and speak	er identif	icatio	n.								
	3. Gain insights into	video signal processing	, includir	ig cap	oture, co	mpress	ion, m	otion estima	ation,				
	and advanced topi	cs like object tracking, o	deep lear	ning,	and AR	/VR ap	plication	ons.					
CO1													
		ction and perception	mechani	sms,	applyir	g DSF	fund	amentals to)				
	process speech signals	effectively.											
CO2	Implement speech codi	ng taahniguas and synt	hasis swa	ome	utilizin	a faatu	rog lileg	MECC on	1 I DC				
CO2	for efficient speech pro		iicsis sysi	.cms,	uumzm	g Icalu	ies iike	WIFCE and	1 LFC				
CO3	Evaluate the performation		amplovin	α HI	/M. and	doon	laarnin	a annroach	as for				
COS	accurate speech recogni	•		gımv	iivi aiic	uccp	icai iiii	g approach	CS 101				
CO4	Create video processing			dae c	of video	cionale	comr	reccion ctai	ndarde				
CO4	and motion estimation			-		_	s, comp	nession star	nuarus,				
	and motion estimation i	or quanty video represe	intation a	na su	11111111111111	ation.							
CO5	Apply advanced techni	ques such as object trac	cking, de	ep le	arning,	and sur	rveillar	ce applicat	ions to				
	analyze and enhance vi	deos, paving the way fo	r AR and	VR	innovati	ons.							
			~ .	. 1			<u> </u>		1				
Unit-	Conte	ent	Contact	t	Le	arning	Outco	ome	BL				
No.	T. 1. 1. 1. C. 1.1		Hour	**	1 .	1.0 1		1 0					
	Introduction to Speech	O	12		nderstar								
	Speech Production and Pe			_	eech pr		-	-					
	Signal Characteristics. Ph							thesis, and	2.2				
	Phonology. Digital Signa	Č		S1	gnal ana	ilysis te	cnnıqu	es.	2,3				
	Fundamentals for Speech												
	Methods for Speech Proc	_											
	Fourier Transform, Wave		10	T	oun to	ahni ana	o for	onolyssin a					
	Speech Analysis and Syl		10			_		analysing					
	Extraction: MFCC, LPC,				•	•	•	ch signals,					
	Techniques. Speech Enha				_	_	nicai a	pplications	2.4				
	Reduction. Text-to-Speed Speech Synthesis Technic	· · · · · · · · · · · · · · · · · · ·		an	d tools.				3,4				
	Synthesis, Concatenative	-											
	·	Symmesis, Parametric											
	Synthesis. Speech Recognition	and Speaker	8	ŢT.	nderstar	nd o	nd	imploment					
	•	-	٥					implement					
	Identification: Automati (ASR) Systems. Hidde	-			cnnique cognitic		automa and	tic speech	2 1				
	•	Recognition. Deep			cogniuc entifica		focus	speaker	3,4				
	` '	-						· ·					
	Learning Approaches	in ASR. Language		ac	curacy	and effi	ciency	•					

	Models and Acoustic Models. Speaker Identification and Verification. Applications of Speech Recognition in Industry.			
IV	Basics of Video Signals and Systems. Video Capture and Representation. Color Spaces and Color Models. Video Compression Standards: H. Introduction to Video Processing264, HEVC. Motion Estimation and Compensation. Key Frame Extraction and Video Summarization.	8	Understand fundamentals of video signals including processing techniques and practical applications.	2,3
V	Advanced Topics in Video Processing: Video Segmentation and Object Tracking. Video Enhancement and Restoration. Deep Learning for Video Analysis. Action Recognition and Video Understanding. Video Surveillance and Security Applications. Introduction to Augmented Reality (AR) and Virtual Reality (VR) Applications	8	Master advanced video processing techniques, including segmentation, object tracking, enhancement, and restoration.	4,5
Practic al	NA	30		1,2, 3,4

T1Rabiner, L., & Schafer, R. (2007). *Introduction to Digital Speech Processing*. Foundations and Trends in Signal Processing.

T2 Gonzalez, R. C., & Woods, R. E. (2018). Digital Image Processing. Pearson.

T3 Gonzalez, R. C., & Woods, R. E. (2018). Digital Image Processing. Pearson.

REFERENCE BOOKS:

R1Jurafsky, D., & Martin, J. H. (2008). Speech and Language Processing. Pearson.

R2Szeliski, R. (2010). Computer Vision: Algorithms and Applications. Springer.

R3 Richardson, I. E. (2010). The H.264 Advanced Video Compression Standard. Wiley.

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 11, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 11, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 9, 10, 11, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 9, 10, 11, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 9, 10, 11, 12

Course	Course	CO	PO	PO	PO	P	PO	РО	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	O	5	6	7	8	9	0	1	2
						4								
		CO												
		1												
			3	3	1	2							2	2
	Speech	CO												
22BTCS12	and	2	3	3	1	2	2						2	1
7R	Video	CO												
/11	Processi	3	2	2	3	2	2				1	2	1	3
	ng	CO												
		4	2	2	3	2	2				1	1	1	2
		CO												
		5	2	2	2	1	2				1	1	1	2

		SEMEST	ER – 8								
Course		PE-VII: A	dvanced I	ata N	Iining						
Title								_			
Course coo	de 22BTCS128R	Total credits: 3	L	T	P	S	R	O/F		C	
		Total hours: 45T	3	0	0	0	0	0		3	
Pre-	Nil	Co-requisite				N	il				
requisite											
Programm	ne Bache	ence and Engineering e programme									
Semester											
Course	1. Understand and app	• •	nsupervise	d lear	ning al	gorithn	ns alo	ng with e	val	uation	
Objectives			_					_			
(Minimum		graph mining algorith	ms, sentim	ent an	alysis,	topic n	nodelir	ng, and we	b n	nining	
3)	techniques.										
	3. Learn advanced data	-	ke deep le	arnıng	, transf	er lear	nıng, a	and addre	ss e	ethical	
G01	concerns in data mining	•	. 1		1		1 .		1	1	
CO1	Apply decision trees,		networks	ın pr	actical	examp	oles to	underst	ınd	how	
CO2	supervise d learning wo Evaluate K-means and		.1	40 100		.4		مد مداد ا	:	اه مد م	
CO2	how to interpret results	•	argoriumis	to lea	m abou	it unsu _j	pervise	ed data iii	11111	g and	
CO3	Analyze network struc	· · · · · · · · · · · · · · · · · · ·	eory princ	inles (and alo	orithm	c like	PageRani	r to	find	
003	important insights in gra		cory princ	ipies a	and arg	OHUIIII	5 IIKC	1 agerrain	. 10) IIIId	
	important marginia in gr				- 41-	nianos	to av	ztract and	91	nolvzo	
CO4	CO4 Use sentiment analysis, topic modeling, and web mining techniques to extract a										
CO4	*		and web	111111111	g tecn	inques	10 6	anct and	aı	naryze	
CO4	Use sentiment analysi information from text a		and web	111111111	g tecm	inques	10 6	and and	. ai	nary ZC	
CO4	information from text at Evaluate time series da	nd web data. ata, use deep learnin	g models,							_	
	information from text a	nd web data. ata, use deep learnin	g models,							_	
CO5	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios.	and c	onsider	· ethica	al aspe	ects to de		nstrate	
CO5	information from text at Evaluate time series da	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios.	and c	onsider		al aspe	ects to de		_	
CO5 Unit-No.	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios. Contac Hour	and c	consider Le	ethica	al aspe	ects to de		nstrate	
CO5	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios.	and c	consider Le aster su	ethica earning	al aspe	come		nstrate BL	
CO5 Unit-No.	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios. Contac Hour	and c	Le aster su	earning	aspend aspendicular aspendicula	come a mining	nor	nstrate	
CO5 Unit-No.	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sce	g models, enarios. Contac Hour	and c	Leaster suethods a	ethica earning pervise and eva	al aspe g Outc ed data aluate t	come mining their g predictive	mor	nstrate BL	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and c	Le aster su ethods a fectiven	pervise pervise and eva	al aspe g Outc ed data aluate t solving assifica	come mining cheir g predictivation tasks	mor	nstrate	
CO5 Unit-No.	Evaluate time series da advanced data mining s	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour	and c	Leaster su ethods a fectiven odeling aster un	pervise and eva	g Outce ed data alluate to solving assifications of the content of	come mining their g predictivation tasks	mor	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and c	Leaster su ethods a fectivent odeling aster un	pervise and eva and cla and cla supervise	al aspe	come mining cheir g predictivation tasks	mor	nstrate BL	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and c	Leaster su ethods a fectivent odeling aster un	pervise and eva and cla asupervise and cla	al aspe	come mining their g predictivation tasks	mor	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and contact and co	Leaster su ethods a fectiven odeling aster un chnique	pervise and eva and cla asupervise and cla	al aspe	come mining heir g predictivation tasks data minin	re s. lig sir	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte Supervised Data Mining a	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and control of the co	Leaster suethods a fectiven chnique ficacy i scovery ilize	pervise pervise and eva ess in a and cla supervise s and n clust tasks.	al aspe	come mining heir g predictivation tasks data minin	re si. ir rn	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte Supervised Data Mining a	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and control of the co	Leaster suethods a fectiven chnique ficacy i scovery ilize	pervise and evances and classing cluster tasks. graph s to	al aspe	ects to de come mining their g predictivation tasks data mining and patte a mining a mining e comple	re si. ir rn	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte Supervised Data Mining a	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and control of the co	Leaster su ethods a fectivent odeling aster un chnique ficacy i scovery ilize chnique ationsh	pervise and elan supervise and classes and classes tasks. graph s to ips a	al aspe	come mining their g predictivation tasks data minin luate the and patte	more rees ng sir rn	BL 4,5	
CO5 Unit- No. I	Evaluate time series da advanced data mining s Conte Supervised Data Mining a	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12	and control of the co	aster suethods a fectiven odeling aster unchnique ficacy i iscovery ilize chnique ationsher connectionsher conn	pervise and evances and class and class tasks. graph s to ips a ected d	g Outce ed data aluate to solving assifications it evaluates tering data analyzand palata strucks	ects to de	more re si. ng sir rn ng ex in	BL 4,5	
CO5 Unit- No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12 10	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery ilize chnique ationsh erconne	pervise and elsa tasks. graph s to ips a ected dext are	al aspe	ects to de	mores.	BL 4,5	
CO5 Unit- No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12 10	and control of the co	aster su ethods a fectiven odeling aster un chnique ficacy i scovery ilize chnique ationsh erconne	pervise and class and class and class tasks. graph s to ips a ected dext ar s to ext	g Outce ed data aluate to solving assifications data analyzand plata strand worker and w	ects to de come mining cheir g predictivation tasks data mining and patte a mining comple comple comple comple comple comple conterns a cuctures.	more rees	BL 4,5	
Unit-No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining	nd web data. ata, use deep learnin kills in real-world sceent and Evaluation	g models, enarios. Contac Hour 12 10	and control of the co	Leaster sure thods a fectiven odeling aster unchnique ficacy i scovery ilize chnique ationsher connections a fection of the fe	pervise and class and class and class tasks. graph s to ips a ected dext ar s to ext	g Outce ed data aluate to solving assifications data analyzand plata strand worker and w	ects to de	more rees	BL 4,5	
CO5 Unit- No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining	ata, use deep learnin kills in real-world sceent and Evaluation ag and Evaluation	g models, enarios. Contac Hour 12 10	and control of the co	aster suethods a fectivent odeling aster unchnique ficacy i scovery ilize chnique ationsher connections terconnections terconnections arructurunces.	pervise and evanuess in and class tasks. graph s to ips a ected dext and s to extend dext an	al aspectory assification of the control of the con	ects to decome mining their g predictivation tasks data minin luate the and patte a minin e comple batterns uctures. eb minin asights fro	more response BL 4,5		
Unit-No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining Graph Data Mining	ata, use deep learnin kills in real-world sceent and Evaluation ag and Evaluation	g models, enarios. Contac Hour 12 10 8	and control of the co	aster sue thods a fectiven odeling aster un chnique ficacy i scovery ilize chnique ationshe erconnoply to chnique structururces.	pervise and classes in a stock are decreded decr	ed data aluate t solving assifications data string data strind we tract in ata a anneed domplex	ects to de come mining cheir g predictivation tasks data mining and patte a mining comple control on mining control on mining ata mining a problem	more response 4,5 4,5 4,5		
Unit-No. I II III	Evaluate time series da advanced data mining s Conte Supervised Data Mining a Unsupervised Data Mining Graph Data Mining	ata, use deep learnin kills in real-world sceent and Evaluation ag and Evaluation	g models, enarios. Contac Hour 12 10 8	and control of the co	aster sue thods a fectiven odeling aster unchnique ficacy i iscovery ilize chnique ationsh terconnoply to chnique structururces. Inplement chnique living, for the chnique ations, nd the chnique ations at the ch	pervise and evaluess in and class and n clust tasks. graph s to ips a ected dext and ext are s to ext are s for coocusing	data aspendicular analyzand plata structuract in ata a analez g on in	ects to decome mining their g predictivation tasks data minin luate the and patte a minin e comple batterns uctures. eb minin asights fro	more response BL 4,5 4,5		

Practic	NA	20	1,2,
al		30	3,4

T1"Data Mining: Concepts and Techniques" by Jiawei Han, Micheline Kamber, and Jian Pei

REFERENCE BOOKS:

R1"Pattern Recognition and Machine Learning" by Christopher M. Bishop

R2 "Introduction to Data Mining" by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	3	2	2	2	1					1		3
22BTCS12	Advanc	CO 2	3	3	3	3	1					1		3
8R	ed Data Mining	CO 3	3	2	2	2	1					1		3
		CO 4	3	2	2	2	1					1		3
		CO 5	3	3	2	2	1		-			1	_	3

		SEMESTER	R – 8						
Course		PE-VII: Data Mo	delling	and S	Simulat	ion			
Title									
Course co	de 22BTCS128R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 45T	3	0	0	0	0	0	3
Pre-	Nil	Co-requisite				N	il		
requisite									
Programn	ne Bache	lor of Technology in C					ineerin	ıg	
Semester		8th semester of four							
Course	1.Equip students with	•		_				principles of	of data
Objectives	•	•	• •		-				
(Minimun		•	sess ma	athema	itical ai	nd stati	stical	models usir	ig real-
3)	world data, ensuring acc	•		1	. 1		1. 1	. 1	
	3. Provide practical expe	11.	rse sim	ulatior	i techni	ques a	nd tool	s to solve c	omplex
CO1	engineering and industr		1.11!.		_:1.	41 1.	1 1'	- 4 C	1.1.
CO1	Understand the fundam and their applications, the			ig and	siinula	uon, 11	iciuain	g types of i	nodels
CO2	Develop and validate m	<u> </u>		ale noi	na nrob	ability	dietrik	utione hym	othesis
CO2	testing, and regression a				ng proc	aomity	uisuio	utions, myp	ouiesis
CO3	Implement discrete-eve	-			imulatio	ons us	no sin	nulation so	ftware
	ensuring accurate mode			arro s	iiiiaiaii	311 5 4 5.		idiation 50	it ware,
CO4	Analyze complex syste	•	•	techn	iaues s	uch as	svsten	dvnamics.	agent-
	based modelling, and or	-			_		J	,	
CO5	Apply data modelling a	_			lustry-s	pecific	proble	ems, demon	strating
	ethical and practical cor	siderations in real-world	d projec	cts.					
Unit-	Conte	nt	Contac	et	Le	earning	Outc	ome	BL
No.			Hour			•	•		
I	Introduction to Data	a Modelling and	12	Uı	ndersta	nd fund	lament	al concepts	
	Simulation: Overview	of Data Modelling.		of	data r	nodelir	g and	simulation	
	Types of Models: Phy	sical, Mathematical,		fo	r anal	lysing	and	predicting	
	Statistical, and Si	mulation Models.		co	mplex	system	S.		
	Introduction to Simulat	ion: Definition and							2, 3
	Importance. Steps in a	•							
	Applications of Modellin	-							
	Engineering. Case Stu								
	Modelling and Simulation	•							
II	Mathematical and Sta	_	10		pply		ematic		
	Mathematical Modelling						_	chniques to	
		atistical Modelling:					d pro	blems and	
	Probability Distributions,	• •		ını	terpret (data.			
	Regression Analysis. M	_							2, 3
	Assumptions, Formulation								
	Data Collection and Prepa	~							
	Model Fitting and Pa Goodness-of-Fit Tests.	rameter Estimation.							
III	Simulation Techniques	and Tools: Types of	8	I	arn to	analy	70 dot	a and data	
1111	Simulations: Discrete-Eve	* *	o		odelling	•	orithm		
		ations. Simulation			nulatio		ormill	s mough	7, 3
ĺ	MINING CALLO SHILLING	anons. Simulation		511	muralio	110			

	Methodologies: Time-Driven, Event-Driven,			
	and Process-Oriented Approaches.			
	Introduction to Simulation Software:			
	MATLAB, Simulink, Arena, AnyLogic.			
	Building Simulation Models: Entity, Attribute,			
	Event, and Queue Concepts. Verification and			
	Validation of Simulation Models. Output			
	Analysis and Interpretation.			
IV	Advanced Topics in Simulation: System	8	Learn to analyze data and data	
	Dynamics and Agent-Based Modelling. Hybrid		modelling algorithms through	
	Simulation Techniques. Optimization in		simulations	
	Simulation: Genetic Algorithms, Simulated			
	Annealing. Simulation of Complex Systems:			3, 4
	Supply Chains, Healthcare, Manufacturing			
	Systems. Real-Time and Parallel Simulations.			
	Case Studies of Advanced Simulations in			
	Industry.			
V	Real-world Applications: Application of Data	8	Apply data modelling techniques	
	Modelling and Simulation in Real-World		and algorithms to solve real world	
	Scenarios. Industry-Specific Simulation		problems	
	Projects: Finance, Engineering, IT,			3, 4
	Environmental Systems. End-to-End			3, .
	Modelling and Simulation of a Given Problem.			
	Ethical and Practical Considerations in Data			
	Modelling and Simulation.			
Practic	NA	30		1,2,
al				3,4

T1 Law, A. M., & Kelton, W. D. (2015). Simulation Modeling and Analysis. McGraw-Hill.

T2 Banks, J., Carson, J. S., Nelson, B. L., & Nicol, D. M. (2010). Discrete-Event System Simulation. Pearson.

REFERENCE BOOKS:

R1Ross, S. M. (2014). Introduction to Probability Models. Academic Press.

R2 Jain, R. (2010). The Art of Computer Systems Performance Analysis. Wiley.

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOME

	CO PO Map	ping
SN	Course Outcome (CO)	Mapped Program Outcome

1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Data	CO 1	3	2	2	2	1					1		3
22BTCS12	Modellin g and	CO 2	3	3	3	3	1					1		3
8R	Simulati on	CO 3	3	2	2	2	1					1		3
		CO 4	3	2	2	2	1					1		3
		CO 5	3	3	2	2	1					1		3

		SEMESTER	-8											
Course Tit		III: Introduction to				ted Rea	lity							
Course coo	de 22BTCS129R	Total credits: 3	L	T	P S	R	O/F	C						
		Total hours: 45T	3	0	0 0	0	0	3						
Pre-requis		Nil Co-requisite Nil Bachelor of Technology in Computer Science and Engineering												
Programm							eering							
Semester		8th semester of fourth year of the programme 1 Understand core concepts, historical context, and hardware, preparing for practical												
Course		1. Understand core concepts, historical context, and hardware, preparing for practical development and application												
Objectives		development and application. 2. Acquire skills in environment setup, 3D modeling, and interaction design, using popular.												
(Minimum	_	2. Acquire skills in environment setup, 3D modeling, and interaction design, using popular development tools like Unity or Unreal Engine												
3)	•	development tools like Unity or Unreal Engine.												
	~	3. Investigate diverse industry uses, ethical implications, and emerging trends, while												
	_	delving into advanced development techniques and integration with AI.												
CO1		Understand key historical milestones and technological advancements in VR and AR												
	evolution.													
CO2		Understand the fundamental principles of 3D modeling and interaction design for VR												
	environments.	environments.												
CO3	Apply AR framewor	ks and design princi	ples to	crea	ate immer	sive A	R experie	ences for						
~~.	mobile devices.					- /								
CO4	Analyze the ethical	implications and so	cietal :	ımpa	cts of VI	R/AR a	applicatioi	ns across						
	diverse industries.													
CO5	Design and develop a	n innovative VR/AR	applica	tion i	integrating	advan	ced techn	iques and						
000	technologies.		арриса		mogrami	5 ua van	cca teenn	rques une						
	teemiorogies.													
Unit-No.	Conte	nt	Contac	t	Learnii	ng Outo	come	BL						
			Hour											
Ι	Foundations of Virtua	l and Augmented	12	U	nderstand	the								
	Reality				ındamenta	•	•							
				te	chnologie	s behin	d virtual	2,3						
				aı	nd augmer	nted rea	lity							
					plication									
II	Virtual Reality Develop	oment	10		evelop in									
					eality exp									
					dvanced	tools		3, 6						
					chniques		various							
					pplication									
III	Augmented Reality Dev	velopment	8		reate		teractive							
					agmented		reality							
					plication		using	2 -						
					dvanced		elopment	3,6						
					ools and		•							
					iverse	re	al-world							
					enarios.		1							
TT.	1 1 1 1 1 1 1	, 1	_		xplore a	nd in	nplement	1						
IV	Applications and Use C	Cases	8		-		_							
IV	Applications and Use C	ases	8	pı	ractical a	applicat	ions of							
IV	Applications and Use C	ases	8	pı aı	ractical a	applicat reality	ions of across	4, 5						
IV	Applications and Use C	ases	8	pı aı in	ractical augmented adustries	applicat reality for er	ions of across hancing	4, 5						
IV	Applications and Use C	ases	8	pr au in us	ractical augmented adustries	applicat reality for er perience	ions of across hancing	4, 5						

	Techniques, social VR experiences		techniques for creating immersive social VR experiences, integrating	4,6
			AR/VR technologies for interactive social interactions.	
Practical	NA	30		1,2,3,4

T1"Augmented Reality: Principles and Practice" by Dieter Schmalstieg and Tobias Hollerer

REFERENCE BOOKS:

R1"Virtual Reality Technology" by Grigore C. Burdea and Philippe Coiffet

R2"Virtual Reality: Concepts and Technologies" edited by Giovanna Calogiuri

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology including structure and functions of cell and cell organelles.	1, 2, 3, 4, 5, 10, 12
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 10, 12
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 10, 12
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 10, 12

Course	Course	CO	PO	PO	PO	PO	PO	PO	РО	РО	РО	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
		CO 1	2	2	1	1	1					1		2
	Introducti on to	CO 2	3	3	3	3	2					2		3
22BTCS12 9R	Virtual and	CO 3	3	2	3	3	3					2		3
	Augmente d Reality	CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

Ī	SEME	STER – 8										
Course	PE-VIII: Cryp	tography	&Net	work	Secur	ity						
Title												
Course code Pre-requisite Programme Semester Course 1 Objectives (Minimum 2 3)	22BTCS129R Total credits: 3		T	P	S	R	O/F	C				
	Total hours: 4		0	0	0	0	0	3				
	Nil Co-requisit	e				Nil						
							eering					
	8th semester of											
	1.To provide deeper understanding in	• • • •			pplica	ition t	o network	security				
•												
`			ption	tech	nique	s, str	engths o	f Traffic				
3)	Confidentiality, Message Authenticati											
	To familiarize Digital Signature Standard and provide solutions for their issues.											
	To familiarize with cryptographic techniques for secure (confidential) communication o											
	wo parties over an insecure (public) channel; verification of the authenticity of the source											
	of a message.	a message.										
CO1	Identify basic security attacks and serv	rices.										
CO2	Use symmetric and asymmetric key algorithms for cryptography.											
CO3	Design a security solution for a given	Design a security solution for a given application.										
CO4	Analyze Key Management techniques	and the imp	ortar	ice of	numb	er The	eory.					
CO5	Understanding of Authentication functions the manner in which Message Authentication											
	Codes and Hash Functions work.			<i>.</i>	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	11105	age Hain					
Unit-	Content	Conta	ct	Lea	arnin	g Out	come	BL				
No.		Hour										
I		11001										
	INTRODUCTION: Security trends, T			Inders	tand f	ounda	tional					
	INTRODUCTION: Security trends, T OSI Security Architecture, Security	he 12	τ				tional graphy					
	•	he 12 ty	l c	oncept	ts of c	ryptog						
	OSI Security Architecture, Securi	he 12 ty ty	c a	oncept	ts of cormat	ryptog	graphy					
	OSI Security Architecture, Security Attacks, Security Services and Security	he 12 ty ty	c a se	oncept nd info	ts of c ormat g digi	ryptog ion sec tal	graphy	2.4				
	OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Netwo	ty ty rk	c a se	oncept nd info	ts of c ormat g digi	ryptog ion sec tal	graphy curity for	3, 4				
	OSI Security Architecture, Security Attacks, Security Services and Security Mechanisms, A model for Networksecurity.	ne 12 ty ty rk	c a se	oncept nd info	ts of c ormat g digi	ryptog ion sec tal	graphy curity for	3, 4				
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- **T1** William Stallings (2006), Cryptography and Network Security: Principles and Practice,4th edition, Pearson Education, India.
- **T2** William Stallings (2000), Network Security Essentials (Applications and Standards), Pearson Education, India.

REFERENCE BOOKS:

R1 Charlie Kaufman (2002), Network Security: Private Communication in a Public World, 2nd edition, Prentice Hall of India, New Delhi.

R2 Atul Kahate (2008), Cryptography and Network Security, 2nd edition, Tata McGraw hill, India.

Robert Bragg, Mark Rhodes (2004), Network Security: The complete reference, Tata McGraw-Hill, India.

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 10, 12
	including structure and functions of cell and cell organelles.	
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 10, 12
3	Learn and develop skills for operating microscope, preparing	1, 2, 3, 4, 5, 10, 12
	slides by various staining techniques	
4	Apply knowledge of cellular processes to explain how cells	1, 2, 3, 4, 5, 10, 12
	operate and interact within living organisms.	
5	Demonstrate a comprehensive understanding of cell structure	1, 2, 3, 4, 5, 10, 12
	and function.	

Course	Course	CO	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
code	Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Cryptogra phy & Network Security	CO 1	2	2	1	1	1					1		2
		CO 2	3	3	3	3	2					2		3
22BTCS1 29R		CO 3	3	2	3	3	3					2		3
		CO 4	2	2	2	2	2					2		2
		CO 5	2	2	3	2	2					2		3

			SEMEST	ER	-8							
Course Tit	le		J	Proje	ect III							
Course cod	le 22BTCS42	21R /	Total credits: 7		L	T	P	S	R	O/I	7	С
		ŗ	Fotal hours: 15	6 P	0	0	14	0	0	0		7
Pre-requisi			Co-requisite						Nil			
Programm	e Ba		of Technology i							eering	3	
Semester			th semester of f									
Course			nowledge gained						gram	to solv	e re	eal-world
Objectives	<u>^</u>	-	novative solutio		•				-			
(Minimum		_	iency in projec	_	-					-		_
3)		_	ent analysis, des	-	_				-			
		-	ent research, e cement of know	_				_			_	
CO1			or real-world pr			_						
COI	network solution	_	or rear world pr	OOIC	111 501	viiig	using	pros	1 (4111111	ing iai	igue	iges and
CO2			ects as a team n	nemb	er, de	mons	stratin	g effe	ective	persor	al a	nd team
	management sl				,		,	C		•		
CO3	Develop prog	ramming	g skills to crea	te a	nd as	sess	softw	are,	hardw	are, a	nd	network
	solution.											
CO4	Apply persona	l and tea	m management	skills	s as a	profe	ssiona	l soft	ware o	develo	per.	
CO.5	C-1/:/1	Cultivate employability skills and uphold professionalism in software development.										
CO5	Cultivate empl	loyability	y skills and upho	ola pi	rotessi	ionali	ism in	softw	are de	evelop	men	t.
Unit-No.		Conten	t	(Contac	et	Learning Outcome					BL
					Hour							
I	This course will				156		_		-	ceive,		
	an individual or	_					esign,	_				
	under the direct	_				_	resent	_				
	of academic staff	_					computer science project				,	
	topic undertaken			l			demonstrating advanced technical proficiency,					
	and supervisor. S							_		icy, kills, a	nd	
	to:	students	will be required			_	novat		villg si	xiiis, a	IIu	
						1	iiiovai	.1011.				
	6. Perform	a literat	ure search to									
	review c	urrent k	nowledge and									
	developi	ments in	the chosen									5,6
	technica											
			ed technical									
			en area using									
	one or m	nore of:										
	a)	theore	etical studies									
	b)		ater simulations									
	c)	_	are construction	.								
	ζ,	-141 4 11		7								
	8. Produce	progres	s reports or									
			ssional journal to)								

	establish work completed, and to schedule additional work within the time frame specified for the project; 9. Deliver a seminar on the general		
	area of work being undertaken and specific contributions to that field; 10. Prepare a formal report describing the work undertaken and results obtained so far; and		
	Present the work in a forum involving poster presentations and demonstrations of operational hardware and software.		
Practical	NA	30	1,2,3,4

OTHER LEARNING RESOURCES:

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Able to explain the fundamentals and advances of cytology	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12						
	including structure and functions of cell and cell organelles.							
2	Able to explain the cell cycle and cell division.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12						
3	Learn and develop skills for operating microscope, preparing slides by various staining techniques	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12						
4	Apply knowledge of cellular processes to explain how cells operate and interact within living organisms.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12						
5	Demonstrate a comprehensive understanding of cell structure and function.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12						

Course code	Cours	CO	PO	PO	PO	PO	PO	PO	РО	РО	PO	PO1	PO1	PO1
	e Name	S	1	2	3	4	5	6	7	8	9	0	1	2
	Proje ct III	CO 1	3	3	2	3	2	1	1	2	3	2	2	3
		CO 2	3	3	3	3	2	1	1	2	3	2	2	3
22BTCS42 1R		CO 3	3	2	3	2	3	1	1	2	3	3	2	3
		CO 4	3	2	2	2	2	1	1	2	3	3	3	3
		CO 5												



Curriculum and Syllabus

Bachelor of Computer Application

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 2.0

FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson Board of Studies

Member Secretary
Academic Council

Vision

To become a Globally Recognized University from North Eastern Region of India, Dedicated to the Holistic Development of Students and Making Society Better

Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

Programme Details

Programme Overview (not more than 100 words)

Understanding the fundamentals of computer programming languages and databases is of utmost importance in the field of computer science and information technology. The Bachelor of Computer Application (BCA) Programme has been designed in sync with the latest industry demands. This programme enriches the students with the necessary skills to build a successful career in the Information Technology sector. Through this programme, we intend to create a skilled workforce to take up future challenges in the industry. It aims at educating the students as expert programmers and computer professionals for the future.

I. Specific Features of the Curriculum

The Bachelor of Computer Application (BCA) programme is meticulously designed to align with current industry demands. It focuses on imparting a strong foundation in programming languages and database management. Students gain practical skills essential for the IT sector, preparing them for successful careers. The curriculum emphasizes hands-on experience, ensuring students are ready to tackle real-world challenges. By integrating the latest technological trends, the programme ensures relevance in a rapidly evolving field. It aims to produce expert programmers and computer professionals. Graduates are equipped to meet future industry challenges. Continuous updates keep the curriculum effective. The programme builds a skilled workforce for the future.

II. Eligibility Criteria: (To be aligned with the admission office)

Students should be secured 45 % in 10+2 in Arts/Science/Commerce from AHSEC or any other equivalent Examination recognized as such by the University with preferably Mathematics as one of the subjects in HS (Pass Marks).

Note: Candidate having (10+2) without mathematics/computer Science has to undertake additional bridge courses.

III. Program Educational Objectives (PEOs):

PEO1: To produce graduates who have a strong foundation of knowledge and skills in the field of Computer Applications.

PEO2: To produce graduates who can provide solutions to challenging problems in their profession by applying Computer Science theory and practices.

PEO3: To produce graduates who are employable in industries/public sector/Govt. organizations or work as an entrepreneur, as well as can provide leadership and are effective in a multidisciplinary environment

IV. Program Specific Outcomes (PSOs):

- **PSO 1:** Ability to demonstrate a degree of mastery in the area of computer applications.
- **PSO 2:** Ability to independently carry out research/investigation and developmental work to solve practical problems.
- **PSO 3:** Develop sound knowledge and skill sets in fields related to human-computer interaction and management of industrial processes for the design and implementation of intelligent systems.

V. Program Outcome: (8-12)

PO1 Basic Mathematical Knowledge: Apply knowledge of Mathematics & Statistics to the solution of ICT problems.

PO2 Problem Analysis, Design/Development of Solutions: Analysis the IT problem and then design/develop the solutions using Software Engineering principles that meet specified needs with appropriate consideration for cultural, societal, and environmental considerations.

PO3 Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern ICT tools including prediction and modelling with an understanding of the limitations.

PO4 Environment and Sustainability: Understand the impact of professional IT solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

PO5 Ethics: Apply ethical principles and commit to professional ethics, responsibilities, and norms.

PO6 Communication: Communicate effectively with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO7 Project Management and Finance: Demonstrate knowledge and understanding of Software Engineering and Project management principles and apply these to one's work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO8 Life-long Learning: Recognize the need for and have the preparation and ability to Engage in independent and life-long learning in the broadest context of technological Change.

VI. Total Credits to be Earned:

Total credits: 135

VII. Career Prospects:

After completing a degree in one of the most desirable professions in the current times, Computer Application graduates have a wide array of options at their disposal. There is no one single career option but several after Computer Application -

- a. Higher Studies in Technical Field: From there one could go into the research field or complete PhD and work as a faculty. In order to pursue M. Tech. in India, one will need to clear the GATE Examination, which will open a lot of opportunities to study Master's as well as work in PSUs. From here you can work in Government owned companies like DRDO, BARC, CSIR, ISRO, AAI, ONGC etc.
- b. Technical Job: Graduates can work at a good company in various fields like Data science and Analysis, Machine Learning Engineer, Software Developer, Blockchain Developer and Engineer, Computer Network Architect, Database Administration and Management, Security Analyst, Game Development, Digital Marketing, etc.
- c. Government Services: Along with pursuing technical government jobs after appearing for GATE, engineering graduates could also work in non-technical fields by applying and studying for various government exams like UPSC, SSC, Banking exams, Defence or IAS. These are very rewarding jobs as they are well paid, and very secure.

Entrepreneurship: If someone is filled with ideas with a need to create a change in the society, and like being one's own boss, one can even commence own start-up. For an entrepreneur, "opportunity" equates to something that solves a problem and addresses a need in a way that the entrepreneurs can profit from or further a cause.

EVALUATION METHODS

The student performance shall be evaluated through In-semester (Sessional) and semester-end examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

A. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting in-semester (sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks Allotted
1.	In-Sem Exam – I (ISE-I) (Written Examination) *	30
2.	In-Sem Exam – II (ISE-II) (Written Examination) *	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

INSTRUCTION

- 1. If a student fails to appear in any of the components without any valid reason, he/she shall be marked zero in that component. However, the course teacher at his discretion may arrange for the missed test on an alternate date for the absentee students after determining ground with genuine/valid reasons for the absence.
- 2. The report of evaluation of an activity towards the in-semester (sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.
- 3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

B. SEMESTER END EXAMINATION:

Time table for the end semester examination is published at least 25 days prior to the start of Examination.

I. Pre-Examination:

Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

II. Admit Card:

Admit cards for the examination may be downloaded through ERP where the system will generate Unique ID Cards online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

III. Pattern of Question Papers:

The question paper shall follow the principles of Bloom's Taxonomy.

Table

S. N.	Level	Questions /verbs for test					
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.					
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.					
3	Apply	Predict, apply, solve, illustrate, determine, examine, modify					
4	Analyse	Classify, outline, categorize, analyse, diagrams, illustrate, infer, etc.					
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.					
6	Create	Design, Formulate, Modify, Develop, integrate, etc.					

Note: No course is to be evaluated on the basis of all 6 knowledge levels.

The format of the question paper across all the program follows a unique pattern and the total marks is 60

Table 1: Question paper pattern for End semester examination

Sl no	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

IV. Examination Duration:

Each paper of 60 marks shall ordinarily be of two hours duration.

V. Practical Examinations, Viva-Voce etc.:

- Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

VI. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the centre may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the exam with a new answer sheet or may expel the student from appearing on the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribed expulsion form. The student may not be allowed to write that examination.

VII. Instruction to the Students:

- (i) The students shall not bring to the Examination Hall any electronic gadget used as a means of communication or record except electronic calculators, if required.
- (ii) The students shall not receive any book or printed or handwritten or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during the course of examination.

- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.
- (iv) The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi) The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to the examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix) The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

VIII. Provision for an Amanuensis (writer):

- (i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by a Medical Certificate from a competent Medical Officer.
- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.
- (iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

C. Credit Point:

It is the product of grade point and number of credits for a course, thus,

 $CP = GP \times CR$

i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

- (i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.
- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in Table 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

Table 2: Letter Grades and Grade Points

Letter Grade	Grade Points	Description
0	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
С	5	Average
P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

iv. Grade Point Average:

a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} c_i G_i}{\sum_{i=1}^{n} c_i}$$
 (1.1)

The SGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

b. CGPA (Cumulative Grade Point Average)

- (i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrollment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrollment.
- (ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and Ci is the Credit (weight)of that Course.

$$CGPA = \frac{\sum_{i=1}^{N} c_{i}G_{i}}{\sum_{i=1}^{N} c_{i}}$$
 (1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

D. Post-Examination

i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

- (i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.
- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a university appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or viva voce and wish to appear again may apply to be evaluated and can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of the Vice Chancellor.

- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.
- (ix) If as a result of revaluation of the candidate attracts the provision of condonation of deficiency, the same may be applied to his/her only for fresh attempt.

INSTRUCTION TO TEACHERS AND STUDENTS

(Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centred classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- **a. Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programmes the student has to undergo project-based learning at least 4 months duration. This approach will help the student to think critically, evaluate, analyse, make decisions, collaborate, and more.
- **b. Inquiry-Based Learning:** The teacher/ students are supposed to list at least five questions in each contact hour and students solve these questions or search for answers which becomes the homework for the students "question-driven" learning approach. The teacher may look for the correctness of the solution or the best possible answer and discuss it in the successive class. This will help in the preparation for various competitive examinations and develop a habit for searching for solutions.

c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watch video or lectures prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time in-classroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are more passive to an approach where students are active participants. As a result, this approach is also a student-centric teaching method.

d. Cooperative Learning: The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence	of
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

Inquiry-based approach has to be followed in all of the classes

The teacher has to distribute the topics to be considered for teaching by the above-mentioned approaches and prepare a lesson plan for execution and maintain a file.

Curriculum Framework: Breakdown of Credits (for 2022-23 Syllabus)

Sl. No	Category	Total number of Credits
1	University Core (UC)	9
2	University Elective (UE)	12
3	Program Core (PC)	102
4	Program Elective (PE)	6
5	Faculty Elective (FE)	6
Total number of credits		135

Breakdown by categories of courses

Sl no	Category	Credits	%
1	Science	8	5.92%
2	Engineering	126	93.34%
3	Commerce and Management	1	0.74%
Total		135	100%

SEMESTER WISE COURSE DISTRIBUTION

	Sl. No	Course Code	Course Title	Category I	Credit	L	Т	P	S	R	O/F	Max In-Sem Marks [Theory]	Max End- Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
	1	22BCAO111R	DIGITAL ELECTRONICS	DSC (MINOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	22BCAO112R	PROGRAMING FOR PROBLEM SOLVING	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
Semester I	3	22BCAO113R	MATHEMATICS –I	DSC (MINOR) / PC	4	3	1	0	0	0	0	40	60	0	100
Sen	4	22BCAO114R	FUNDAMENTALS OF COMPUTER APPLICATIONS	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
	5	22UBPD113R	INTRODUCTORY ENGLISH	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	6	22UBEC111	EXTRA CURRICULAR ACTIVITY	Co and extra- Curricular / UC	1	0	0	0	4	0	0	0	0	100	100
		Т	otal		20	12	1	12	4	0	0	160	240	400	800

	Sl. No	Course Code	Course Title	Category I	Credit	L	Т	P	S	R	O/F	Max In- Sem Marks [Theory]	Max End- Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
	1	22BCAO121R	DATA STRUCTURE USING C	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
	2	22BCAO122R	COMPUTER ORGANIZATION AND ARCHITECTURE	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	3	22BCAO123R	MATHEMATICS-II	DSC (MINOR) / PC	4	3	1	0	0	0	0	40	60	0	100
ster II	4	22BCAO124R	INTRODUCTION TO WEB TECHNOLOGY	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
Semester	5	22UBES101R	ENVIRONMENTAL SCIENCE	VAC / UE	2	2	0	0	0	0	0	40	60	0	100
S	6	22BCAO125R	TECHNO PROFESSIONAL SKILLS I	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
	7	22UBPD123R	PDP II (IMPLICATIVE ENGLISH)	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	8	22MOSY121R/ 22MOSY122R/ 22MOSY123R	MOOC I (ENHANCING STUDY SKILLS/ COMMUNITY ENGAGEMENT AND SOCIAL RESPONSIBILITY /HTML)	VAC / FE	2	0	0	0	0	0	0	0	0	100	100
	9	22UUHV101R	UNIVERSAL	VAC / UC	2	1	0	2	0	0	0	40	60	100	200

11	22UBEC121	EXTRA- CURRICULAR	UC Co and extra- Curricular / UC	1	0	0	0	4	0	0	0	0	100	100
12	22UCDL103R	COMPUTATIONAL SYSTEMS AND DIGITAL WORLD	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	Total	•		28	15	1	16	8	0	0	240	360	900	1500

	Sl. No	Course Code	Course Title	Category I	Credit	L	Т	P	s	R	O/F	Max In-Sem Marks [Theory]	Max End- Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
	1	22BCAO211R	DATABASE MANAGEMENT SYSTEMS	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
	2	22BCAO212R	OPERATING SYSTEMS	DSC (MAJOR) / PC	3	Red L T P S R O/F	60	0	100						
	3	22BCAO213R	INTRODUCTION TO LINUX	DSC (MAJOR) / PC	4	3	0	2	0	0	0	40	60	100	200
	4	22BCAO214R	OBJECT ORIENTED PROGRAMMING PARADIGM	DSC (MAJOR) / PC	5	3	0	4	0	0	0	40	60	100	200
	5	22BCAO216R	GENERIC ELECTIVE I (INTRODUCTION TO DIGITAL MARKETING)	MDC / PC	2	2	0	0	0		0	100			
er III	6	22BCAO215R	TECHNO PROFESSIONAL SKILLS II	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
Semester III	7	22UBPD212R	ENGLISH LANGUAGE FOR EXCELLENCE	AEC / PC	2	0	0	4	0	0	0	0	0	100	100
	8	22MOSY211R/ 22MOSY212R/ 22MOSY213R	MOOC II (FOUNDATION OF CYBERSECURITY/ WRITING, RUNNING AND FIXING CODE IN C/FONDATIONS OF DIGITAL MARKETING AND E-COMMERCE)	SEC / FE	1	0	0	0	0	0	0	0	0	100	100
	9	22UBCC211	CO-CURRICULAR ACTIVITY	UC	1	0	0	0	4	0	0	0	0	100	100
	10	22UBEC211	EXTRA CURRICULAR ACTIVITY	UC	1	0	0	0	4	0	0	0	0	100	100
	11	22UUFL213R	PERSONAL FINANCIAL PLANNING	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
	12	22UULS212R	BASIC LIFE SAVING SKILLS	VAC / UE	1	0	0	2	0	0	0	0	0	100 100 100 100 100 100	100
		Total			27	14	0	20	8	0	0	160	340	1000	1500

	Sl. No	Course Code	Course Title	Category I	Cr edi t	L	Т	P	S	R	O/F	Max In- Sem Marks [Theor y]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTAL Marks
	1	22BCAO221R	DESIGN AND ANALYSIS OF ALGORITHM	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	2	22BCAO222R	BASICS OF PYTHON PROGRAMMIN G	DSC (MAJOR) / PC	5	2	1	4	0	0	0	40	60	100	200
	3	22BCAO223R	COMPUTER NETWORKS	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
Semester IV	4	22BCAO225R	GENERIC ELECTIVE II (THE STRATEGY OF CONTENT MARKETING)	MDC / CBCS / FE	2	0	0	0	0	0	0	0	0	100	100
	5	22BCAO224R	TECHNO PROFESSIONA L SKILLS III	DSC (MAJOR) / PC	1	0	0	2	0	0	0	0	0	100	100
	6	22UBPD222R	PDP IV (ENGLISH FOR EMPLOYABILI TY)	AEC / UE	2	0	0	4	0	0	0	0	0	100	100
	7	22MOSY221R /22MOSY222R/ 22MOSY223R	MOOC III (JAVASCRIPT, JQUERY, AND JSON/INTERME DIATE POSTGRESQL/J SON AND NATURAL LANGUAGE PROCESSING IN POSTGRESQL)	MDC / CBCS / FE	2	0	0	0	0	0	0	0	0	100	100
	8	22UBCC221	CO- CURRICULAR	CO- CURRICU LAR / UC	1	0	0	0	4	0	0	0	0	100	100
	9	22UBEC221	EXTRA- CURRICULAR	Extra- CURRICU LAR / UC	1	0	0	0	4	0	0	0	0	100	100
	10	22UULS221R	BASIC ACLAMETIZIN G SKILLS	VAC / UE	1	0	0	2	0	0	0	0	0	100	100
		Tota	1		21	8	1	12	8	0	0	120	180	800	1100

	Sl. No	Course Code	Course Title	Category I	Credit	L	Т	P	S	R	O /F	Max In- Sem Mar ks [The ory]	Max End- Sem Marks [Theor y]	Max End Sem Practic al Marks	TOTAL Marks
	1	22BCAO311R	PROGRA MMING IN JAVA	DSC (MAJOR) / PC	4	3	0	2	0	0	0	40	60	100	200
	2	22BCAO312R	CLOUD COMPUTI NG	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	3	22BCAO313R	PROJECT-	Research/ Industry Internship / PC	6	0	0	4	12	6	0	0	0	100	100
	4	22BCAO314R	TECHNO PROFESSI ONAL SKILLS IV	SEC / PC	1	0	0	2	0	0	0	0	0	100	100
ter V	5	22BCAO316R	PE I	DSC (MAJOR) / PE	3	3	0	0	0	0	0	40	60	0	100
Semester V	6	22BCAO317R	PE II	DSC (MAJOR) / PE	3	3	0	0	0	0	0	40	60	0	100
	8	22MOSY311R 22MOSY312R 22MOSY313R	MOOC IV (MEAN Stack Developer: MongoDB, ExpressJS, AngularJS & NodeJS/ DATA STRUCTU RES & BACKEN D WITH JAVA/ ADVANC ED PROGRA MMIN IN KOTLIN)	SEC / FE	1	0	0	0	0	0	0	0	0	100	100
	9	22BCAO315R	INTERNS HIP	Summer Internship / PC	1	0	0	0	0	0	8	0	0	100	100
		Total			22	12	0	8	12	6	8	160	240	500	900

	Sl. No	Course Code	Course Title	Category I	Credit	L	Т	P	S	R	O/F	Max In-Sem Marks [Theory]	Max End- Sem Marks [Theory]	Max End Sem Practical Marks	TOTAL Marks
	1	22BCAO321R	COMPUT ER VISION	DSC (MAJOR) / PC	5	2	1	4	0	0	0	40	60	100	200
er VI	2	22BCAO323R	PE III	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
Semester VI	3	22BCAO324R	PE IV	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	4	22BCAO325R	PE V	DSC (MAJOR) / PC	3	3	0	0	0	0	0	40	60	0	100
	5	22BCAO322R	PROJECT II	Research/ Industry Internship / PC	6	0	0	6	8	6	0	0	0	100	100
		Total			20	11	1	10	8	6	0	160	240	200	600

*IA: Internal Assessment, SEE: Semester End Examination, PE: Practical Examination

		SEMES	TER	2 – I							
Course Title		Di	gital	Elect	ronics						
Course code	22BCAO111R	Total credits: 2	L	T	P	S	R	O/F	(;	
		Total hours:30	2	0	0	0	0	0	2	}	
Pre- requisite	Nil	Co- requisite				ľ	Nil				
Programme		Bachelor o	of Co	mput	er Applic	ation					
Semester	Fall	/ I semester o	of the	e first	year of th	ie prog	ram				
Course	1. To familiarize with the d	ifferent numb	er sy	stems	, logic gat	es, and	com	binational an	d		
Objectives	sequential circuits utilized in the different digital circuits and systems. 2. The course will help in design and analysis of the digital circuit and system. 3. To impart how to design Digital Circuits. Interpret different number systems, binary codes and Boolean algebra to minimize logic										
CO1	Interpret different number systems, binary codes and Boolean algebra to minimize logic expressions										
CO2	Develop K-maps to minimize and optimize logic functions up to 5 variables										
CO3	Infer the knowledge about v these families	arious logic g	ates	and lo	gic famili	es and	analy	ze basic circ	uits o	f	
CO4	Design and implement Com	binational and	d Sec	uenti	al logic cir	cuits.					
CO5	Describe and compare various analog conversion circuits	us memory sy	stem	ıs, shi	ft registers	and ar	nalog	to digital and	d digi	tal to	
Unit-No.	Cont	ent			Conta Hour		Lear	ning Outcon	1e	KL	
I	Fundamentals of Digital families: Digital signals, di NOT, NAND, NOR and H Boolean algebra, example systems-binary, signed bin number, binary arithmet complements arithmetic, co correcting codes, characteristical logic families, TTI CMOS logic, interfacing C logic	gital circuits, Exclusive-OR s of IC gate nary, octal h tic, one's a odes, error de cteristics of o L, Schottky	ANI oper es, n exad and tectin digita	D, OR rations tumbe ecima two'ng and ICs	r 1 1 s d	und diffe app	ersta erent lying	ering nding logic gates them circuits.	the		

II	Combinational Digital Circuits: Standard representation for logic functions, K-map representation, simplification of logic functions using K-map, minimization of logical. Don't care conditions, Multiplexer, De Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry lookahead adder, serial adder, ALU, elementary ALU design, popular MSI chips, digital comparator, parity checker/generator, code converters, priority encoders, decoders/drivers for display devices, QM method of function realization	Applying and analysing different digital circuits, K-map, minimization of logical. Don't care conditions, Multiplexer, De Multiplexer/Decoders, Adders, Subtractors, BCD arithmetic, carry lookahead adder, serial adder, ALU, elementary ALU design	3,4
III	Sequential circuits and systems: A 1-bit memory, the circuit properties of Bistable latch, the clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops, shift registers, applications of shift registers, serial to parallel converter, parallel to serial converter, ring counter, sequence generator, ripple (Asynchronous) counters, synchronous counters, counters design using flip flops, special counter IC's, asynchronous sequential counters, applications of counters.	Applying and analyzing different sequential circuits, clocked SR flip flop, J- K-T and D types flip flops, applications of flip flops	3,4
IV	A/D and D/A Converters: Digital to analog converters: weighted resistor/converter, R-2R Ladder D/A converter, specifications for D/A converters, examples of D/A converter ICs, sample and hold circuit, analog to digital converters: quantization and encoding, parallel comparator A/D converter, successive approximation A/D converter, counting A/D converter, dual slope A/D converter, A/D converter using voltage to frequency and voltage to time conversion, specifications of A/D converters, example of A/D converter ICs	Describe, Differentiate, and analyzing A/D and D/A converters	2,4

V	Semiconductor memories and	6	Understanding,	analyzing	and	1,2,4
	Programmable logic devices: Memory		explaining diff	erent memories	and	
	organization and operation, expanding		logic.			
	memory size, classification and					
	characteristics of memories, sequential					
	memory, read only memory (ROM), read					
	and write memory (RAM), content					
	addressable memory (CAM), charge de					
	coupled device memory (CCD), commonly					
	used memory chips, ROM as a PLD,					
	Programmable logic array, Programmable					
	array logic, complex Programmable logic					
	devices (CPLDS), Field Programmable Gate					
	Array (FPGA).					

1. Modern Digital Electronics, R. P. Jain, McGraw Hill Education, 2009.

REFERENCE BOOKS:

- 1. Digital logic and Computer design, M. M. Mano, Pearson Education India, 2016.
- 2. Fundamentals of Digital Circuits, A. Kumar, Prentice Hall India, 2016.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Interpret different number systems, binary codes and Boolean algebra to minimize logic expressions	1 and 3
2	Develop K-maps to minimize and optimize logic functions up to 5 variables	2,3, and 4
3	Infer the knowledge about various logic gates and logic families and analyze basic circuits of these families	1,2, and 7
4	Design and implement Combinational and Sequential logic circuits.	1,2,4, and 7
5	Describe and compare various memory systems, shift registers and analog to digital and digital to analog conversion circuits	1,2,5, and 7

		SEME	STER								
Course Title		Fundament	als of	Comp	outer Ap	plicat	tions				
Course code	22BCAO114R	Total credits: 5	L	T	P	S	R	O/F	С		
		Total hours:	2	•	1	Δ.	0	0	_		
		45L+60P	3	0	4	0	0	0	5		
Pre-requisite	Nil	Co-requisite	ı		l	ı	Nil	1			
Programme		Bachelo	r of Co	mput	ter App	licatio	n				
Semester		Fall/ I semeste	r of th	e first	year of	the p	rogra	m			
Course	1. To acqu	ire the basic knowledg	ge of C	ompu	ter Syste	ems ar	nd thei	r uses.			
Objectives		v about Application So			_	_		nments			
	3. Identify and protect from computer viruses and online threats.										
CO1	Explain the working of a computer and its various components.										
CO2	Discuss the use of Software and programming in a computer system. Outline the basic concepts of Computer Networks and Internet Protocols.										
CO3	Outline the basic	concepts of Computer	r Netw	orks a	nd Inter	net Pr	otocol	s.			
CO4	Develop Proficie	ncy in Identifying diff	ferent	types	of comp	uter v	iruses	, worms, and ma	alware to		
	enhance threat av	vareness.									
CO5	Apply the role of	various Software pac	kages 1	for Of	fice Aut	omatio	on				
Unit-No.	C	ontent	Con	tact]	Learn	ing O	utcome	KL		
			Ho	ur							
I	Basics of Comp	uter	8	3	Underst	and	and	explain the	1, 2		
	What is Comp	iter and its History,			differen	t typ	es o	of computers,			
	Generation	of Computers,			working	g of	cor	nputers, and			
	Classification	of Computers;			identify	the va	arious	components.			
	_	a Digital Computer:									
		I/O devices; Storage									
		s, ROMs, Hard Disk									
	etc.), Backup Sy	stem and it is use.									
II	Software and L	anguages	8	3	Underst	and th	ne basi	ics of software	1, 2		
	What is Compu	ter Software and its			and	progra	ımmin	g concepts,			
	need, Types	_			identify	dif	ferent	types of			
	Software's; Co	1 0 0			progran	nming	langu	age.			
		Computer Languages,									
	Classification	of Computer									
	Languages.										
III	Networks		8	}				orking of an	1, 2, 3		
	LAN, MAN,	WAN, Internet,						vork. Identify			
	•	sers, Basic Internet				. •	e diff	erent types of			
		TELNET, FTP).	_		network			10 1100	4 -		
IV	_	ses and Security.	8	•				entify different	1, 2		
		Worms, Malware,			• •			and worms,			
	Firewalls, Phish	ıng, Anti-Virus.			firewall	and p	hishin	g.			

V	Software packages for Office Automation (Any available standard Office Suite may be referred) Word Processing software, Spreadsheet software, Presentation software, Drawing and Graphics manipulation software.	12	Describe the different types of MS Office package. Apply and create different files using MS Office Software.	3, 5
	Practical (Componen	ts	
Practical 1	Identify the components of a computer	2	Identifying and understanding the components of a computer.	2
Practical 2	Showing and explaining the working process of the computer's components.	2	Remembering and understanding the working process of computers.	1,2
Practical 3	A computer is not powering on. List and demonstrate the steps you would take to diagnose and fix the issue.	4	Applying the knowledge of computers to fix some issues related to computers.	3
Practical 4	Access the BIOS/UEFI on a computer and describe how to change the boot order to prioritize booting from a USB drive.	4	Understanding and applying the knowledge on BIOS.	2,3
Practical 5	Demonstrate how to install an operating system (e.g., Windows, Linux) on a computer. Include partitioning the hard drive and configuring system settings.	2	Applying the knowledge of installation to install softwares.	3
Practical 6	Connect and configure a printer or a scanner to a computer. Install the necessary drivers and software, and demonstrate printing or scanning a document.	2	Applying the knowledge to configure a printer.	3
Practical 7	Install a software application (e.g., a web browser or office suite) on a computer and configure its basic settings.	2	Applying the configuration knowledge for software installation.	1,3
Practical 8	Write a simple program in a language of your choice (e.g., C, C++) that takes user input and performs a basic calculation or task.	2	Applying and creating a first program in any language.	3,5
Practical 9	Demonstrate how to use version control software (e.g., Git) to clone a repository, make changes, commit those changes, and push them to a remote repository.	2	Understanding and applying the Git knowledge to clone repositories, etc.	2,3

Practical 10	Use an Integrated Development Environment (IDE) to write, debug, and run a simple program. Explain the benefits of using an IDE.	2	Using different IDEs for creating, solving and running simple programs.	3
Practical 11	Set up a small local area network (LAN) with at least two computers. Ensure that they can communicate with each other by sharing files.	2	Identifying and applying the knowledge on different types of networking.	2,3
Practical 12	Explain the difference between static and dynamic IP addressing. Configure a computer with a static IP address.	2	Explaining and differentiating between static and dynamic IP addressing.	2,4
Practical 13	Use the ping and traceroute (or tracert on Windows) commands to diagnose network connectivity issues between two devices on a network.	2	Using ping and traceroute knowledge to diagnose networks.	3
Practical 14	Install an antivirus program on a computer. Perform a full system scan and demonstrate how to handle detected threats.	2	Understanding and demonstrating how to handle threats.	2,3
Practical 15	Explain safe browsing practices to avoid malware. Show how to configure a web browser with extensions and settings to enhance security.	2	Understanding and explaining safe browser practices.	2,3
Practical 16	Demonstrate how to create strong passwords and manage them using a password manager. Explain the importance of using different passwords for different accounts	2	Explaining and creating strong passwords using different characters and different passwords for different accounts.	2,5
Practical 17	Configure a software firewall on a computer to block all incoming connections except for a specific application (e.g., a web server).	2	Configuring a software firewall to block any connections from malicious users.	3,5
Practical 18	Make a Resume. It must include the features mentioned below— Tables Alignment Bullets At least 3 Font Styles and 3 Font Sizes One picture	2	Applying and creating a resume with MS Word.	3,5
Practical 19	Create a time table in MS Word.	2	Applying and creating a time table in MS Word.	3,5
Practical 20	Create a University ID card in MS Word.	2	Applying different styles to create a University ID card.	3,5

Practical 21	Use MS-Word to create Project	2	Applying and creating reports in	3,5
	Reports or Thesis.		MS Word.	
Practical 22	Make a presentation of 3 slides in MS PowerPoint. The first slide should have a title and subtitle, the second slide an image with a caption, and the third slide a bulleted list.	2	Applying and building presentation with MS PowerPoint	3,5
Practical 23	Create time table in MS Excel	2	Creating time table in MS Excel	5
Practical 24	Prepare a stationary order for the month of March in MS Excel.	2	Applying the knowledge of MS Excel to create stationary order details.	3,5
Practical 25	Prepare a student marks distribution table in MS Excel	2	Creating a marks records using MS Excel	5
Practical 26	VLOOKUP and INDEX function in MS Excel	2	Using formulas like VLOOKUP and INDEX in MS Excel.	3,5
Practical 27	Joining two strings in MS Excel	2	Using excel formulas to join two strings.	3,5
Practical 28	Conditional Formatting in MS Excel	2	Applying conditional formatting for different data cells.	3

- 1. Introduction of Computer Sc. ITL ESL, Pearson Education India.
- 2. Computer Fundamentals. Rajaraman, V.

REFERENCE BOOKS:

1. Computer Fundamentals: Concepts, Systems & Applications Priti Sinha, Pradeep K., Sinha, BPB Publications

	CO PO Mapping							
S N	Course Outcome (CO)	Mapped Program Outcome						
1	Explain the working of a computer and its various components.	3, 8						
2	Discuss the use of Software and programming in a computer system.	1, 2, 3, 8						
3	Outline the basic concepts of Computer Networks and Internet Protocols.	2, 8						
4	Develop Proficiency in Identifying different types of computer viruses, worms, and malware to enhance threat awareness.	2, 3, 8						
5	Apply the role of various Software packages for Office Automation	2, 3, 8						

		S	SEMESTER -	· I					
Course Title	PROGRAMMING FOR PROBLEM SOLVING								
Course	22BCAO112R	Total credits: 5	L	P	S	R	O/F	C	
code		Total hours: 45T+60P	3	4	0	0	0	5	
Pre-	Nil	Co-requisite		I	ı	N	Vil		
requisite									
Programme			helor of Com	-					
Semester			nester of the f						
Course		formulate simple alg				_	_		
Objectives		test and execute the			-	ax and l	logical erro	ors.	
G01		solve real-time probl				•.	•1	1 1 1	
CO1	_	terminology used in	computer pro	gramm	ung t	o write,	compile a	and debug prograi	ms in
G02	C programming la	<u> </u>	11 (1		C	. 0	. ,	COD :	
CO2	Examine the synt	ax and semantics and	a be fluent in t	ne use	or va	irious U	perators o	of C Programming	ζ.
CO3	Demonstrate the a	concept of Searching	and Sorting i	n nrogr	ramm	nino			
		s to describe the app					ch as array	vs and strings etc	
CO4	Develop program	is to describe the app	ineations of de	iivea e	iaia i	ypes su	cii as airay	s and strings etc.	
CO5	Illustrate the dyna	amics of memory by	the use of poi	nters ai	nd St	ructures	· · · · · · · · · · · · · · · · · · ·		
Unit-No.		Content		Cont			Learning	Outcome	KL
OIII-140.		Content		Hou		•	Learning	Outcome	IXL
I	Introduction to (C Programming:		7		Describ	e, illustra	ite, and explain	1,2
	Introduction, His	story, Features, Ad	vantages and		(compute	er, algorith	nms, flowchart	
	Disadvantages, S	tructure of C progra	m, Compiling						
	Process, C Pre-pr	ocessor and Header	Files, Library						
	Function, Charact	ter Set, Comments, 7	Γokens and its						
	types. Data types,	, Escape Sequences,	Preprocessors						
	Directives.								
	Operators and E	-		10				ite, and explain	1,2
	_	tor, Relational Oper	ator, Logical		ľ	differen	t operators	S	
	Operator, Assigni	•							
		nent Operator, Condi							
	_	e Operator, Comma Crator Precedence and	_						
	Associativity.	ator Frededence and							
		tions (including u	sina hvilt in	10		Dagamih	a :11,1,04ma	ota and avulain	1.2
		tions (including u eter passing in func	· ·	10				ite, and explain e function.	1 1,4
		rays to functions: io	-			uncul	i, iccuisive	c runcuon.	
		ion: Recursion, as a	-						
		ems. Example progr	-						
		al, Fibonacci serie							
	~								
	function etc. Quick sort or Merge sort.								

	Structure: Structures, defining structures and Array of Structures Pointers: Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation)	8	Describe, illustrate, and explain structure, linked-list	1,2
V	File handling (only if time is available, otherwise should be done as part of the lab)	10	Describe, illustrate, and explain file handling	1,2
	Practical			
Practical 1	C program to display "hello world".	1	Creating a first program to display hello world in C	3, 5
Practical 2	Create a simple program where we will Print Integer in C where variable value is pre-defined.	1	Creating and displaying a value of a variable in C	3, 5
Practical 3	Program where we will Print the Integer in C where the value of the variable is entered by the user.	2	Creating and displaying the value variable from user input.	3, 5
Practical 4	Input integer, float and character values using one scanf() statement in C.	2	Creating and displaying different types of data types.	3, 5
Practical 5	C Program to Find the Size of int, float, double and char.	2	Creating and finding the size of different data types.	3, 5
Practical 6	Perform addition, subtraction, multiplication and division of two numbers.	2	Creating and displaying the different types of calculation program using C	3, 5
Practical 7	C Program to Calculate Percentage of 5 Subjects.	2	Creating and calculating the percentage of five subject in C	3, 5
Practical 8	C Program to Calculate Simple interest.	2	Creating and calculating the simple interest.	3, 5
Practical 9	C Program to Calculate Compound interest.	2	Creating and finding the compound interest.	3, 5
Practical 10	C Program to Find Area and Perimeter of Rectangle.	2	Creating and finding the area and perimeter of the rectangle.	3, 5
Practical 11	Radius and Area of Circle program in C.	2	Creating and finding the radius and area of a circle.	3, 5
Practical 12	Swap numbers using temporary variables.	2	Creating a program to swap two numbers with the help of a temporary variable.	3, 5

Practical 13	Swap numbers without using temporary	2	Creating a program to swap two	3, 5
	variables.	_	numbers without using the temporary variable.	, ,
Practical 14	C example to print "hello world" using if statement and without using semicolon.	2	Creating a C program for implementing the <i>if</i> statement.	3, 5
Practical 15	C Program to find the largest number among three numbers using the if statement.	2	Creating a C program to find the largest number among the three numbers.	3, 5
Practical 16	C Program to find the largest number among three numbers using the if else ladder.	2	Creating a C program to find the largest number among the three numbers using if-else statement	3, 5
Practical 17	C Program to find the largest number among three numbers using nested if-else statements.	2	Creating a C program to find the largest number among the three numbers using the nested if-else.	3, 5
Practical 18	C Program to check whether a number is even or odd.	2	Creating a C program to check whether the given number is odd or even.	3, 5
Practical 19	C Program to check whether a character is a Vowel or a Consonant.	2	Creating a program to check whether a character is a vowel or consonant.	3, 5
Practical 20	C program to check whether a number is Positive or Negative or Zero.	2	Creating a C program to check if the given number is positive or negative.	3, 5
Practical 21	C program to find the factorial of a number.	2	Creating a program to find the factorial of a number.	3, 5
Practical 22	C example to print "hello world" using switch statement and without using semicolon.	2	Creating a C program to display hello world using switch statement.	3, 5
Practical 23	C Program to Find Largest of Two Numbers using Switch Case.	2	Creating and finding the largest of two numbers using switch case statement.	3, 5
Practical 24	C Program to Find Largest of Two Numbers using Conditional Operator.	2	Creating a program to find the largest of two using conditional operators.	3, 5
Practical 25	C Program to print first 10 natural numbers using a for loop	2	Creating a C program to display the first 10 natural numbers using a for loop.	3, 5

Practical 26	C Program to calculate the sum of first n natural numbers using a for loop	2	Creating a C program to display the first n natural numbers using a for loop.	3, 5
Practical 27	C program to print all natural numbers in reverse in a given range using a for loop.	2	Creating a program to print all natural numbers in reverse	3, 5
Practical 28	C Program to print even and odd natural numbers using a for loop	2	Creating a program to print even and odd numbers using a for loop.	3, 5
Practical 29	C Program to check whether a number is a prime number or not.	2	Creating and displaying whether a given number is a prime number or not.	3, 5
Practical 30	Print prime numbers between 1 to n in c language using a for loop.	2	Creating a C program to check the prime numbers between 1-10 using a for loop.	3, 5
Practical 31	Write a c program to print Fibonacci series using a for loop.	2	Creating a C program to print Fibonacci series using a for loop.	3, 5
Practical 32	C example to print "hello world" using a while loop and without using a semicolon.	2	Creating a C program using a while loop.	3, 5
Practical 33	C Program to find the sum of the first and last digit using a while loop.	2	Creating a C program to demonstrate a while loop for finding the sum of the first and last digit.	3, 5
Practical 34	C program to reverse a number using a while loop.	2	Creating a program for reversing a number using a while loop.	3, 5
Practical 35	C Program to print the first 10 natural numbers using a while loop.	2	Creating a program to print the first 10 natural numbers using a while loop.	3, 5
Practical 36	C program to print all natural numbers in reverse from n to 1 using a while loop.	2	Creating a C program to print all natural numbers in reverse using a while loop.	3, 5
Practical 37	Write a c program to print Fibonacci series using while loop	2	Creating a program to display the Fibonacci series using a while loop.	3, 5
Practical 38	C example to print "hello world" using do while loop.	2	Creating a program to display the do while loop.	3, 5
Practical 39	C Program to print first n natural numbers using do while loop.	2	Creating a program to display the first n natural number using a	3, 5

			do while loop.	
Practical 40	C program to print all the numbers from 20 to 1 in reverse order on the screen using do while loop.	2	Displaying the natural numbers in reverse using a do while loop.	3, 5
Practical 41	C program to print all the even numbers from 10 to 20 on the screen using do while loop	2	Displaying the even numbers from 10-20 using a do while loop.	3, 5
Practical 42	C Program to print multiplication table using dowhile loop.	2	Displaying the multiplication table using a do while loop.	3, 5
Practical 43	C program to input a 4-digit number and find the sum of its digits using do while loop.	2	Displaying the sum of 4-digit numbers and finding its sum using a do while loop.	3, 5

- 1. Bal Guruswamy, Programming in ANSI C, Tata McGraw-Hill.
- 2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

REFERENCE BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Explain the basic terminology used in computer programming to write, compile and debug programs in C programming language.	1,2 & 8						
2	Examine the syntax and semantics and be fluent in the use of various Operators of C Programming.	1,2 & 8						
3	Demonstrate the concept of Searching and Sorting in programming.	1,2 &8						
4	Develop programs to describe the applications of derived data types such as arrays and strings etc.	1,2 ,4, 5,6,7 & 8						
5	Illustrate the dynamics of memory by the use of pointers and Structures	1,2 ,4						

		SEN	MEST	ER – I						
Course	MATHEMATICS -I									
Title										
Course	22BCAO113R	Total credits: 4	L	T	P	S	R	O/F	C	
code		Total hours:	3	1	0	0	0	0	4	
		45T+15T	3	1	U	U	U		7	
Pre-	Nil	Co-requisite		l			Nil	1		
requisite										
Programme		Bache	lor of	Comput	ter Ap	plicat	ion			
Semester		Fall/ I semes	ster of	the first	year	of the	prog	ram		
Course	1. To make u	nderstanding to eval	luate d	efinite a	nd im	proper	integ	rals. Apa	art from the	se some
Objectives	special functions	like Beta and Gamm	na func	tions mu	st be i	introdu	iced.			
	2. To provide t	the application of dif	fferenti	al and ir	ntegral	calcu	lus.			
		nd the convergence		_		_				
CO1	Illustrate the foun	dation concepts in M	I athem	atics lik	e Mat	rices, S	Set, re	lations ar	nd functions	3
CO2		al Integration and D								
CO3		ivariable Calculus fo								
CO4	Describe matrices	like Inverse and rar	ık of a	matrix, 1	rank-n	ullity	theore	m		
CO5	Apply the foundate	tion concepts in prog	gramm	ing and a	analyt	ical su	bjects	•		
Unit-No.		Content		Conta	ect	I	Learn	ing Outc	come	KL
				Hou	r					
I	Calculus:			8	E	Describ	e, illı	istrate, a	ınd explain	1,2
	Evolutes and i	nvolutes; Evaluation	on of		Iı	ntegral	ls and	its applic	cations	
	_	roper integrals; Be								
		ns and their prop								
		efinite integrals to ev								
		volumes of revolution	ons.							
II	Calculus:			12					ınd explain	1,2
		, Mean value the			V	arious	theore	ems of ca	alculus	
		faclaurin theorems								
	· ·	leterminate forms								
777	-	Maxima and minima	a.	•	T-	\	. '11	44	1 1	1.0
III	Sequences and se		~ 4- 4	8					and explain	1,2
	_	sequence and series			n	umber	s serie	es		
		Power series, T exponential, trigono								
		functions; Fourier								
	•	nd cosine series, Par								
	theorem.	ia comic series, i di	oo rai s							
IV		alculus (Differentia	tion):	8	Г)escrib	e. illı	ıstrate. a	nd explain	1,2
1		and partial deriv		U				calculus	_	1,2
	1	vatives, total deri			[- 412 4145		
		nd normal line; M								
		ddle points; Meth								
		liers; Gradient, cu								
	divergence.	,	_							

V	Matrices:	9	Describe, illustrate, and explain	1,2
	Inverse and rank of a matrix, rank-nullity		types of matrices	
	theorem; System of linear equations;			
	Symmetric, skew-symmetric and orthogonal			
	matrices; Determinants; Eigenvalues and			
	eigenvectors; Diagonalization of matrices;			
	Cayley-Hamilton Theorem, and Orthogonal			
	transformation.			

- 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

REFERENCE BOOKS:

- 1. N.P. Bali and Manish Goyal, A textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Illustrate the foundation concepts in Mathematics like Matrices, Set, relations and functions	1 & 6							
2	Outline Differential Integration and Differentiation and with this background.	1 & 6							
3	Learn about Multivariable Calculus for Limit, continuity and partial derivatives	1 & 6							
4	Describe matrices like Inverse and rank of a matrix, rank-nullity theorem	1 & 6							
5	Apply the foundation concepts in programming and analytical subjects.	1 & 6							

		SEMES'	TER -	- I						
Course Title	INTRODUC	TORY ENGLI	SH (C	omm	unicativ	e Engl	ish & S	Soft Skills)	
Course code	22UBPD113R	Total credits:	L	T	P	S	R	O/F	C	
		2 Total hours:	0	0	4 0 0 0		0	2		
Pre-requisite	Nil	Co-requisite				Ni	il		•	
Programme	Technology/Bachelo Administration (Ind Sociology/Bachelor Disaster Manageme Microbiology/Bachelor Computer Application Information Technology Computer Application	Bachelor of Business Administration/Bachelor of Hotel Management and Catering Technology/Bachelor of Business Administration (I)/Bachelor of Business Administration (Industry Integrated)/Bachelor of Social Work/Bachelor of Arts in Sociology/Bachelor of Arts in Psychology/Bachelor of Trauma, Emergency and Disaster Management/Bachelor of Science in Biotechnology/Bachelor of Science in Microbiology/Bachelor of Science in Food Nutrition and Dietetics/Bachelor of Computer Application/ Bachelor of Computer Application (P)/Bachelor of Science in Information Technology (P)/ Bachelor of Science in Information Technology/Bachelor of Computer Application on Cloud Technology and Information Security/Bachelor of Computer Application on Artificial Intelligence and Machine Learning/Bachelor of Computer Application on Artificial Intelligence and Machine Learning								
Semester	Fall/I o	r Winter/II Sem	ester	of Fir	st Year	of the	Progra	amme		
Course Objectives	language. 2. To enhance 3. To give insphonetics. 4. Introduction	sight into Engl	peakinish pi	ng/sk onun	ills for a	self-de and ii	velopi ito cei	nent. ntral conc	epts in	
CO1	It enables learners to to understand, speak	recognize the st		e of a	sentence	e and it	s variat	ions as the	y learn	
CO2	Introduction to Phon		ortance	e will	improve	the lea	arners'	pronuncia	tion	
CO3	Students will be able									
CO4	Knowledge of comm	unication will be	e enha	nced t	hrough	practica	al exam	ples.		
Unit-No.	Conte	nt	Conta Hou		Le	arning	Outco	ome	KL	
I	Grammar: Parts of Speech, Articles, Auxiliary Verbs, Affirmative and Negative Sentences Understanding, identifying and 1,2,4 analyzing part of speech, articles, auxiliary verbs, affirmative and negative sentences.									
II	Grammar: Determ Construction, Types (Assertive, Imperation of Comparison, Exercises	s of Sentences	4	cl		tences,	detern	d construct niners and		

III	Listening Skills: What is listening? The Process of Listening, Factors that adversely affect Listening, Difference between Listening and Hearing, Purpose and Importance of Effective Listening, How to Improve Listening Process		Understand and differentiate listening from hearing, comprehend the listening process and factors affecting it, recognize its purpose and importance, and apply strategies to improve their listening skills effectively.	2,4
IV	Speaking Skills: Introducing yourself, Self-discovery, Basics of Phonetics, pronunciation, Extempore speech, Video Recording for Self-Reflection		Develop the ability to effectively introduce themselves, engage in self-discovery, grasp the basics of phonetics and pronunciation, deliver extempore speeches, and use video recording for self-reflection to enhance their speaking skills.	5
V	Communication Skills: i. Introduction to Communication, ii. Importance of Communication Skills iii. Purpose of Communication iv. Types of Communication v. Formal and informal communication vi. Importance of Communication vii. Barriers to Communication viii. How to improve/ tips to improve Communication skills. ix. Responding to different questions in various situations (formal/informal)	8	Understand the fundamentals and importance of communication skills, identify the purpose and types of communication, differentiate between formal and informal communication	2

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011. *Business Communication: Concepts, Cases and Applications*, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. *Soft Skills: Know Yourself and Know the World*, first edition, S. Chand & Company Ltd.: New Delhi

REFERENCE BOOKS:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2. Marks, Jonathan. (2017) *IELTS Advantage Speaking and Listening Skills: A step-by-stepguide to a high IELTS speaking and listening score*. Book + CD-ROM, Delta Publishing by Klett

OTHER LEARNING RESOURCES:

1. https://youtu.be/bEB8-SWMYhIhttps://youtu.be/-zZau_dttRY

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	It enables learners to recognize the structure of a sentence and its variations as they learn to understand, speak and write.	1,2 and 3
2	Introduction to Phonetics and its importance will improve the learners' pronunciation	1,2, and 3
3	Students will be able to identify, pick and form different kinds of sentences.	1,2, and 3
4	Knowledge of communication will be enhanced through practical examples.	1,2 and 3

		SEMEST	ER – I					
Course Title		Extra-	Curricul	ar Act	ivity			
Course code	22UBEC111	Total credits: 1	L		P S	R	O/F	C
		Total hours: 60	0	0	0 4	0	0	1
Pre-requisite	Nil	Co-requisite				Nil		
Programme		Bachelor of						
Semester		Fall/ I semester of						
		blem-solving abili			_	_	s and hacl	cathons.
· ·		in app developmen			khibition	ıs.		
	-	repreneurial skills						
	Importance of diffe						.1	1
	Formulate regular	activities like wo	orkshops,	comp	etitions	as po	er their ii	nterest and
	hobbies.	mt ADTII :	iona inte		vamait	atat-	and act	onol laval
	Adapt to represe competitions.	nt ADIU in var	ious inte	r univ	ersity,	state	and nati	onai level
	Discuss with invite	d avenants in their m	aanaatirra	fielde				
	Develop an apprec					on		
Unit-No.	* **	tent	Contact		Learnin		come	KL
Omt-No.	Con	tent	Hour		Leai IIIII	g Oui	Come	KL
I	AdtU encourage	es a range of	2	Der	nonstrat	e i	mproved	1,2,3,4
•	activities outsid	-	_		ficiency		in	1,2,5,1
		nded to meet		^	grammiı		software	
	learner's interest,				-	-	d the use	
	are aimed to deve	lop the social and			_		nological	
	soft skills and p	romote a holistic		tool	s and pl	atforr	ns.	
	development of	the learners,		App	oly	th	eoretical	
	Keeping in mind	the 360 degree		kno	wledge	to re	al-world	
	learning methodo	logy the students		prol	blems		through	
	are engaged in d	ifferent activities		proj	ects, in	ternsł	nips, and	
	headed under dif	fferent clubs viz.		indu	ıstry col	llabor	ations.	
	Dance, music,							
	drama, literary e							
	are encouraged							
	regular club activ	_						
	_	per their interest						
	and hobbies, The							
		trained represent						
		inter University national level						
	student and competitions,	national level Renewed						
	personalities are i							
	workshops that							
1	members and stu							
1		m to learn from						
	experts.	to louin moin						
	enperts.							

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Students engage in different activities under different clubs.	2,3,4,5,6,7							
2	Role play in regular activities like workshops, competitions as per their interest and hobbies.	2,3,4,5,6,7							
3	Adapt and trained to represent ADTU in various inter university, state and national level competitions.	2,3,4,5,6,7,8							
4	The students will be given a platform to earn from invited experts in their respective fields.	2,3,4,5,6,7,8							
5	Develop an appreciation for diverse forms of artistic expression.	2,3,5,6,7,8							

MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO111R	DIGITAL ELECTRONI CS	1.75	2.5	2	2	1		1.33	
23BCAO112R	PROGRAMIN G FOR PROBLEM SOLVING	2.4	2.8	2	1	1.5	2	1	1.5
22BCAO113R	MATHEMATI CS –I	3					3		
22BCAO114R	FUNDAMEN TALS OF COMPUTER APPLICATIO NS	1	1.75	2.25					1.6
22UBPD113R	INTRODUCT ORY ENGLISH	2.33	2.33	1					
22UBEC111	EXTRA CURRICULA R ACTIVITY		1.2	2.2	1.75	2.2	2.6	1.6	2.33

		SEMEST	TER – II	[
Course Title		Computer C)rganiza	tion	& Ar	chite	cture		
Course code	22BCAO122	Total credits: 3	L	T	P	S	R	O/F	C
	R	Total hours:	3	0	0	0	0	0	3
		45L							
Pre-requisite	Nil	Co-requisite					Nil		
Programme		mputer Application							
Semester		er of the first year							
Course		e organization and	archited	cture	of co	ompu	ter sy	stems ar	d electronic
Objectives	computers.		C		4	1	1 41		
	*	pasic components of	_	-				_	
	•	it-output organizati	ion, mei	mory	orga	nızatı	on ar	ia manag	gement, and
601	pipelining.		40 000 1 41.	.::.					
CO1		es of instructions se			•				11/0
CO2	transfers.	trol unit design app	oroacnes,	, inei	mory d	esign	techn	ioiogies a	na I/O
G03			<u> </u>		A 1 1				
CO3	_	cepts of pipelining in	_						
CO4		alyze Parallel Proce							
CO5		concepts of Memo	ry Organ	nzati	ion Thi	ough	Map _j	ping Func	tions and
TI24 NI-	Replacement Al		C4-	-4	T		- 04		171
Unit-No.	Co	ntent	Contac Hour		Lea	rmm	g Oui	come	KL
I	Functional block	as of a computer:	9		Infor th	a int	oracti	on of the	1,2,3
1	CPU, memor	•	,					computer	1,2,3
	subsystems,	control unit.			system		with	_	
	1	architecture of a			•			hitecture	
	CPU – regis							ldressing	
	execution	cycle, RTL			modes	10 6	ina ac	diessing	
	interpretation	of instructions,			modes				
	_	es, instruction set.							
		nstruction sets of							
	some common C								
II		ntation: signed	10		Explair	n the	vario	ous data	3,4
	_	ntation, fixed and			represe				- , -
	-	representations,			technic			perform	
	O 1	representation.				•		etic and	
		metic – integer			discuss		he	various	
	_	ubtraction, ripple			adders	and	l mu	ltipliers.	
	carry adder,	carry look-ahead]	Exami	ne th	e con	trol unit	
	adder, etc. mult	iplication – shift-		-	design		app	roaches,	
	and add, Booth	multiplier, carry		1	memor	У		design	
	save multiplier	etc. Division		1	techno	logie	s an	id I/O	
	restoring and	U		1	transfe	rs.	Dem	onstrate	
	techniques,	floating point		1	the	coı	ncepts	of	
		oduction to x86]	pipelin	ing,		parallel	
	architecture.]	proces	sing		and	
					concur	rent	acce	ess to	
				1	memor	у			

III	CPU control unit design: hardwired and microprogrammed design approaches, Case study – design of a simple hypothetical CPU. Memory system design: semiconductor memory technologies, memory organization Peripheral devices and their characteristics: Inputoutput subsystems, I/O device interface, I/O transfers – program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions. Programs and processes – role of interrupts in process state transitions, I/O device interfaces – SCII, USB	10	Explain the various data representation techniques, perform computer arithmetic and discuss the various adders and multipliers Demonstrate the concepts of pipelining, parallel processing and concurrent access to memory. Summarize the concepts of memory organization with mapping functions and replacement algorithms	3,4
IV	Pipelining: Basic concepts of pipelining, throughput and speedup, pipeline hazards. Parallel Processors: Introduction to parallel processors, Concurrent access to memory and cache coherency.	8	Summarize the concepts of memory organization with mapping functions and replacement algorithms.	4
V	Memory organization: Memory interleaving, concept of hierarchical memory organization, cache memory, cache size vs. block size, mapping functions, replacement algorithms, write policies.	8	Summarize the concepts of memory organization with mapping functions and replacement algorithms	1,2

1. "Computer Organization and Design: The Hardware/Software Interface", 5th Edition by David A. Patterson and John L. Hennessy, Elsevier.

REFERENCE BOOKS:

- 1. "Computer Organization and Embedded Systems", 6th Edition by Carl Hamacher, McGraw Hill Higher Education.
- 2. "Computer Architecture and Organization", 3rd Edition by John P. Hayes, WCB/McGraw-Hill.
- 3. "Computer Organization and Architecture: Designing for Performance", 10th Edition by William Stallings, Pearson Education.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Outline the basics of instructions sets and their impact on processor design	3,5,6,8							
2	Examine the control unit design approaches, memory design technologies and I/O transfers.	2,3,5,6,8							
3	Explain the concepts of pipelining in Computer Architecture.	2,3,5,6,7,8							
4	Interpret and analyze Parallel Processing Principles and Applications.	2,3,5,7,8							
5	Demonstrate the concepts of Memory Organization Through Mapping Functions and Replacement Algorithms.	2,3,7,8							

SEMESTER – II													
Course Title		Data Structu	re using	g C									
Course code	22BCAO121R	Total credits: 5	L	T	P	S	R	O/F	ז	С			
		Total hours: 45L+60P	3	0	4	0	0	0		5			
Pre-requisite	Fundamentals	Co-requisite			1	C Pr	ograi	nming					
	of												
	programming												
	logic												
Programme		puter Application											
Semester		of the first year o											
Course	•	pasic concepts of da				_							
Objectives		basic concepts abo		_				_	phs.				
	3. To understand	concepts about sea	rching a	nd so	orting	techi	niques	S					
CO1		c concepts of Data											
CO2	Apply Data Struct	ure techniques on o	computi	ng pr	roblen	ns.							
CO3	·	lop algorithms to so											
CO4	-	velop a program fo		s cor	ncepts	of da	ata str	ructures	incl	uding			
	array, stack, queue	e, graphs and trees.											
CO5	Demonstrate and a	analyze various sor	ting algo	orithi	ms an	d has	hing t	techniq	ues.				
Unit-No.	Cont	ent	Contac	t	Lea	rnin	g Out	tcome		KL			
			Hour										
I	Introduction:	Basic	8							1,2,3			
	Terminologies: E	-			-		_	rithms					
		Data Structure						ime a					
	Operations: inse				ompu			mplexi					
	traversal etc.; A	*			nd		ıstify	t	he				
	Algorithm, Asym	•		C	orrect	ness							
	Time-Space trade												
	Searching: Line												
	Binary Search	•											
TT	their complexity a	•	10	Α		41.		1.1	· c	2.2			
II	Stacks and Quer and its operation		10				_	blem o d linke		2,3			
	and its operation	•				•		the tim					
	Applications	of Stacks:				ucter							
	* *	nversion and	T						/11				
	evaluation – corre												
	algorithms and												
	analysis. ADT q	1											
	Queues: Simple												
	-	-											
	Oueue. Prior												
	Queue, Prior Operations on	-											
	Queue, Prior Operations on Queues: Algorithm	each type of											

III	Linked Lists: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue, Header nodes, Doubly linked list: operations on it and algorithmic analysis; Circular Linked Lists: all operations their algorithms and the complexity analysis.	10	Analyze the problem of stacks, queues and linked list to determine the time and computation complexity	3
IV	Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree; Tree operations on each of the trees and their algorithms with complexity analysis. Applications of Binary Trees. B Tree, B+ Tree: definitions, algorithms and analysis	9	Implement basic tree- based traversal and search algorithms, learn about applications using tree	1.3
V	Sorting and Hashing: Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort; Performance and Comparison among all the methods, Hashing. Graph: Basic Terminologies and Representations, Graph search and traversal algorithms and complexity analysis.	8	Summarize Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in terms of Space and Time complexity. Graph search and traversal algorithms and determine the time and computation complexity	2,3
	Practical C	Component		
Practical 1	Array implementation of stack using C program	2	Understand the basics of stack	2,3
Practical 2	Array implementation of queue using C program	2	Understand the basics of queue	2,3
Practical 3	Array implementation of list using C program	2	Understand the basics of array implementation	2
Practical 4	Linked list implementation of list using C program [singly linked list]	2	Understand the basics of linked list	2,3

Practical 5	Linked list implementation of	2	Understand and	2,3
Tractical 5	stack using C program	2	implement stack using	2,3
	stack using C program		linked list	
Practical 6	Linked list implementation of	2	Understand and	2,3
Fractical 0	<u> </u>	2		2,3
	queue using C program		implement queue using linked list	
D 4: 15	A 1: .:			4
Practical 7	Applications of list polynomial	2	Understand and apply	4
	Addition and subtraction using C		polynomial addition and	
	program		subtraction	
Practical 8	Infix to postfix using C program	2	Understand and convert	3
			infix to postfix using C	
			program.	
Practical 9	Expression evaluation using C	2	Evaluate expressions	3,4
	program		using a C program.	
Practical 10	Implementation of avl trees using	2	Understand AVL tree and	3
	C program	_	implement using arrays.	
Practical 11		2	,	3,4
Practical 11	Implementation of heap using	2	Develop heap using	3,4
	priority Queues using C program		priority queue.	
Practical 12	Representation of graph using C	2	Understand graph and its	3
	program		representation.	
Practical 13	Graph traversal-breadth first	2	Understand the concepts	3
	traversal using C program		of traversal breadth first	
			traversal.	
Practical 14	Graph traversal-depth first	2	Understand and apply the	3
	Traversal using C program		concepts of traversal	
			depth first traversal.	
Practical 15	Linear search using C program	2	Understand and apply	2,3,4
Tructicui 13	Efficient search using c program	2	linear search	2,5,4
	D:			2.2.4
Practical 16	Binary search using C program	2	Understand and apply	2,3,4
			binary search	
Practical 17	Insertion sort using C program	2	Implement and apply	3,4
			Insertion sort.	
Practical 18	Bubble sort using C program	2	Implement and apply	3,4
I I WOULD IV	= 20010 solit using & program	-	Bubble sort.	
D42 140	Original and arrive C	2		2.4
Practical 19	Quick sort using C program	2	Implement and apply	3,4
			Quick sort.	
Practical 20	Merge sort using C program	2	Implement and apply	3,4
			Merge sort.	

1. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.

REFERENCE BOOKS:

1. Algorithms, Data Structures, and Problem Solving with C++", Illustrated Edition by

- Mark Allen Weiss, Addison-Wesley Publishing Company
 2. "How to Solve it by Computer", 2nd Impression by R. G. Dromey, Pearson Education.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Illustrate the Basic concepts of Data Structures.	1,2,3					
2	Apply Data Structure techniques on computing problems.	1,2,3					
3	Analyse and develop algorithms to solve real world	1,2,3					
	problems.						
4	Implement and develop a program for various concepts of	1,2,3					
	data structures including array, stack, queue, graphs and						
	trees.						
5	Demonstrate and analyze various sorting algorithms and	1,2,3,8					
	hashing techniques.						

		SEMEST	TER – II							
Course Title		Introduction to	Web Tec	hnolog	gy					
Course code	22BCAO124	Total credits: 5	L	TI	S	R	O/F		C	
	R	Total hours:	3	0 4	1 0	0	0		5	
		45L+60P								
Pre-requisite	Nil	Co-requisite				Ni	il			
Programme		Bachelor of Computer Application								
Semester		Fall/ II semester of the first year of the program								
Course	1. To unders	tand the Fundan	nental pri	nciple	of	Web	design,	hosti	ng and	
Objectives	maintenanc	e.								
		nd tools required f		_						
CO1	Illustrate eleme	nts and attributes o	f a web pa	ge.						
CO2	Build web page	s using HTML and	Cascadin	g Style	Sheet	ts				
CO3	Develop XML	documents and Sch	emas							
CO4	Design and imp	lement static and d	ynamic w	ebsite						
CO5	Analyse best tee	chnologies for solv	ing web cl	ient/se	rver p	roble	ns			
Unit-No.	Co	ntent	Contact	L	earni	ng Oı	itcome		KL	
			Hour							
I	Basics of Inter	net:	10	Illus	Illustrate elements and				1,2,3	
	Client/Server C		attri	butes (of a w	eb page.				
	is C/S Computi									
	Fat client VS Fa	at Servers, N-								
	tiered Software	Architecture.								
		global access to								
		TML, HTTP, IP								
	address, DN	1 ,								
	Accessing a	web server,								
	_	veb server, secure								
	1	Socket layer,								
		, IIS, Case study								
**	of Apache web		4.5	D	1		•	\perp	2.4	
II		d web casting	12				ges usin	-	3,4	
	Technique:						Cascadin	_		
	Popular web	•		Styl			Develo	-		
	·	marks, cookies,		XM		ocume				
	progress	indicators,			emas	Des	•			
	customization	of browsers,		_	ement		atic an	d		
		, next generation		ayna	amic v	ebsit	e			
	_	search engines,								
		search engines,								
	search tools,	•								
		ler, agent-based								
		tudy of any Web								
	Browser.									

III	Web page design:	8	Build web pages using	3,4
	Designing web pages with		HTML and Cascading	,
	HTML- use of tags, hyperlinks,		Style Sheets. Design and	
	URLs, tables, text formatting,		implement static and	
	graphics & multimedia,		dynamic websites.	
	imagemap, frames and forms in		Analyse best	
	web pages. Use of Cascading		technologies for solving	
	Style Sheet in web pages.		web client/server	
	Introduction to DHTML.		problems	
IV	Creating interactive and	8	Analyse best	4
1 4	dynamic web pages with	0	technologies for solving	7
	JavaScript:		web client/server	
	JavaScript overview; constants,		problems	
	_		problems	
	variables, operators, expressions			
	& statements; user-defined &			
	built-in functions; client-side			
	form validation; using properties			
	and methods of built-in objects.			
	Extensible Markup Language			
	(XML):			
	Introduction- using user-defined			
	tags in web pages; displaying			
	XML contents; XML DTDs; use			
	of XSL.			
V	Web Server:	7	Analyse best	4
	Web services and web server		technologies for solving	
	functionality; web server		web client/server	
	composition; registration;		problems	
	conceptual architecture of some			
	typical web servers. Server-side			
	scripting: overview of server-			
	side scripts like CGI, ASP, and			
	JSP. Server-side scripting using			
	PHP; Web database			
	connectivity- introduction to			
	ODBC; PHP with database			
	ODBC; PHP with database connectivity.			
	connectivity.			
	connectivity. Exposure to Advanced Web			
	connectivity. Exposure to Advanced Web Technologies:			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based models- DCOM, CORBA, EJB;			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based models- DCOM, CORBA, EJB; Web services and Related Technologies- ISAPI, SOAP,			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based models- DCOM, CORBA, EJB; Web services and Related Technologies- ISAPI, SOAP, UDDI, WSDL; Other Advanced			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based models- DCOM, CORBA, EJB; Web services and Related Technologies- ISAPI, SOAP, UDDI, WSDL; Other Advanced Web Technologies- AJAX,			
	connectivity. Exposure to Advanced Web Technologies: Distributed Object based models- DCOM, CORBA, EJB; Web services and Related Technologies- ISAPI, SOAP, UDDI, WSDL; Other Advanced	Component		

Practical 1	Write a HTML program for the	2	Learn to create	2,3
	demonstration of Unordered		Unordered Lists	·
	Lists.			
Practical 2	Write a HTML program for the	2	Learn to create Ordered	2,3
	demonstration of ordered Lists		Lists	
Practical 3	Write a HTML program for the	2	Learn to create Definition	2
	demonstration of Definition Lists		Lists	
Practical 4	Write a HTML program for the	2	Learn to create Nested	2,3
	demonstration of Nested Lists		Lists	
Practical 5	Write a HTML program for	2	Understand hyperlink	2,3
	demonstrating Hyperlinks.		and implement hyperlink	
	Navigation from one page to		navigation from one page	
	another and Navigation within the		to another and within the	
	page.		page	
Practical 6	Write a HTML program for time-	2	Understand and	2,3
	table using tables.		implement queue using	
			linked list	
Practical 7	Write a HTML program to	2	Understand and apply	4
	develop a static Home Page using		polynomial addition and	
D 4: 10	frames.	2	subtraction	3
Practical 8	Write a HTML program to	2	Understand and convert	3
	develop a static Registration Form		infix to postfix using C	
Practical 9	Write a HTML program to	2	program. Evaluate expressions	3
1 Tactical 9	develop a static Login Page.	2	using a C program.	3
Practical 10	Write a HTML program to	2	Understand AVL tree and	3
Tractical 10	develop a static Web Page for	2	implement using array.	3
	Catalog.		implement using array.	
Practical 11	Write a HTML program to	2	Develop heap using	3
1140004111	develop a static Web Page for	_	priority queue.	
	Shopping Cart.		T T T T	
Practical 12	Write HTML for demonstration	2	Understand graph and its	3
	of cascading Embedded		representation.	
	stylesheets.			
Practical 13	Write HTML for demonstration	2	Understand the concepts	3
	of cascading External stylesheets		of traversal breadth first	
			traversal.	
Practical 14	Write HTML for demonstration	2	Understand and apply the	3
	of cascading Inline styles.		concepts of traversal	
			depth first traversal.	
Practical 15	Write a JavaScript program to	2	Develop a user login	3
	validate the USER LOGIN page.		page	
Practical 16	Write a program for	2	Develop skills in creating	3
	implementing XML documents		well-formed XML	
	for CUSTOMER DETAILS.		documents.	

Practical 17	Write an internal Document Type	2	Learn how to create an	3
	Definition to validate XML for		internal DTD to define	
	CUSTOMER DETAILS		the structure and	
			constraints of an XML	
			document.	
Practical 18	Write an external Document Type	2	Develop skills in	3
	Definition to validate XML for		managing and	
	CUSTOMER DETAILS		maintaining DTD files	
			for multiple XML	
			documents.	
Practical 19	Write a simple servlet that	2	Develop skills in	3
	displays a message		handling HTTP requests	
			and generating HTTP	
			responses.	
Practical 20	Write a servlet that reads	2	Understand how to read	3
	parameters from employee login		and process parameters	
	page		from HTTP requests in a	
			servlet.	

- 1. C. Xavier, "Web Technology & Design", New Age Publication, 2003
- 2. Austin and Pawlan, "Advanced Programming for JAVA2 Platform", Pearson, 2000

REFERENCE BOOKS:

- 1. Oliver, Dick; SAMS Teach Yourself Html 4 in 24 Hours; Techmedia.
- 2. Ashbacher, Charles; SAMS Teach Yourself XML in 24 Hours; Techmedia.

OTHER LEARNING RESOURCES:

- 1. https://books.google.co.in/books/about/Data Structures and Algorithms.html?id=11CHY j5eV-EC&redir_esc=y
- 2. https://techdevguide.withgoogle.com/paths/data-structures-and-algorithms/

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Illustrate elements and attributes of a web page.	1,2,3,4,8					
2	Build web pages using HTML and Cascading Style Sheets	1,2,3,4,7,8					
3	Develop XML documents and Schemas	1,2,3,4,7,8					
4	Design and implement static and dynamic website	1,2,3,4,7,8					
5	Analyse best technologies for solving web client/server problems	1,2,3,4,7,8					

		SEMEST	TER – II						
Course Title		MOOCS	I (HTM)	L)					
Course code		Total credits: 1	L	T	P	S	R	O/F	C
		Total hours:	0	0	0	0	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme	Bachelor of Co	mputer Application	n						
Semester		er of the first year	_	_					
Course		rstand the basic stru							
Objectives	2. To learn how to use HTML elements and attributes to create web pages.						ages.		
	3. To deve	lop skills for structu	aring and	orga	nizing	g web	conte	ent effecti	vely.
	4. To gain	knowledge of best j	practices	for c	reatin	g acc	essibl	e and SEC	O-friendly
	web pag	es.							
		e and style static we			g HTN	ΊL.			
CO1	Create and struc	ture basic HTML do	ocuments	S					
CO2	Use a variety of	HTML elements an	ıd attribu	tes to	build	web	pages	3.	
CO3	Apply best pract	ices for organizing	content v	within	n web	page	s.		
CO4	Develop accessi	ble and SEO-friend	ly web co	onten	t.				
CO5	Construct and st	yle static web pages	s that are	visua	ally ap	peali	ng an	d function	nal
Unit-No.	Con	ntent	t Contact Learning Outcome		come	KL			
			Hour						
I	Definition and p	ourpose of HTML.	6	U	Inders	tand	the	basic	1,2
	History and evo	olution of HTML.		st	ructu	re	of	HTML	
	Basic HTML	Structure HTML		d	ocum	ents			
		ure. Creating your							
		HTML Elements							
	_	standing tags and							
		monly used tags.							
	Attributes and Their Usage Basic								
		attributes: id, class, src, href, alt,							
	_	Simple Web Page							
	Combining	elements and							
		create a basic							
	webpage.								
II		ements. Semantic	6		Inders			HTML	1,2,3
		nts. Importance of						ibutes to	
		ents for structure		Cı	reate	web p	ages		
	and accessib								
	Content for ima and Input Creati	ges. Table, Forms							

III	Images element and attributes.	6	Understand the images	4,5
	Audio and Video elements.	U	elements, and attributes	7,5
	Attributes and controls.		cicinents, and attitudes	
	Embedding Content for			
	embedding other web content.			
	Attributes: src, width, height,			
	frameborder, allow Fullscreen.			
	· ·			
	Using Media Responsively Responsive images with srcset.			
	1			
	Making media content responsive for different devices.			
TX7		7	Understand the	2.4
IV	Introduction to Web Accessibility	/		3,4
	Importance of accessibility. ARIA		accessibility concept in	
	(Accessible Rich Internet		website	
	Applications) roles and attributes.			
	Accessibility Best Practices Using			
	semantic HTML for better			
	accessibility. Adding alt text for			
	images. Ensuring proper focus			
	order and keyboard navigation.			
	SEO Basics Importance of SEO.			
	Using appropriate HTML tags for			
	SEO. Improving SEO with			
	Structured Data Using schema.org			
	vocabulary. Adding JSON-LD to			
	HTML. Performance			
	Optimization Reducing page load			
	time. Using lazy loading for			
	images and videos.			
V	Introduction to CSS. Inline,	6	Understand the style sheet	4,5,6
	internal, and external CSS. Basic		like CSS.	
	CSS Syntax Selectors, properties,			
	and values. Colour, background,			
	borders, and text styles. Layout			
	Techniques Box model: margin,			
	border, padding, content. Display			
	property: block, inline, inline-			
	block, none. Positioning: static,			
	relative, absolute, fixed, sticky.			
	Responsive Design Media			
	queries. Flexible layouts with			
	flexbox. Best Practices for CSS			
	Organizing CSS. Avoiding			
	common pitfalls.			

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Create and structure basic HTML documents	2,3,8					
2	Use a variety of HTML elements and attributes to build web pages.	2,3,8					
3	Apply best practices for organizing content within web pages.	2,3,6,8					
4	Develop accessible and SEO-friendly web content.	2,3,6,8					
5	Construct and style static web pages that are visually appealing and functional	2,3,8					

		SEMEST	TER – II						
Course Title		Environme	ntal Scie	nce					
Course code	22UBES101R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours:	2	0	0	0	0	0	2
		30L							
Pre-requisite	Nil	Co-requisite					Nil	•	
Programme		Bachelor	of Comp	outer	App	licati	on		
Semester		Fall/ II semester							
Course	1. To understan	nd the fundamental	concepts	and	princi	ples	of env	rironmenta	al science.
Objectives	2. To analyse t	he impact of humar	n activitie	s on	the er	iviroi	nment		
	3. To explore e	cological processes	s and the	impo	ortanc	e of b	iodiv	ersity.	
	4. To examine	various environme	ntal issue	s and	l their	pote	ntial s	olutions.	
	5. To develop	critical thinking ski	lls to eva	luate	envir	onme	ental p	olicies an	d practices.
CO1	Demonstrate the	multidisciplinary r	nature of	envir	onme	ntal s	tudies		
CO2	Learning about	natural resource, it	s importa	ance	and e	nviro	nmen	tal impac	ts of Human
	activities on natu		•					•	
CO3	Explain environ	nent and ecosysten	n, concep	t of t	oiodiv	ersity	7.		
CO4		about problems of						s impact	and control
	measures.	•			•			•	
CO5	Illustrate the hur	Illustrate the human population and the environment							
Unit-No.	<u> </u>	ntent	Contac			rnin	g Out	come	KL
011101100			Hour				8 0 4.		
I	Multidisciplina	ry nature of	8	J	Jnders	stand		basic	1,2
	environmental	•		e	colog	ical	conce	epts and	
	Definition, scope	e and importance		e	nviro	nmen	tal pr	ocesses.	
	Need for public	awareness.							
II	Natural Resour	ces:	10	I	dentif	y an	d ana	lyze the	2,3,4
	Renewable and	l non-renewable		impact of human activities					
	resources:			C	n the	envir	onme	nt.	
	Natural resour	ces face over-							
	exploitation, d	eforestation, and		(Gain k	nowl	edge a	about	
		degradation from		e	nviro	nmen	t and		
		imber extraction,		e	cosys	tem.			
	_	am construction.							
		leads to floods,						oncept of	
	droughts, and conflicts. biodiversity and respect						respect		
	_	modern practices		t	hem.				
	cause soil is								
	_	gy needs stress							
		degradation and							
		are critical for the							
	future.								

III	Ecosystems: Concept of an ecosystem. Structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession. Food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the Following ecosystem: - Forest ecosystem, Grassland ecosystem,	9	Identify and analyze the impact of human activities on the environment. Gain knowledge about environment and ecosystem	3,4
	Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)			
IV	Biodiversity and its conservation Introduction – Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega diversity nation. Hot-sports of biodiversity: Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: Insitu and Ex-situ conservation of biodiversity.	9	Gain knowledge about the environment and ecosystem. Understand the concept of biodiversity and respect them Gain knowledge about the conservation of biodiversity and its importance. Aware students about problems of environmental pollution, its impact on human and ecosystem and control measures	4,5

V	The Interconnection Between		Gain knowledge about the	4,5
,	Environmental Pollution and		environment and	.,e
	Social Issues: Impacts and		ecosystem.	
	Solutions:		Cosjstem	
	Definition Cause, effects and		Understand the concept of	
	control measures of: -Air		biodiversity and respect	
	pollution, Water pollution, Soil		them	
	pollution, Marine pollution, Noise		them	
	pollution, Thermal pollution,		Gain knowledge about the	
	nuclear hazards. Solid waste		conservation of	
	Management: Causes, effects and		biodiversity and its	
	control measures of urban and		importance. Aware	
	industrial wastes. Role of an		students about problems	
			of environmental	
	1			
	pollution. Pollution case studies. Disaster management: floods,		pollution, its impact on	
	,		human and ecosystem and	
	earthquake, cyclone and		control measures	
	landslides.			
	Social Issues and the			
	Environment:			
	From Unsustainable to			
	Sustainable development. Urban	9		
	problems related to energy. Water			
	conservation, rain water			
	harvesting, watershed			
	management. Resettlement and			
	rehabilitation of people; its			
	problems and concerns. Case			
	Studies. Environmental ethics:			
	Issues and possible solutions.			
	Climate change, global warming,			
	acid rain, ozone layer depletion,			
	nuclear accidents and holocaust.			
	Case Studies. Waste land			
	reclamation. Consumerism and			
	waste products. Environment			
	Protection Act. Air (Prevention			
	and Control of Pollution) Act.			
	Water (Prevention and control of			
	Pollution) Act. Wildlife			
	Protection Act. Forest			
	Conservation Act. Issues involved			
	in enforcement of environmental			
	legislation. Public awareness.			

- 1. Harucha E. B, Textbook of Environmental Studies, Orient Blackswan Publishing.
- 2. Tiwari V. K A Textbook of Environmental Studies, Himalaya Publishing House

3. Chatwal G. R. & Sharma H. Environmental Studies, Himalaya Publishing House

REFERENCE BOOKS:

- 1. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and
- 2. Stadards, Vol I and II, Enviro Media (R)
- 3. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno-Science Publication (TB)
- Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad 380 013, India, Email:mapin@icenet.net (R)
- Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p Clark R.S., Marine Pollution, Clanderson Press Oxford (TB)

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate the multidisciplinary nature of environmental studies	4					
2	Learning about natural resource, its importance and environmental impacts of Human activities on natural resource	3,4					
3	Explain the environment and ecosystem, concept of biodiversity.	3,4					
4	Aware students about problems of environmental pollution, its impact and control measures.	4,5,6,7					
5	Illustrate the human population and the environment	4,8					

SEMESTER – II									
Course Title	IMPLICATIVE ENGLISH (Communicative English & Soft Skills)								
Course code	22UBPD123R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 60P	0	0	4	0	0	0	2
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of	Comp	uter .	Appli	catio	n		
Semester		Fall/ II semester of	the fi	rst ye	ar of	the j	progr	am	
Course		uce the types of senter			_				
Objectives	1	gthen the vocabulary of							
		their speaking and w	riting	skills	it th	e im	porta	nce of dress	s codes in
		rganizations.							
		oduce the 3P's (Pla	annıng	, pri	oritiz	ing	& p	erforming)	of Time
801	Managen								
CO1		s sentence comprehen							
CO2	-	s ability in framing dif					_		iting.
CO3		skills in different areas						tter writing.	
CO4	_	s self-management ski							
CO5		pacity in understanding	g and u	ısing	differ	ent n	on-ve	erbal commu	nications
	throughout their								1
Unit-No.	Co	ontent		tact	I	Leari	ning (Outcome	KL
			Ho		711			. 1 .	100
I	Grammar:	T	1	0		ıstrat		student's	1,2,3
	•	hange of Interrogative and tive Sentences, Exclamatory			sentence comprehension.				
	and Assertive Sente	· · · · · · · · · · · · · · · · · · ·			COI	пргеі	lensic)11.	
	ii. Types of								
	iii. Common								
II	Vocabulary:	Lifois	1	4	Im	prove	,	student's	3,4
	i. Synonym	ns	_	-	1 1	lity	in	framing	
	ii. Antonym					feren		sentences	
	iii. Homonyi							king and	
						ting.	_	Enhance	
						ting		kills in	
					dif	feren	t area	s including	
					CV	an	d co	over letter	
						_		•	
						dent'		self-	
						-		skills to	
					pla	n the	ir goa	ls.	

III	Reading Skills:	12	Improve student's	3,4
	i. Techniques of Effective		ability in framing	·
	Reading		different sentences	
	ii. Gathering ideas and		while speaking and	
	information from a text		writing. Develop	
	iii. TheSQ3RTechnique		student's self-	
	iv. Interpret the text		management skills to	
			plan their goals.	
			Enhance their capacity	
			in understanding and	
			using different non-	
			verbal communications	
			throughout their	
IV	Conflict Management	12	communication.	4
10	Conflict Management: i. Definition	12	Enhance their capacity in understanding and	4
			in understanding and using different non-	
	ii. Type of Conflict		verbal communications	
	Management iii. Effects of Conflict		throughout their	
	Management		communication.	
	iv. Methods to deal with			
	Conflicts (Negative)			
V	Time-Management Skills:	12	Enhance their capacity	4
•	i. Introduction To Time	12	in understanding and	7
	Management,		using different non-	
	ii. Purpose And Importance		verbal communications	
	of Time Management,		throughout their	
	iii. Basic Tips to Maintain		communication.	
	Time.			
	Activity: Problem solving			
	activity: A situation will be given			
	to the students and they will have			
	to tell us how to handle the			
	situation or solve the problem.			

- 1. Wren, P.C and Martin, H. 1995. High School English Grammar and Composition, S Chand Publishing.
- 2. Barrett, Grant. 2016. Perfect English Grammar: The Indispensable Guide to Excellent Writing and Speaking, Zephyros Press

REFERENCE BOOKS:

1. McCarthy. (2008) English Vocabulary in Use Upper - Intermediate with CD ROM, Cambridge University Press

2. Tracy, Brian. (2018) Time Management: The Brian Tracy Success Library, Manjul Publishing House

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Illustrate student's sentence comprehension.	3,4,5,6,7,8
2	Improve student's ability in framing different sentences while speaking and writing.	3,4,5,6,7,8
3	Enhance writing skills in different areas including CV and cover letter writing.	2,3,4,5,6,7,8
4	Develop student's self-management skills to plan their goals.	2,34
5	Enhance their capacity in understanding and using different non-verbal communications throughout their communication.	2,3,4,5

		SEMESTI	ER – II							
Course Title			Mathe	matic	s II					
Course code	22BCAO123R	Total credits:	L	T	P	S	R	O/F	C	7
		4	3	1	0	0	0	0	4	
		Total hours:								
		45L +15T								
Pre-requisite	Mathematics	Co-requisite					Nil			
Programme	Bachelor of Comp	uter Application	1							
Semester	Fall/ II semester of	f the first year of	f the pi	ogra	m					
Course	1. Describe th	e concept of al	lgebraic	stru	ctures	incl	luding	Boolean	algebra	a and
Objectives	Boolean rin	g and apply them	in und	erstan	ding a	comp	lex pr	oblems		
				Cistan	iding (omp	ion pr	oorems.		
	2. Apply the co	oncept of graphs.								
CO1	Outline the basic pri	nciples of set the	orem a	nd ap	ply the	em in	solvi	ng differei	nt compl	lex
- ~ -	problems.	1		1-1	. ,			0	r	
CO2	Apply transform cal	culus in solving v	various	comn	lex nr	obler	ns.			
CO3	Demonstrate the cor				10.1 p.	00101				
CO4	Evaluate the limit of				inity n	umei	ically	by using	L'Hospi	ital's
	Rule.							- 78	F	
CO5	Implement the estim	ata mavima and	minima	of m	ultiva	riable	funct	ion		
Unit-No.	Conten		Contac					come	K	T
Unit-No.	Conten	ıı	Hour		Lea	11.11111	g Out	come	I N	L
I	Sets, relations and	functions:	8		Inders	tand	and	identify	1,	2
-	Basic operations	on sets,	Ü		liffere		type	•		_
	Cartesian products,	·			functions					
	(sum), and power's									
	_	ions, their								
	compositions and	d inverses.								
	Different types of fu	unctions, their								
	compositions and	d inverses.								
	Complete partial or	dering, chain,								
	lattice, complete,	distributive,								
	modular and o	complemented								
	lattices. Boolean	and pseudo-								
	Boolean lattices.									
II	Propositional Logic		12		Develo		a	deep	2,3	3,4
	Syntax and sema				ınders			of the		
	systems, satisfiabili							antics of		
	soundness, complete				ropos			logic,		
	deduction theorem, etc. Decision including proof sy			systems						
	problems of propos							roperties		
	Introduction to firs	•			uch	as		sfiability,		
	and first order theor	y.						ess, and		
	completeness.									

III	Algebraic Structures: Algebraic structures with one binary operation — semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operations ring, integral domain, and field. Boolean algebra and Boolean ring (Definitions and simple examples only).	8	Develop Proficiency in the Analysis and Application of Various Algebraic Structures	3,4
IV	Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeon- hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions.	8	Master Basic and Advanced Counting Techniques	4,5
V	Introduction to Graphs: Graphs and their basic properties — degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.	8	Develop Proficiency in Analyzing and Applying Fundamental Graph Theory Concepts:	4,5

- 1. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
- 2. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.

REFERENCE BOOKS:

1. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Outline the basic principles of set theorem and apply them in solving different complex problems.	1,2,3				
2	Apply transform calculus in solving various complex problems.	1,2,3				
3	Demonstrate the concepts of proposition logic.	1,2,3,4				
4	Evaluate the limit of a function at a point or at infinity numerically by using L'Hospital's rule.	1,2,3				
5	Implement the estimate maxima and minima of multivariable function	1,2,3				

	SEMESTER – II									
Course Title		Techno Profess	ional S	Skills	I					
Course code	22BCAO125	Total credits: 1	L	T	P	S	R	O/F		С
	R	Total hours:	0	0	2	0	0	0		1
		30P								
Pre-requisite	Nil	Co-requisite			•		Nil		•	
Programme		Bachelor of	f Com	puter	App	licati	ion			
Semester		Fall/ II semester o	f the f	ïrst y	ear o	f the	prog	ram		
Course	1. To have a	detailed revision of	Com	puter	Scie	nce &	& Info	ormation	Tech	nology
Objectives	concepts lea	rnt so far.								
		confident in Compu			& In	form	ation	Technol	ogy co	oncepts
	to solve pro	olems in real-life situ	ations	S.						
CO1	Implement prog	rams that utilize file	input/	outpu	t ope	ation	is to p	erform t	asks li	ke data
		l, and manipulation.								
CO2	Illustrate the in	nportance of proper	r mem	ory 1	nana	geme	nt an	d the p	otentia	al risks
	associated with	•								
CO3		ograms that utilize f		out/ou	tput	opera	tions	to perfo	rm tas	sks like
	_	rieval, and manipula								
CO4	Outline the best	practices for writing	g maint	ainab	le and	d effi	cient	code.		
CO5	Apply coding sk	ills and technical ac	umen	to solv	ve rea	ıl-life	prob	lem scen	arios	
Unit-No.	Cor	ntent	Conta	ct	Lea	rnin	g Out	come		KL
			Hour							
I	Computer Appli	cation	2	D	evelo	p	four	ndational	1	1,2,3
	Fundamentals			kı	nowle	edge	and	l skills		
				ne	ecess	ary	to ef	fectively		
					se			computer		
					pplica					
				pe	erson	al an	d pro	fessional		
					ontex					
II	Office Automati	on	2			•		oility to		3,4
								age and		
					utoma			tasks,		
					ading	-		ncreased		
				_	roduc	-		and		
					ream			business		
					perati					
III	C Programming		2	_	nder			the		3,4
					nport			writing		
						nt co		nd learn		
					asic		opti	mization		
				te	chnic	ques.				

		ı		1
IV	Advanced C Programming	2	Understand and apply fundamental programming concepts, and develop problemsolving skills that are essential for advanced studies in computer science and software development.	4
V	Digital electronics	2	Understand digital systems and their applications.	4
	Practical C	component		
Practical 1	Write a program in C to implement the following. A bank stores the customer ids in a single dimensional array. The customer ids are generated using a random number generator. Each customer number is a 4-digit number. When a new customer id is to be entered, first the array needs to be checked sequentially. If the randomly generated 4-digit customer id already exists in the array, then the number to be regenerated (using a random number generator). This process is to be continued till it is ensured that the newly generated customer id does not already exist in the array. The new customer id is to be inserted into the array only if there is no repetition.	2	Develop proficiency in utilizing arrays to store and manage data. Learn to implement random number generation to create unique identifiers. Understand how to check for duplicates and ensure data uniqueness using iterative and conditional logic.	2,3

Practical 2	Write a program in C to do the	4	Develop skills in	2,3
	following.		initializing and	
	Initialize all cells of a 5X5		manipulating multi-	
	matrix. Then enter a few positive		dimensional arrays.	
	numbers arbitrarily to some of		Learn to traverse a matrix	
	the cells of the matrix. Now start		along its diagonals and	
	from the middle cell of the top-		implement complex	
	most row i.e., 0th row and start		traversal logic.	
	entering the numbers 1,2, 3 etc.		Enhance problem-	
	in sequence along the four		solving abilities by	
	diagonals (When one diagonal		implementing specific	
	goes out of scope, change		traversal patterns and	
	direction and move along the		ensuring data is correctly	
	next lower/upper diagonal).		placed in a matrix	
			structure.	
Practical 3	You want to keep track of the	2	Develop skills in	2
	number of hours a worker in		collecting and storing	
	your company has worked per		data using arrays and	
	day. Note that Sundays are		data structures.	
	holidays. At the end of the		Learn to perform data	
	month, you want to give awards		analysis to identify	
	to the following:		maximum values and	
	a. Workers who have		meet specific conditions.	
	worked the maximum hours in a		Enhance problem-solving	
	week.		abilities by implementing	
	b. Workers who have		algorithms to determine	
	worked the maximum hours in a		awards based on defined	
	month c. Workers who have not		criteria.	
	c. Workers who have not missed a single work day			
	provided they have worked at			
	leasts8 hours per day of the			
	week.			
	WCCK.			

Practical 4	Write a program in C to implement the following (using linked list). A bank stores the customer ids in a single dimensional array. The customer ids are generated using a random number generator. Each customer number is a 4-digit number. When a new customer id is to be entered, first the array needs to be checked sequentially. If the randomly generated 4-digit customer id already exists in the array, then the number to be regenerated (using a random number generator). This process is to be continued till it is ensured that the newly generated customer id does not already exist in the array. The new customer id is to	2	Acquire the ability to choose appropriate data structures based on problem requirements and constraints.	2,3
	_			

Practical 5	Write a program in C using linked list to implement the following: Store a route containing different stops/places one after another. A user will be asked to enter a start place and a destination place. The program will then print the route from the user given start point to the user given destination point in any direction. For e.g., supposed in our route, we have stored chandmari, silpukhuri, ghy club, ambary etc. Now the user should be able to give as start point — chandmari and destination as ambari and also, he must be able to give starting point as Ambari and destination as Chandmari. However, if the user given start point and /or destination does not exist in the stored route, then an appropriate message has to be displayed.	2	Acquire proficiency in dynamically allocating memory and managing linked list nodes to store and retrieve complex data structures effectively in a C environment.	2,3
Practical 6	Write a program to enter duplicate elements in an array. The program should then a. Print the duplicate elements only once. b. Print the array after removing any duplicated elements. Hint: you can use a second array for doing the necessary manipulation	4	Gain proficiency in algorithmic thinking by implementing logic to identify and manage duplicate elements in an array.	2,3

			Γ	_
Practical 7	You are conducting a meeting	2	Develop a thorough	4
	for n people in a room where		understanding of circular	
	they sit in a circular table. Later		data structures such as	
	you want to find out if any two		circular arrays or circular	
	people X and Y were sitting		linked lists.	
	adjacent (i.e., immediately next)			
	to reach other. What data			
	structure will you use to			
	implement this? The program			
	should take as input the value of			
	N, it should take as input the			
	names of the N people and			
	information as to who was sitting			
	next to whom. After this, it			
	should take as input a pair of			
	names and then tell whether they			
	were sitting adjacent to each			
	other or not.			

- 1. C. Xavier, "Web Technology & Design", New Age Publication, 2003
- 2. Austin and Pawlan, "Advanced Programming for JAVA2 Platform", Pearson, 2000

REFERENCE BOOKS:

- 1. Oliver, Dick; SAMS Teach Yourself Html 4 in 24 Hours; Techmedia.
- 2. Ashbacher, Charles; SAMS Teach Yourself XML in 24 Hours; Techmedia.
- 3. Ashbacher, Charles; SAMS Teach Yourself XML in 24 Hours; Techmedia.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Implement programs that utilize file input/output operations to perform tasks like data storage, retrieval, and manipulation.	2,3,7,8						
2	Illustrate the importance of proper memory management and the potential risks associated with memory leaks.	2,3,7,8						
3	Demonstrate programs that utilize file input/output operations to perform tasks like data storage, retrieval, and manipulation.	2,3,7,8						
4	Outline the best practices for writing maintainable and efficient code.	2,3,7,8						
5	Apply coding skills and technical acumen to solve real-life problem scenarios	2,3,7,8						

		SEN	MEST	ER –	· II					
Course Title	UNIVERSAL HUMAN VALUES (UHV) and PROFESSIONAL ETHICS									
Course code	22UUHV10	Total credits: 2	L	T	P	S	R	O/F	C	
	1R	Total hours:	1	0	2	0	0	0	2	
		15L + 30P								
Pre-requisite	Nil	Co-requisite						Nil		
Programme		A	ll UG	and	PG P	rogr	amm	ies		
Semester		Fall/ II sem								
Course		lp the students appr					•	•		
Objectives		LS' to ensure sustain	ed ha	ppine	ss an	d pro	speri	ty, which a	re the core aspin	rations of
		nan beings								
		ilitate the developm				_	_	_		
	_	sion as well as towa				_	_	•		_
		Human reality and								
		of Universal Human	vaiue	es and	mov	emer	it tow	ards value	-based living in	a naturai
	way	ghlight plausible imp	diooti	one o	f suel	h a L	[alieti	a undarata	nding in terms	of othical
		anight plausible imp a conduct, trustful an							-	
		ction with Nature	iu iiiui	luarry	Tullii	inng	muma	ii beliaviou	i and mutually (emicining
CO1		gnificance of value	innu	ts fo	llowi	no oi	ıideli	nes and o	rasning the cor	ntent and
601	process of value	~	три	, 10	110 111		aracii	nes, una g	rusping the cor	itent una
CO2	•	he Self from the B	odv. 1	foster	ing a	ware	ness	and unders	tanding the me	aning of
202	harmony.	ne sen nom me s	ouj, i	.05.01		·· arc	11000	and anacis	adding the me	uning of
CO3	•	al and unethical	practi	ices.	demo	onstr	ating	increased	awareness of	f ethical
	considerations		Ι	,			8			
CO4	Develop strate	gies for a harmonic	ous, et	thical	profe	essio	nal er	vironment	, promoting cod	operation
	and ethical pra	-			_					
CO5	Engage in cr	tical decision-maki	ng, a	pplyir	ng et	hical	prin	ciples to r	navigate challer	nges and
	contribute to a	positive work environment	onmei	nt.						
Unit-No.		Content		Co	ntac	t		Learning	Outcome	KL
				I	lour					
I		luction - Need, E			12			•	he need, basic	1,2
		ontent and Process	for				-		ent and process	
	Value Educati	on					for V	alue Educa	tion	
II	Harmony in th	e Human Being -			8		Unde	rstanding h	uman being as	2,3,4
	Harmony in M	lyself!					а со-е	existence of	f the sentient	
III	Harmony in t	he Family and Soc	iety-		8		Unde	rstanding	values in	3,4
	Harmony i	n Human- Hu	man							
	Relationship									
IV		e Nature and Exister			6			•	Existence as	4,5
	- Whole existe	nce as Co-existence	.					•	Sah-astitva) of	
								•	acting unitsin	
							all-pe	ervasive spa	nce	

V	Implications of the above		Basis for Humanistic	4,5
	Holistic Understanding of	8	Education, Humanistic	
	Harmony on Professional Ethics		Constitution and Humanistic	
			Universal Order	

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2

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- 2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
- 3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986,1991
- 4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins.USA
- 5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III,1972, limits to Growth, Club of Rome's Report, Universe Books.
- 6. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
- 7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
- 8. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

OTHER LEARNING RESOURCES:

- 1. Value Education websites, http://www.uptu.ac.in
- 2. Story of Stuff, http://www.storyofstuff.com
- 3. Al Gore, An Inconvenient Truth, Paramount Classics, USA

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Explain the significance of value inputs, following	5
	guidelines, and grasping the content and process of value	
	education.	
2	Differentiate the Self from the Body, fostering awareness	5
	and understanding the meaning of harmony.	
3	Identify ethical and unethical practices, demonstrating	5
	increased awareness of ethical considerations.	
4	Develop strategies for a harmonious, ethical professional	6,7
	environment, promoting cooperation and ethical practices.	
5	Engage in critical decision-making, applying ethical	4,5
	principles to navigate challenges and contribute to a	
	positive work environment.	

	SEMESTER – II								
Course Title		Ext	ra-Cu	ırricu	ılar				
Course code	22UBEC121	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours:	0	0	0	4	0	0	0.5
Pre-requisite	Nil	Co-requisite					Nil		
Programme	Bachelor of Co	mputer Application	ons						
Semester	Winter/ II semester of the second year of the program								
Course	1. To dev	elop problem-solvi	ng at	oilitie	s thr	ough	codi	ng challe	enges and
Objectives	hackath	hackathons.							
	2. To parti	cipate in app develo	lopment contests and exhibitions.						
	3. To deve	lop entrepreneurial s	skills a	and m	indse	t.			
CO1	Importance of di	fferent activities und	der dif	feren	t club	s.			
CO2	Formulate regul	ar activities like wo	rksho	ps, co	mpet	ition	s as p	er their in	nterest and
	hobbies.								
CO3	Adapt to repres	o represent ADTU in various inter university, state and national level							
	competitions.								
CO4	Discuss with inv	rited experts in their	respec	ctive f	ields.				
CO5	Develop an appr	reciation for diverse	forms	of art	tistic	expre	ession.	ı	

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Importance of different activities under different clubs.	2,3,4,5,6,7					
2	Formulate regular activities like workshops, competitions as per their interest and hobbies.	2,3,4,5,6,7					
3	Adapt to represent ADTU in various inter university, state and national level competitions.	2,3,4,5,6,7,8					
4	Discuss with invited experts in their respective fields.	2,3,4,5,6,7,8					
5	Develop an appreciation for diverse forms of artistic expression.	2,3,5,6,7					

		SEMESTE	R – II						
Course Title		CO-CURRICULAR ACTIVITIES							
Course code	22UBCC12	Total credits: 1	L T P S R O/F C						C
	1		0 0 0 4 0 0 1				1		
		Total hours:							
Pre-requisite	Nil	Co-requisite	o-requisite Nil						
Programme		Bachelor of Computer Applications							
Semester	W	inter/ II semester of	f the s	econd	l year	r of tl	he pro	ogram	
Course	It is to develop	the social and soft si	kills a	nd to	prom	ote a	holis	tic develo	opment of
Objectives	the learners								
CO1	Connect and ad	apt cultural diversity	amon	g com	muni	ties.			
CO2	Enhance team f	or working toward a	shared	visio	n				
CO3	Demonstrate an	d apply interdisciplin	ary co	nnect	ions	and C	Cultiva	ite spirit o	of creative
	thought and cur	iosity to achieve goal	ls						
CO4	Learn to effecti	vely communicate, de	elegate	eresp	onsib	ilities	and 1	notivate t	team
	members.								
CO5	Develop strong	teamwork and collab	oratio	n skil	ls by	enga	ging i	n group a	ctivities.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Connect and adapt cultural diversity among communities.	4,5,6,7,8
2	Enhance team for working toward a shared vision	4,5,6,7,8
3	Demonstrate and apply interdisciplinary connections and Cultivate spirit of creative thought and curiosity to achieve goals	4,5,6,7,8
4	Learn to effectively communicate, delegate responsibilities and motivate team members.	5,6,7,8
5	Develop strong teamwork and collaboration skills by engaging in group activities.	5,6,7,8

		SEM	ESTE	R - I	[
Course Title		Computational S	System	s & 1	Digita	ıl Wo	orld		
Course code	22UCDL103R	Total credits:	L	T	P	S	R	O/F	С
		1	0	0	2	0	0	0	1
		Total hours:							
		30P							
Pre-requisite	Digital	Co-requisite						Nil	
	Proficiency								
Programme			UG aı						
Semester		Fall/ II seme							
Course	1. Students w	vill be able to ide	entify a	nd aı	nalyse	e con	npute	r hardwa	re, software and their
Objectives	uses.								
		ill be able to use							
				ernet	effici	iently	for 1	equired i	information as well as
		financial transacti							
CO1		Computer Hardy							ng
CO2		e to solve basic i				-			
CO3	Operate the soci	al media and e-co	ommerc	e site	es effi	icient	ly an	d ethicall	У
CO4	Analyze the me	erchants to facili	itate ea	asier	trans	actio	ns an	d accept	a variety of digital
	payment method								
CO5	Use of computir	g technically eth	ically,	safely	, seci	urely	and 1	egally fo	r day-to-day use.
Unit-No.	Cont	ent	Conta		Lea	rnin	g Out	tcome	KL
			Hour						
I	Fundamentals		6		Devel	•		an	1,2
	Systems and In				ınders		_	of	
	i. Compon				compu			nitecture	
	_	er and their						e in the	
	function							vare and	
	ii. Office	Automation		S	oftwa	are in	teract	tions.	
	_	IS-Word, MS-							
	Excel,	and MS-							
	PowerPo								
	iii. Data	management,							
	Statistic								
	Analysis Visualiz								
	MS-Exc								
		f Functions,							
		& Charts in							
	MS-Exc								
	MIS-EXC	C1.							

II	Internet & Cyber World	8	Equip learners with	2,3,4
	i. Introduction to		essential knowledge and	_,-,-,-
	Computer Networks,		skills to navigate the	
	Internet and World		digital landscape	
	Wide Web, Websites		effectively, understand	
	and Web portals.		web technologies,	
	ii. Creation and use of	,	utilize online	
	Email Accounts.		communication tools,	
	iii. Web browsing, Web		conduct efficient web	
	Searching, Different		searches, and	
	aspects of Web		comprehend legal and	
	Searching- Search		ethical aspects related	
	Keywords, conditions		to information	
	and combinations.		technology and	
	iv. Study of different		cybersecurity.	
	Search Engines like		cyconscenity.	
	Google, Microsoft			
	Bing, Yahoo, Yandex,			
	Duck Duck Go,			
	Ask.com etc.			
	v. Cyber Crimes, Cyber			
	Laws and IT Act 2000,			
	India.			
III	Introduction to social media	6	Explore the nuances of	3,4
111	and E-Commerce	· ·	social media etiquettes,	3,4
	i. Relevance of social		learning appropriate	
	media in present		online behaviour and	
	scenario. Posting		effective interaction	
	different types of		strategies across	
	contents in social		platforms like	
	media.		WhatsApp and	
	ii. Creating accounts and		Facebook.	
	using some popular		1 decoook.	
	social media portals			
	and Apps like			
	WhatsApp,			
	iii. Facebook, etc. Social			
	Media Etiquettes &			
	Crimes.			
	iv. Definition of E-			
	Commerce; E-			
	Commerce versus			
	traditional Commerce.			
	v. Case studies of			
	popular E-Commerce			
	portals like Amazon.			
	vi. E-commerce			
i				
	Etiquettes & Crimes.			

IV	Digital Payments and Digital Transactions i. Introduction to Digital Payment Systems. ii. Creating accounts and using Digital Payment Systems like Credit Cards, Debit Cards, Net banking, UPI.	6	Develop a foundational understanding of digital payment systems, exploring the functionalities of credit cards, debit cards, net banking, and UPI (Unified Payments Interface).	4,5
	iii. Digital payments Etiquettes & Crimes.		, and the second	
V	Basic Accounting and Utility Software iv. Introduction to Basic accounting concepts, Introduction to an Accounting Software like GnuCash or Tally. Page 10 of 10 v. Introduction to Technical Document writing using LaTex. vi. Introduction to Data Visualization software — Sigma, Google Charts, Tableau.	4	Gain a foundational understanding of basic accounting principles and practices, including concepts such as double-entry bookkeeping and financial reporting.	4,5

- 1. Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems & Applications. 3rd ed. New Delhi: BPB Publications.
- 2. Goel, A, 2010. Computer Fundamentals, Pearson India

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- 2. Bal Guruswamy, 2014. E. Fund of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-Hill Education.
- 3. Lawson, C. 2022. Introduction to social media, Oklahoma State University.

OTHER LEARNING RESOURCES:

- 1. https://www.w3schools.com
- 2. https://edu.gcfglobal.org
- 3. https://www.tutorialspoint.com
- 4. https://www.javatpoint.com

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the Computer Hardware, Software and	1,2,3
1	Computer handling	1,2,3
2	Apply MS-Office to solve basic information management	1,2,3
	issues	1,2,3
3	Operate the social media and e-commerce sites efficiently	1,2,3
3	and ethically	1,2,3
4	Analyze the merchants to facilitate easier transactions and	1,2,3,7
-	accept a variety of digital payment methods.	1,2,3,7
5	Use of computing technically ethically, safely, securely	1,2,3,7
	and legally for day-to-day use.	1,2,3,7

MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO121R	DATA STRUCTURE USING C	2	3	1					1
22BCAO122R	COMPUTER								
	ORGANIZATION		2	2		2	2	1	2
	AND		2	2		2	<u> </u>	1	2
	ARCHITECTURE								
22BCAO123R	MATHEMATICS-II	3	2	3	1				
22BCAO124R	INTRODUCTION TO	1	2	3	1	2		1	1
	WEB TECHNOLOGY	1	2	3	1			1	1
22UBES101R	ENVIRONMENTAL			1	3	2	1	1	2
	SCIENCE			1	3		1	1	2
22BCAO125R	TECHNO								
	PROFESSIONAL		2	2				2	2
	SKILLS I								
22UBPD123R	IMPLICATIVE		2	1	2	3	3	2	3
	ENGLISH			_		3	3		
22MOSY123R	MOOC I(HTML)	-	1	2	-	-	1	-	2
22UUHV101R	UNIVERSAL								
	HUMAN VALUE and				2	2	1	2	
	PROFESSIONAL				_		1	2	
	ETHICS								
22UBCC121	CO-CURRICULAR				2	1	3	2	2
22UBEC121	EXTRA-		1	2	2	2	3	2	2
	CURRICULAR		1				<i>J</i>		
22UCDL103R	COMPUTATIONAL								
	SYSTEMS AND	1	3	2				2	
	DIGITAL WORLD								

		SEMESTER -	III						
Course Title		Database Man	agemen	t Sy	stems				
Course code	22BCAO211R	Total credits: 5	L	T	P	S	R	O/F	C
		Total hours:	3	0	4	0	0	0	5
		45L+60P							
Pre-requisite	Nil Co-requisite Nil								
Programme		Bachelor of Com							
Semester		all/ I semester of the so							
Course		fundamental concepts	s and p	rinci	ples	of D	atabas	se Manag	gement
Objectives	Systems (DBMS)		•				•	,	
		nd use data manipulation	on langi	uage	to qu	ery, ı	ipdate	e, and ma	nage a
	database.			DDM	IC as			1	4
	To develop an security, integrity	understanding of ess	senuai	DBM	15 00	псері	s suc	en as: da	nabase
		aild a simple database	evetem s	and d	lemon	ctrate	comr	netence w	ith the
	~	s involved with modell	-				_		
		related to data storage	•	_	_	•		•	
	principles and tec	~	,-,	,			5		
CO1		concepts of database m	nanagem	ent s	ysten	1.			
CO2		fundamentals of creating					g data	definition	n, data
	manipulation and con	trol languages.							
CO3	Develop a database a	pplication and retrieve	the valu	es w	ith the	help	of qu	eries usin	g SQL.
CO4	Design, analyze and e	evaluate the project dev	eloped f	for a	n appl	icatio	n.		
CO5	Demonstrate the con	cepts of database secu	rity, dis	tribu	ted da	atabas	se syst	tems and	object-
	oriented databases								
Unit-No.	Con	tent	Contact	t	Lea	rning	g Outo	come	KL
			Hour				_		
I	_	architecture: Data	6		Inders			Database	1,2
		Independence, Data age (DDL), Data			ystem compr			itecture, Data	
	Definition Langua Manipulation Langua	-			_			s, Grasp	
	Data models:	Entity-relationship			ostia Oata			endence,	
		odel, relational and			xplor		arious		
	•	a models, integrity			Iodels		pply		
	constraints, dat				elatio			Model,	
	operations.	1			erforr	•		Data	
				N	1 anipı	ılatio	n Ope	rations	
II	Relational que	ery languages:	10	U	Inders	tand	R	elational	1,2
	_	Tuple and domain		A	lgebr	a,	Com	prehend	
		SQL3, DDL and			uple	an		Domain	
		Open source and			elatio		(Calculus,	
	Commercial DBN	- '			Itilize			SQL3,	
	ORACLE, DB2, SQ				iffere			Between	
		se design: Domain			pen		ource	and	
	_	ency, Armstrong's			lommo Indore			DBMS,	
	preservation, Lossle	Forms, Dependency			nders Oata	tana		ain and	
	-	and optimization:				e N	_	endency, Forms,	
	Query processing	and optimization:		Α	cinev	C INC	лшаі	roms,	

	Evaluation of relational algebra expressions, Query equivalence, Join		Ensure Dependency Preservation, Evaluate	
	strategies, Query optimization algorithms.		Relational Algebra Expressions, Understand	
			Query Equivalence, Implement Join Strategies, Optimize Queries	
III	Transaction processing: Concurrency control, ACID property, Serializability of scheduling, Locking and timestamp-based schedulers, multi-version and optimistic, Concurrency Control schemes, Database recovery.	8	Understand Transaction Processing, Comprehend Concurrency Control, Master the ACID Properties, Evaluate Serializability of Scheduling, Implement Locking-based Schedulers, Utilize Timestamp-based Schedulers, Explore Multi-version Concurrency Control, Understand Optimistic Concurrency Control Schemes, Implement Database Recovery Mechanisms, Apply Recovery Techniques	1,2
IV	Database Security: Authentication, Authorization and access control, DAC, MAC and RBAC models, Intrusion detection, SQL injection.	6	Understand Authentication, Comprehend Authorization and Access Control, Differentiate Between DAC, MAC, and RBAC Models, Implement Access Control Models, Understand Intrusion Detection, Recognize and Mitigate SQL Injection Attacks	1,2
V	Advanced topics: Object oriented and object relational databases, Logical databases, Web databases, Distributed databases, Data warehousing and data mining.	5	Understand Object- Oriented Databases, Utilize Object-Relational Databases, Comprehend Logical Databases, Understand Web Databases, Understand Distributed Databases, Comprehend Data Warehousing, Understand	1,2

			Data Mining	
	Practical Comp	onent		
Dreatical 1			Describe illustrate	1 2 2
Practical 1	Consider the bank database given, where the primary keys are underlined. Construct the following SQL queries for this relational database. a. Find the ID of each customer of the bank who has an account but not a loan. b. Find the ID of each customer who lives on the same street and in the same city as customer '12345'. c. Find the name of each branch that has at least one customer who has an account in the bank and who lives in "Harrison".	2	Describe, illustrate, explain, apply and develop DBMS Programming using commands.	1,2,3
Practical 2	Create the below tables with the given attributes and enter some records. a. Write a query to find the total number of marks obtained by each student. b. Write a query that gives the total marks obtained by Mohan. c. Write a query that displays the maximum marks of every subject. d. Write the SQL query which displays the name of those students who's total of all subjects is greater than 205. e. Display name of the students whose subjects total is greater than 205 and roll number is between 1 to 2. Pre-Experiment Questions 1. What is the use of sub-Queries? 2. Explain different types of Joins. Post Experiment Questions 1. How to alter Primary Key? 2. How to update a table by enforcing constraint?	2	Design and Create Database Tables, Write SQL Queries for Data Retrieval, Utilize SQL Functions, Implement Conditional Query Logic, Filter Data Based on Multiple Conditions, Understand and utilize subqueries, Alter table structures, Update data with constraints	2,3
Practical 3	Create the table as given below, fill in the data. Question: Which normal form in the table? After creating the table, create a second table (s) to convert the same into 2NF!	2	Understand Database Normalization, Design and Create Database Tables, Identify Normal Forms, Transform Tables to Achieve Higher Normal	2,3

			Forms, Implement	
			_	
			Referential Integrity,	
			Enhance Data Integrity	
			and Reduce Redundancy	
Practical 4	Write the SQL queries using Group	2	Understanding Table	1,2,3
	by and having clause using following		Creation and Data	
	table.		Insertion, Querying and	
	Create the above tables with the given		Summarizing Data, Using	
	attributes and enter some records.		Aggregate Functions,	
	I. Write a query to find the		Filtering Grouped Data	
	total number of marks obtained by each			
	student.			
	II. Write a query that gives the			
	total marks obtained by Mohan.			
	III. Write a query that displays			
	the maximum marks of every subject.			
	,			
	displays the name of those students			
	who's total of all subjects is greater than			
	205.			
	V. Display name of the			
	students whose subjects total is greater			
	than 205 and roll number is between 1			
	to 2.			
Practical 5	Create a table, fill it with customer	2	Table Creation and Data	3,4
	details and do the following queries:		Insertion, summarizing	
	a. Find the total revenue for each		customer revenue,	
	customer		Analyging ordering data,	
	b. List customers who have made		Filtering and Retrieving	
	more than one order			
	more than one order		Specific Orders,	
			•	
			Identifying High-Value	
	c. Find the date of the most recent order for each customer		•	
	c. Find the date of the most recent order for each customerd. Calculate the average order		Identifying High-Value	
	c. Find the date of the most recent order for each customerd. Calculate the average order amount for each customer		Identifying High-Value	
	 c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in 		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount for all orders		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount for all orders i. Find customers who have made		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount for all orders i. Find customers who have made orders on consecutive days		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount for all orders i. Find customers who have made orders on consecutive days j. Calculate the total revenue for		Identifying High-Value	
	c. Find the date of the most recent order for each customer d. Calculate the average order amount for each customer e. Retrieve the orders placed in January 2023 f. Find the top 3 customers with the highest total revenue g. Calculate the total revenue for each month in 2023 h. List orders with a total amount greater than the average total amount for all orders i. Find customers who have made orders on consecutive days		Identifying High-Value	

	orders			
Practical 6	Create the following tables: Books Table CREATE TABLE Books (Book ID INT PRIMARY KEY, Title VARCHAR (255), Author ID INT, Genre VARCHAR (100), ISBN (20), Publication Year INT);	2	Database Design and Table Creation, Data Manipulation and Retrieval, Querying Data with Conditions, Aggregate Functions and Grouping, Updating Data,	3,4
	Authors Table CREATE TABLE Authors (
	Members Table CREATE TABLE Members (
	Loans Table CREATE TABLE Loans (Loan ID INT PRIMARY KEY, Book ID INT, Member ID INT, Loan Date DATE, Return Date DATE, FOREIGN KEY (Book ID) REFERENCES Books (Book ID), FOREIGN KEY (Member ID) REFERENCES Members (Member ID));			
	Write the queries for the following: a. list all books with their authors b. find books by a specific author (e.g., author with ID 5) c. list all members who have borrowed at least one book d. get a list of all genres and the number of books in each genre e. update a loan return date for a			

	specific book and member			
Practical 7	(Exercise on updating records in table) Create Client master table with the following fields (Client NO, Name, Address, City, State, bal_due) (a) Insert five records (b) Find the names of clients whose bal_due>5000. (c) Change the bal_due of Client NO "C123" to Rs. 5100 (d) Change the name of Client master to Client12. (e) Display the bal_due heading as	4	Table Creation and Data Insertion, summarizing customer revenue, analysing ordering data, Filtering and Retrieving Specific Orders	3,4
Practical 8	"BALANCE" Rollback and Commit commands	4	Data Incomion	224
	Create Teacher table with the following fields (Name, Dept No, Date of joining, Dept Name, Location, Salary) (a) Insert five records (b) Give Increment of 25% salary for Mathematics Department. (c) Perform Rollback command (d) Give Increment of 15% salary for Commerce Department (e) Perform commit command		Data Insertion, summarizing customer revenue, analysing ordering data, Filtering and Retrieving Specific Orders, using roll back and commit command	2,3,4
Practical 9	(Exercise on order by and group by clauses) Create Sales table with the following fields (Sales No, Sales name, Branch, Sales amount, DOB) (a) Insert five records (b) Calculate total sales amount in each branch (c) Calculate average sales amount in each branch. (d) Display all the salesmen, DOB who are born in the month of December as day in character format i.e., 21-Dec-09 (e) Display the name and DOB of salesman in alphabetical order of the month.	2	Creation and Insertion of records, use of group by Clouse	2,3,4
Practical 10	Create an Emp table with the following fields: (Emp No, Emp Name, Job, Basic, DA, HRA, PF, Gross Pay, Net Pay)	4	Database Design and Table Creation, Data Manipulation and Retrieval, Querying Data	2,3,4

Practical 11	(Calculate DA as 30% of Basic and HRA as 40% of Basic) (a) Insert Five Records and calculate Gros Pay and Net Pay. (b) Display the employees who's Basic is lowest in each department. (c) If Net Pay is less than <rs. &="" (d)="" (e)="" 10,000="" 1200="" 20,000="" 2023="" 3="" a="" a)="" add="" all="" allowances.="" amount="" and="" as="" average="" b)="" between="" c)="" calculate="" consecutive="" create="" customer="" customers="" d)="" date="" days="" details="" display="" do="" e)="" each="" each<="" earn="" employees="" f)="" fill="" find="" following="" for="" g)="" greater="" gross="" h)="" have="" highest="" i)="" in="" it="" j)="" january="" lies="" list="" made="" maximum="" month="" more="" most="" of="" on="" one="" order="" orders="" pay="" placed="" queries:="" recent="" retrieve="" revenue="" rs.="" salary.="" special="" table,="" th="" than="" the="" top="" total="" who="" whose="" with=""><th>4</th><th>with Conditions, Aggregate Functions and Grouping, Updating Data, Table Creation and Data Insertion, summarizing customer revenue, Analyging ordering data, Filtering and Retrieving Specific Orders.</th><th>2,3,4</th></rs.>	4	with Conditions, Aggregate Functions and Grouping, Updating Data, Table Creation and Data Insertion, summarizing customer revenue, Analyging ordering data, Filtering and Retrieving Specific Orders.	2,3,4
	customer, including orders made by customers who haven't placed any orders.			
Practical 12	Employee Database An Enterprise wishes to maintain a database to automate its operations. Enterprise is divided into certain departments and each department consists of employees. The following two tables describes the automation schemas Dept (deptno, dname, loc) Emp (empno, ename, job, mgr, hiredate,	4	Database Design and Table Creation, Data Manipulation and Retrieval, Querying Data with Conditions, Aggregate Functions and Grouping, Updating Data,	2,3,4

	-1 1			
	sal, comm, deptno)			
	a) Update the employee salary by 15%,			
	whose experience is greater than 10			
	years.			
	b) Delete the employees, who			
	completed 30 years of service.			
	c) Display the manager who is having			
	maximum number of employees			
	working under him?			
	d) Create a view, which contain			
	employee names and their manager			
Practical 13	Using Employee Database perform the	4	Table Creation and Data	2,3,4
	following queries		Insertion, summarizing	
	a) Determine the names of employee,		customer revenue,	
	who earn more than their managers.		analysing ordering data,	
	b) Determine the names of employees,		Filtering and Retrieving	
	who take highest salary in their		Specific Orders.	
	departments.		•	
	c) Determine the employees, who are			
	located at the same place.			
	d) Determine the employees, whose			
	total salary is like the minimum salary			
	of any			
	department.			
	e) Determine the department which does			
	not contain any employees.			
Practical 14	11. Write the SQL queries using Group	4	Design and Create	2,3,4
Tractical 14	by and having clause using following	4	Database Tables, Write	,5 ,5
	table.		SQL Queries for Data	,5
	tuble.		Retrieval, Utilize SQL	
	Create the above tables with the given			
	attributes and enter some records.			
			group by clause Logic, Filter Data Based on	
	a) Write a query to find the total number			
	of marks obtained by each student.		Multiple Conditions,	
	b) Write a query that gives the total		Understand and utilize	
	marks obtained by Mohan.		subqueries, display data	
	c) Write a query that displays the			
	maximum marks of every subject.			
	d) Write the SQL query which displays			
	the name of those students who's total			
	of all subjects			
	is greater than 205.			
	e) Display name of the students whose			
	subjects total is greater than 205 and roll			
	number is			
	between 1 to 2.			
Practical 15				
Fractical 15	Create the following tables: Book (accession-no, title, publisher, year,	4	Table Creation and Data Insertion, summarizing	2,3,4

date-of-purchase, status)	customer revenue,	
Member (member-id, name, number-of-	Analyging ordering data,	
books-issued, max-limit) Book-issue	Filtering and Retrieving	
(accession-no,	Specific Orders	
member-id, date-of-issue)		
(a) Create a form to accept the data		
from the user with appropriate		
validation checks.		
(b) Generate queries to do the		
following:		
(i) List all those books which are due		
from the students to be returned. A book		
is		
considered to be due if it has been		
issued 15 days back and yet not		
returned.		
(ii) List all those members who cannot		
be issued any more books.		

1. Database System Concepts, 6th Edition by Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw-Hill.

REFERENCE BOOKS:

- 1. Principles of Database and Knowledge Base Systems, Vol 1 by J. D. Ullman, Computer Science Press.
- 2. Fundamentals of Database Systems, 5th Edition by R. Elmasri and S. Navathe, Pearson Education
- 3. Foundations of Databases, Reprint by Serge Abiteboul, Richard Hull, Victor Vianu, Addison-Wesley

OTHER LEARNING RESOURCES:

- 1. https://www.jbiet.edu.in/coursefiles/cse/HO/cse2/DBMSI-III.pdf
- 2. https://cs.ulb.ac.be/public/_media/teaching/infoh303/dbmsnotes.pdf

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the basic concepts of database management system.	2, 3, 7, 8					
2	Discover the basic fundamentals of creating a database by using data definition, data manipulation and control languages.	2, 3, 7, 8					
3	Develop a database application and retrieve the values with the help of queries using SQL.	2, 3, 7, 8					

4	Design, analyze and evaluate the project developed for an application.	2, 3, 7, 8
5	Demonstrate the concepts of database security, distributed database systems and object-oriented databases	2, 3, 7, 8

		SEN	MESTER –	·III						
Course Title	Object Oriented Programming using C++									
Course code	22BCAO214R	Total credi	ts: 5	L	T	P	S	R	O/F	C
		Total	hours:	3	0	4	0	0	0	5
		45L+60P								
Pre-requisite	Basic	Co-requisit	te	Nil			•			
	Programming									
Programme	Bachelor of Compu	ter Applicat	tions	•						
Semester	Fall/ I semester of the	he second ye	ear of the p	rogra	m					
Course	1. To allow progra	ammers to the	hink in ter	ms of	the	struc	ture o	of the	problem	
Objectives	rather than in ter	ms of the str	ructure of th	ne com	pute	r.				
	2. To teach how to	decompose	the problen	n into a	a set	of ob	jects.			
	3. To teach how O	bjects interac	ct with each	other	to so	olve t	he pro	blem.		
	4. To teach how to	create new t	ype of obje	cts to	mode	el ele	ments	from	the proble	m space
CO1	Demonstrate the fund	lamental prin	nciples of C	O pro	gram	nming	g, OO	analy	sis, design	Į.
	and development.									
CO2	Explain the princip	les of data	a abstracti	on, e	ncaps	sulati	on a	nd		
	inheritance in C++									
CO3	Describe the concep	ts of polym	orphism ar	nd vir	tual	funct	ions	on		
	computing problem.									
CO4	Design applications for	or a range of	problems u	ising f	ïle ar	nd ex	ceptio	n han	dling.	
CO5	Illustrate the process	of data file m	nanipulation	n using	g C+-	+				
Unit-No.	Content		Contact		Ι	_earn	ing (Outcor	ne	KL
			Hour							
I	Principles of	Objective	8	Und	lersta	nd t	the (OOP	Paradigm,	1,2
	Oriented Progr	ramming:		Und	lersta	nd	Toke	ens	in C++,	
	Object	Oriented		Con	npreh	end				
		Paradigm,		Identifiers, Understand Constants,						
	Basic Concepts of	Object-		Understand Data Types,						
	Oriented Progr	ramming,		Con	npreh	end	Type	Con	npatibility,	
	Benefits of Object-	-Oriented		Und	lersta	nd V	/ariab	les, U	Inderstand	
	Programming,	Object		_					mprehend	
		inguages,		_			versio		Inderstand	
	Applications of Object- Operator Overloading,									
	Oriented Programming, Comprehend Operator Precedence									
	Beginning with C++. Understand Control Structure									
	_			C++	-, Imp	oleme	ent Co	ontrol	Structures	
	Structures:	Tokens,								
	Keywords, Identifiers and									
	Constants, Data Types, Type									
	Compatibility, Varia	bles								96

	Operators in C++,			
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	*			
	Operator Overloading,			
	Operator Precedence, Control			
	Structures.,			
II	Functions in C++: The	8	Understand the Role of the Main	1,2
	Main Function, Function		Function, Understand Function	
	Prototyping, Call by		Prototyping, Understand Call by	
	Reference, Return by		Reference, Understand Return by	
	Reference, Inline Functions,		Reference, Understand Inline	
	Function Overloading,		Functions, Understand Function	
	Friend and Virtual Functions.		Overloading, Understand Friend	
	Specifying a class, Member		Functions, Understand Virtual	
	Functions, Arrays within a		Functions, Specify a Class and	
	class, Static Member		Member Functions, Understand	
	Functions, Arrays of Objects,		Arrays within a Class, Understand	
	Friendly Functions.		Static Member Functions,	
	Object and Classes: Making		Understand Arrays of Objects,	
	sense of core object concepts		Understand Core Object Concepts,	
	(Encapsulation, Abstraction,		Implement Classes in C++,	
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	Messages Association,		Physical Objects, Understand C++	
	Interfaces),		Objects as Data Types, Understand	
	Implementation of class in		Objects as Function Arguments,	
	C++, C++ Objects as physical		Understand Returning Objects from	
	object, C++ object as data		Functions, Understand the	
	types constructor. Object as		Relationship between Structures	
			and Classes, Understand Classes,	
	function arguments. Returning			
	object from function.		Objects, and Memory Management,	
	Structures and classes. Classes		Understand Const and Classes	
	objects and memory static			
	class data. Const and classes			
III	Constructors &	8	Understand Constructors,	1,2
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	Overloading:		Constructors, Understand Copy	
	Constructors,		Constructors, Understand Dynamic	
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	Constructors, Copy		Destructors, Understand Operator	
	Constructors, Dynamic		Overloading, Understand Type	
	Constructors, Destructors,		Conversions, Understand the	
	Defining Operator		Concept of Inheritance, Understand	
	Overloading, Overloading		Derived and Base Classes,	
	Operators, Rules for		Understand Derived Class	
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	Conversions.		Functions in Inheritance,	
	Inheritance: Concept of		Understand Inheritance in the	
	inheritance. Derived class and		English Distance Class, Understand	
	based class. Derived class		Class Hierarchies, Understand	
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	constructors, member		Inheritance and Graphics Shapes,	
	function, inheritance in the		Understand Public and Private	
	English distance class, class		Inheritance, Understand	
	hierarchies, inheritance and		Aggregation, Understand	
	graphics shapes, public and		Inheritance and Program	
	private inheritance,		Development	
	aggregation: Classes within		20 Toropinono	
	classes, inheritance and			
	program development.			
IV	Pointer: Addresses and	8	Understand Addresses and Pointers,	1,2
1,1	pointers. The address of	U	Use the Address of Operator,	1,2
	operator and pointer and		Manipulate Pointers, Understand	
	arrays. Pointer and Faction		Pointer and Arrays Relationship,	
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	pointer and C-types string.		Manipulate Arrays Using Pointers, Use Pointers in Functions,	
	Memory management:		´	
	New and Delete, pointers to		Understand Array and String	
	objects, Name of the Course		Fundamentals, Implement Arrays	
	Object Oriented		as Class Member Data, Manipulate	
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	and string arrays			
	fundamentals. Arrays as class			
	Member Data, Arrays of			
	object, string, The standard			
	C++ String class			
V	Exception handling: Try,	7	Understand Exception Handling	1,2
V	Exception handling: Try, throw, and catch, exceptions	7	Mechanisms, Implement Exception	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function	7	Mechanisms, Implement Exception Handling, Handle Derived	1,2
V	Exception handling: Try, throw, and catch, exceptions	7	Mechanisms, Implement Exception	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function	7	Mechanisms, Implement Exception Handling, Handle Derived	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration,	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions,	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release.	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Streams and Files: Streams	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand Stream Classes, Perform Disk File	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Streams and Files: Streams classes, Stream Errors, Disk	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand Stream Classes, Perform Disk File I/O, Handle File I/O Errors, Use	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand Stream Classes, Perform Disk File I/O, Handle File I/O Errors, Use Memory Streams, Process	1,2
V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand Stream Classes, Perform Disk File I/O, Handle File I/O Errors, Use Memory Streams, Process Command Line Arguments, Implement Function Templates,	1,2
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V	Exception handling: Try, throw, and catch, exceptions and derived classes, function exception declaration, unexpected exceptions, exception when handling exceptions, resource capture and release. Streams and Files: Streams classes, Stream Errors, Disk File I/O with streams, file pointers, error handling in file I/O with member function, overloading the extraction and insertion operators, memory as a stream object, command line	7	Mechanisms, Implement Exception Handling, Handle Derived Exceptions, Declare Function Exceptions, Manage Unexpected Exceptions, Handle Exceptions within Exception Handling, Ensure Resource Management, Understand Stream Classes, Perform Disk File I/O, Handle File I/O Errors, Use Memory Streams, Process Command Line Arguments, Implement Function Templates, Implement Class Templates,	1,2
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	Program to find Area and Circumference of Circle.	4	develop algorithm design skills,	1,2,3,4
1	Circumference of Circle.			
			develop programming skills,	
70 11 10			Understand data types and variables	
Practical 2	Program to convert	2	Understand temperature	1,2
	temperature from degree		conversion, develop algorithm	
	Centigrade to Fahrenheit.		design skills, develop programming	
			skills, Understand data types and	
			variables	
Practical 3	Program to calculate Sum of 5	2	Understand basic arithmetic	1,2
	subjects and find Percentage.		operations, develop algorithm	
			design skills, develop programming	
			skills, Understand data types and	
			variables	
Practical 4	Program to show swap of two	2	Understand how to use variables to	1,2
	numbers by using third	_	store and manipulate data, develop	-,
	variable.		algorithm design skills, develop	
			programming skills, Understand	
			data types and variables	
Practical 5	Program to show swap of two	2	Understand and apply logical	1,2
Fractical 5		4		1,2
	numbers by without using			
	third variable.		design skills, develop programming	
			skills, Understand data types and	
	_		variables	
Practical 6	Program to reverse a given	2	Understand iteration and string	2,3
	number.		manipulation, develop algorithm	
			design skills, develop programming	
1				
			skills, Understand data types and	
			skills, Understand data types and variables	
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Practical 7	Program to find greatest among 3 Numbers.	2	variables	2,3
Practical 7	S	2	variables Understand the concepts of	2,3
Practical 7	S	2	variables Understand the concepts of conditional statements, develop	2,3
Practical 7	S	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop	2,3
Practical 7 Practical 8	S	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand	2,3
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	among 3 Numbers. Program to show use of		variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables	
	among 3 Numbers. Program to show use of		variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills,	
Practical 8	among 3 Numbers. Program to show use of conditional operator.	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables	2,3
	among 3 Numbers. Program to show use of conditional operator. Program to show leap year or		variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for	
Practical 8	among 3 Numbers. Program to show use of conditional operator.	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop	2,3
Practical 8	among 3 Numbers. Program to show use of conditional operator. Program to show leap year or	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop	2,3
Practical 8	among 3 Numbers. Program to show use of conditional operator. Program to show leap year or	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand	2,3
Practical 8 Practical 9	Program to show use of conditional operator. Program to show leap year or not.	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand data types and variables	2,3
Practical 8	Program to show use of conditional operator. Program to show leap year or not. Program to find whether the	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand data types and variables Learn to use the modulo operator	2,3
Practical 8 Practical 9	Program to show use of conditional operator. Program to show leap year or not.	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand data types and variables Learn to use the modulo operator '%', Develop algorithm design	2,3
Practical 8 Practical 9	Program to show use of conditional operator. Program to show leap year or not. Program to find whether the	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand data types and variables Learn to use the modulo operator '%', Develop algorithm design skills, develop programming skills, develop programming skills, develop programming skills,	2,3
Practical 8 Practical 9	Program to show use of conditional operator. Program to show leap year or not. Program to find whether the	2	variables Understand the concepts of conditional statements, develop algorithm design skills, develop programming skills, Understand data types and variables Understand conditional operators, develop algorithm design skills, develop programming skills, Understand data types and variables Understand the criteria for determining a leap year, develop algorithm design skills, develop programming skills, Understand data types and variables Learn to use the modulo operator '%', Develop algorithm design	2,3

	statement.		switch statement, develop	
			algorithm design skills, develop	
			programming skills, Understand	
			data types and variables	
Practical 12	Program to display arithmetic	2	Develop algorithm design skills,	3,4
	operation using switch		develop programming skills,	,
	statement.		Understand data types and variables	
Practical 13				2.4
Practical 13	Program to display first 10	2	Develop algorithm design skills,	3,4
	natural number and their sum.		develop programming skills,	
			Understand data types and variables	
Practical 14	Program to print star pattern	2	Develop algorithm design skills,	3,4
	of the following:		develop programming skills,	,
	*		Understand data types and variables	
	* *		Chacistana data types and variables	
	* * *			
	* * * *			
	* * * * *			
Practical 15	Program to print star pattern	2	Develop algorithm design skills,	1,2,3
	for the following:		develop programming skills,	<i>))</i> -
	*		Understand data types and variables	
	* *		Officerstand data types and variables	
	* * *			
	* * * *			
	* * * * *			
Practical 16	Program to print star pattern	2	Develop algorithm design skills,	1,2,3
	for the following:		develop programming skills,	
			Understand data types and variables	
	*		The character and the control of the characters	
	* *			
	* * *			
	* * *			
	* * * *			
	* * * * *			
Practical 17		2	Develop algorithm design skills,	1,2,3
Practical 17	* * * * * Program to find Fibonacci	2		1,2,3
Practical 17	* * * * *	2	develop programming skills,	1,2,3
	* * * * * Program to find Fibonacci series up to a range.		develop programming skills, Understand data types and variables	
Practical 17 Practical 18	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a	2	develop programming skills, Understand data types and variables Develop algorithm design skills,	1,2,3
	* * * * * Program to find Fibonacci series up to a range.		develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills,	
Practical 18	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number.	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables	1,2,3
	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a		develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills,	
Practical 18	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number.	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables	1,2,3
Practical 18	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills,	1,2,3
Practical 18 Practical 19	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits.	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables	1,2,3
Practical 18	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables	1,2,3
Practical 18 Practical 19	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits.	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop algorithm design skills, develop programming skills,	1,2,3
Practical 18 Practical 19 Practical 20	Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given number is Armstrong or not.	2 2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop programming skills, develop programming skills, Understand data types and variables	1,2,3
Practical 18 Practical 19	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given	2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop algorithm design skills, develop programming skills,	1,2,3
Practical 18 Practical 19 Practical 20	Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given number is Armstrong or not.	2 2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop programming skills, develop programming skills, Understand data types and variables	1,2,3
Practical 18 Practical 19 Practical 20	* * * * * Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given number is Armstrong or not. Program to check whether the given number is palindrome	2 2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop algorithm design skills, develop programming skills, develop programming skills,	1,2,3
Practical 18 Practical 19 Practical 20	Program to find Fibonacci series up to a range. Program to find factorial of a number. Program to count Number of digits. Program to check a given number is Armstrong or not. Program to check whether the	2 2	develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, Understand data types and variables Develop algorithm design skills, develop programming skills, develop programming skills, Understand data types and variables Develop algorithm design skills, Understand data types and variables Develop algorithm design skills,	1,2,3

	given number is prime or not.		develop programming skills,	
	given number is prime or non		Understand data types and variables	
Practical 23	Program to display	2	Develop algorithm design skills,	2,3,4
	1+1/2+1/3++1/n.		develop programming skills,	
			Understand data types and variables	
Practical 24	Program to display 1+3+5+	2	Develop algorithm design skills,	2,3,4
	.+n.		develop programming skills,	
			Understand data types and variables	
Practical 25	Program to show sum of 10	2	Develop algorithm design skills,	2,3,4
	elements of array and show		develop programming skills,	, ,
	the average.		Understand data types and variables	
Practical 26	Program to find the maximum	2	Develop algorithm design skills,	2,3,4
	and minimum number in an		develop programming skills,	
	array.		Understand data types and variables	
Practical 27	Program to display matrix.	2	Develop algorithm design skills,	2,3,4
			develop programming skills,	
			Understand data types and variables	
Practical 28	Program to demonstrate	2	Develop algorithm design skills,	2,3,4
	constructor.		develop programming skills,	
			Understand data types and variables	
Practical 29	Program to demonstrate	2	Develop algorithm design skills,	2,3,4
	constructor.		develop programming skills,	
			Understand data types and variables	
Practical 30	Program to demonstrate copy	2	Develop algorithm design skills,	2,3,4
	constructor.		develop programming skills,	
			Understand data types and variables	

1. Robert Lafore, Object Oriented Programming in C++, Techmedia Publication.

REFERENCE BOOKS:

- 1. Herbert shield, The complete reference C, Tata McGraw Hill Publication.
- 2. Saurav Sahay, Object Oriented Programming in C++, Oxford University Press.
- 3. R Rajaram, Object Oriented Programming in C++, New Age International Publishers

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate the fundamental principles of OO programming, OO analysis, design and development.	2, 3, 4, 5, 6, 8				
2	Explain the principles of data abstraction, encapsulation and inheritance in C++	2, 3, 4, 5, 6, 7, 8				
3	Describe the concepts of polymorphism and virtual functions on computing problem.	2, 3, 4, 6, 8				
4	Design applications for a range of problems using file and exception handling.	2, 3, 4, 5, 6, 8				
5	Illustrate the process of data file manipulation using C++	2, 3, 4, 5, 6, 8				

		SEMES	STER	– III					
Course Title		In	trodi	ıction	to I	Linux			
Course code	22BCAO213	Total credits: 4	L	T	P	S	R	O/F	С
	R	Total hours:	3	0	2	0	0	0	4
		45L+30P							
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor							
Semester		Fall/ I semester					1 0		
Course	_	rinciples of operating	•			•		•	•
Objectives	_	ions, Process utilitie	s, D18	sk util	ities.	, Netwo	rking C	ommands	, Basic Linux
		Scripts and filters.	11	D			-11 /11	.\ _111	
		rize fundamentals of				-		_	-
		t and output redired functions, debugging				ructures	s, arium	ieuc iii s	nen mærrupt
	-	fundamentals of file		_		suppor	t for file	- File str	ucture related
	_	s (file API's).		Pto K		Баррог	. 101 1110	, 1110 511	acture related
	1	e students in unders	tandir	ng Pro	ocess	ses. Inte	r proces	ss commu	nication, and
	Shared Men			0		,	1		,
CO1		e basic knowledge of	Linux	com	mano	ds in lin	ux shell	environm	ent
CO2	Apply Linux co	mmands to write She	ll Pro	gramı	ning	for ope	rating th	e files and	l folders
CO3		ocedure for creating							
	between them								
CO4		Programming to r	nake	effici	ent 1	use of	various	resources	available on
		nes in a network.							
CO5	Design various	client server applicati	on us	ing To	CP a	nd UDP	protoco	ols	
Unit-No.		Content		Cont Hou		Lear	ning O	ıtcome	KL
I	Introduction	To Linux and Lin	nux	8		Descri	· ·	llustrate,	1,2
	Utilities:						_	Linux,	
	1	of LINUX, architect					histo	•	
		features of LINU				Linux		nitecture,	
		to vi editor. Li				feature		Linux.	
		ATH, man, echo, pri				Comm	and patl	1.	
		uname, who, date, s r, rmdir, ls, cp, mv,	-						
	-	t, findir, is, cp, inv, t, lp, od, tar, gzip,							
		ties, security by							
	_	process utilities, o							
	_	tworking commar							
	•	, mount, umount, fi							
		t, ps, w, finger, arp,							
		Text Processing utili	_						
	_	tilities, tail, head, s							
	nl, uniq, grep,	egrep, fgrep, cut, pa	ste,						
	join, tee, pg, co	omm, cmp, diff, tr, a	wk,						
	cpio								

П	Introduction to Shells:	8	Describe, illustrate,	1,2
	Linux Session, Standard Streams,	_	and explain Shell	7
	Redirection, Pipes, Tee Command,		Programming using	
	Command Execution, Command-Line		Linux commands and	
	Editing, Quotes, Command		manipulate system	
	Substitution, Job Control, Aliases,		operations.	
	Variables, Predefined Variables,			
	Options, Shell/Environment			
	Customization. Filters: Filters and			
	Pipes, concatenating files, Display			
	Beginning and End of files, Cut and			
	Paste, Sorting, Translating Characters,			
	Files with Duplicate Lines, Count			
	Characters, Words or Lines,			
	Comparing Files, Grep: Operation,			
	grep Family, Searching for File			
	Content. Sed: Scripts, Operation,			
	Addresses, commands, Applications,			
	grep and sed.			
III	Unix/Linux File Structure:	8	Describe, illustrate,	1,2,3
	Introduction to UNIX file system,		and explain UNIX file	
	inode (Index Node), file descriptors,		system, device drivers	
	system calls and device drivers.		and Design and write	
	File Management:		application.	
	File Structures, System Calls for File			
	Management – create, open, close,			
	read, write, lseek, link, symlink,			
	unlink, stat, fstat, lstat, chmod, chown,			
	Directory API – opendir, readdir,			
	closedir, mkdir, rmdir, umask.		- II III	1.0.0.1
IV	Process And Signals:	8	Describe, illustrate,	1,2,3,4
	Process, process identifiers, process		and explain process	
	structure: process table, viewing		identifier and signals	
	processes, system processes, process		and develop IPC-	
	scheduling, starting new processes:		API's.	
	waiting for a process, zombie			
	processes, orphan process, fork, vfork,			
	exit, wait, waitpid, exec, signals			
	functions, unreliable			
	signals, interrupted system calls, kill,			
	raise, alarm, pause, abort, system,			
	sleep functions, signal sets. File			
	locking: creating lock files, locking			
	regions, use of read and write with			
	locking, competing locks, other lock commands, deadlocks.			
V	Inter Process Communication:	7	Describe, illustrate,	1,2,3,4
•	Pipe, process pipes, the pipe call,	,	and explain and apply	1,4,5,4
	Tipe, process pipes, the pipe call,		and explain and apply	

	nament and shild measures and named	1	inton process	
	parent and child processes, and named		inter process	
	pipes: fifos, semaphores: semget,		communication.	
	semop, semctl, message queues:			
	msgget, msgsnd, msgrcv, msgctl,			
	shared memory: shmget, shmat, shmdt,			
	shmetl, ipc status commands.			
	Introduction To Sockets:			
	Socket, socket connections - socket			
	attributes, socket addresses, socket,			
	connect, bind, listen, accept, socket			
	communications.			
	Practical Con	nponent		
Practical 1	T	2	Describe, Shell	2.2
Practical 1	Write a shell script that accept a file	<u> </u>	,	2,3
	name starting and ending line numbers		Programming using	
	as arguments and display all the lines		Linux commands.	
	between given line no:	_	711	
Practical 2	Write a shell script that delete all lines	2	Illustrate, explain,	2,3
	containing a specified word		Shell Programming	
			using Linux	
			commands	
Practical 3	Write a shell script that displays a list	2	Describe, illustrate,	2,3
	of all the files in the current directory		explain, apply and	
			develop Shell	
			Programming using	
			Linux commands in	
			current directory.	
Practical 4	Write a shell script that receives any	2	Compare and analyse	2,3
	number of file names as arguments		different methods for	,
	checks if every argument supplied is a		checking file types in	
	file or a directory and reports		shell scripting.	
	accordingly, whenever the argument is		shen sempung.	
	a file or directory.			
Practical 5	Write a shell script that accept a list of	2	Evaluate the script's	2,3,4
1 1 actical 5	file names as arguments count and	<u> </u>	performance and	2,3,4
			*	
	report the occurrence of each word.		reliability in different	
Dag -42 - 1 6	White a could could to find the	2	scenarios.	0.2.4
Practical 6	Write a awk script to find the number	2	Evaluate the accuracy	2,3,4
	of characters, words and lines in a file?		and efficiency of the	
	linked list respectively.		AWK script in various	
			scenarios.	
D	Write of C Program that well-se	2	Design a marine of	2.2.4
Practical 7	Write a C Program that makes a copy	2	Design a script that	2,3,4
	of a file using standard I/O and system		generates a detailed	
	calls? using Cat command		report of file and	
			directory statuses,	
			including permissions	
			and sizes.	
Practical 8	Implement in C the following Unix	2	Design a C program	2,3,4
	l		1	

	commands using system calls "mv"		that mimics other Unix	
			commands, such as cp	
			or rm, using similar	
			system calls and	
			techniques.	
Practical 9	Implement in C the following Unix	2	Explain the purpose	2,3,4
	commands using system calls "ls"	_	and functionality of the	7- 7
	general control of		ls command and its	
			variations (ls -l).	
Practical 10	Write a C program to emulate the Unix	2	Create more advanced	2,3,4
Tractical 10	ls-1 command?	_	programs that	2,3,4
	is-i command:		incorporate additional	
			features of the ls	
			command, such as	
	, , , , , , , , , , , , , , , , , , ,		sorting or filtering.	
Practical 11	Write a C program to list for every file	2	Demonstrate the	2,3,4
	in a directory, its inode number and		ability to use system	
	filename.?		calls to read directory	
			contents and retrieve	
			file information.	
Practical 12	Write a C program to create a child	2	Assess the	2,3,4
	process and allow the parent to display		synchronization and	
	"parent" and the child to display		communication	
	"child" on the screen		between parent and	
			child processes in a C	
			program.	
Practical 13	Write a C program to create a Zombie	2	Create a more	2,3,4
	process.?		advanced script that	
			includes additional	
			functionalities such as	
			recursive directory	
			checks	
Practical 14	Write a C program that illustrates how	2	Evaluate the program's	4,5
	an orphan is created.		correctness in creating	
			orphan processes and	
			handling command	
			execution with pipes.	
Practical 15	Write a program that illustrates how to	2	esign a system that	4,5
	execute two commands concurrently		uses process control	
	with a command pipe.		and pipes to perform	
			more sophisticated	
			tasks, such as a custom	
			shell or command	
			interpreter.	
			morprotor.	

1. W. Richard. Stevens, Advanced Programming in the UNIX Environment, Pearson Education, New Delhi, India.

2. UNIX and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson

REFERENCE BOOKS:

- 1. Linux System Programming, Robert Love, O'Reilly, SPD.
- 2. Advanced Programming in the UNIX environment, 2nd Edition, W.R. Stevens, Pearson Education.
- 3. UNIX Network Programming, W.R. Stevens, PHI.
- 4. UNIX for Programmers and Users, 3rd Edition, Graham Glass, King Ables, Pearson Education.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate the basic knowledge of Linux commands in linux shell environment	1,2,3,4,5				
2	Apply Linux commands to write Shell Programming for operating the files and folders	1,2,3,4,5				
3	Analyze the procedure for creating parent, child, zombie, orphan process and relationship between them	1,2,3,4,5				
4	Create Network Programming to make efficient use of various resources available on different machines in a network.	1,2,3,4,5				
5	Design various client server application using TCP and UDP protocols	1,2,3				

	SEMESTER – III								
Course Title		Operati	ing Syste	ms					
Course code	22BCAO212R	Total credits: 3	L	T P	S	R	O/F	C	
		Total hours: 45L	3	0 0	0	0	0	3	
Pre-requisite	Nil	Co-requisite			N	lil			
Programme		Bachelor of Cor	nputer A	pplicatio	ns				
Semester		all/ I semester of the s							
Course		mechanisms of OS		•					
Objectives	communication and the mechanisms involved in memory management in								
		contemporary OS.							
	_	ledge on Mutual excl	usion alg	orithms,	deadlo	ck dete	ction algo	orithms	
	and agreemen	*							
		components and manag	-	_			nanageme	nt.	
CO1		cepts of Operating Sys							
CO2		ots of processes and th	_	cess sch	eduling	ginclud	ling Throu	ıghput,	
		iting Time, Response				1 .			
CO3	1 -	for optimally allocating	ng memo	ry to pro	cesses	by inc	reasing m	nemory	
CO4	utilization and improv		1	11					
CO4		ement the concepts of				ncepts			
COS	implement various tec	chniques of memory an	Contact		ι.				
Unit-No.	Content		Hour	L	earnin	g Outc	ome	KL	
I	Introduction:		7	Under	stand	the Co	ncept of	1,2	
	Concept of Op	perating Systems,		Opera	ting S	Systems	s, Trace		
	Generations of C	Operating systems,		the	Gen	eration	s of		
	Types of Operation	ng Systems, OS		Opera	ting S	ystems,	Identify		
	Services, System Ca	alls, Structure of an		Types	O	f C	Operating		
	OS-Layered, Mono	lithic, Microkernel		Syster	ns, C	ompreh	end OS		
	Operating Systems,	Concept of Virtual		Servic	es, I	Jtilize	System		
	Machine.			Calls,	Un	derstan	d OS		
				Struct			eptualize		
						I achine			
II	Processes:		8				inition of	2,3	
	Definition, Proce	* '			ocess,		nprehend		
	Different states of	·		Proces			ionships,		
	State transitions, Pro				•		tates of a		
	(PCB), Context swit	ching.			,		d Process		
	Thread:	D C' C					Explore		
	Definition, Various	·					ol Block		
	threads, Types of t	nreads, Concept of					Context		
	multithreads,				_		Threads,		
	Process Scheduling			Threa	•	rious S Indersta	States of and the		
	Foundation and School Types of School			Benef			Threads,		
	criteria: CPU utiliz			Conce			rineaus,		
	Turnaround Time,	<u> </u>			_		nderstand		
	i urnaround i ime,	waiting Time,		winin	meaul	ng, UI	iucistand		

	D m 01 11 1 11		4 5 12	
	Response Time; Scheduling algorithms: Pre-emptive and Non-pre-emptive,		the Foundation and Objectives of Process	
	FCFS, SJF, RR; Multiprocessor		Scheduling, Identify Types	
	scheduling.		of Schedulers, Understand	
	scheduning.		· · · · · · · · · · · · · · · · · · ·	
			Scheduling Criteria, Explore	
			Scheduling Algorithms,	
			Comprehend Multiprocessor	
			Scheduling	
III	Inter-process Communication:	8	Understand the Concept of	2,3
	Critical Section, Race Conditions,		Inter-Process	
	Mutual Exclusion, Hardware Solution		Communication,	
	Deadlocks:		Comprehend the Critical	
	Definition, Necessary and sufficient		Section Problem, Identify	
	conditions for Deadlock, Deadlock		Race Conditions,	
	Prevention, Deadlock Avoidance:		Understand Mutual	
	Banker's algorithm, Deadlock detection		Exclusion, Explore	
	and Recovery		Hardware Solutions for	
	,		Mutual Exclusion,	
			Understand the Definition of	
			Deadlock, Identify	
			Necessary and Sufficient	
			Conditions for Deadlock,	
			Understand Deadlock	
			Prevention, Explore	
			Deadlock Avoidance,	
			Comprehend Deadlock	
		_	Detection and Recovery	
IV	Memory Management:	8	Understand the Basic	2,3
	Basic concept, Logical and Physical		Concept of Memory	
	address map, Memory allocation:		Management, Comprehend	
	Contiguous Memory allocation – Fixed		Logical and Physical	
	and variable partition-Internal and		Address Mapping, Explore	
	External fragmentation and Compaction;		Memory Allocation	
	Paging.		Techniques, Identify	
	Virtual Memory: Basics of Virtual		Internal and External	
	Memory – Hardware and control, 1		Fragmentation, Understand	
	structures - Locality of reference, Page		Compaction, Explore	
	fault, Working Set, Dirty page/Dirty bit		Paging, Understand the	
	 Demand paging, Page Replacement 		Basics of Virtual Memory,	
	algorithms: Optimal, First in First Out		Comprehend Hardware and	
	(FIFO), Second Chance (SC), Not		Control Structures for	
	recently used (NRU) and Least Recently		Virtual Memory, Explore	
	used (LRU).		the Concept of Locality of	
			Reference, Understand Page	
			Faults, Comprehend the	
			Working Set Model,	
			Understand Dirty Pages and	
			Dirty Bits, Explore Demand	

			Paging, Understand Page	
			Replacement Algorithms,	
V	I/O Hardware:	6	Understand the Different	2,3
	I/O devices, Device controllers, Direct		Types of I/O Devices,	
	memory access Principles of I/O		Comprehend Device	
	Software: Goals of Interrupt handlers,		Controllers, Understand	
	Device drivers, Device independent I/O		Direct Memory Access	
	software, Secondary-Storage Structure.		(DMA), Comprehend the	
	File Management:		Goals of Interrupt Handlers,	
	Concept of File, Access methods, File		Understand Device Drivers,	
	types, File operation, Directory		Explore Device-Independent	
	structure, File System structure,		I/O Software, Understand	
	Allocation methods (contiguous, linked,		Secondary-Storage	
	indexed), Free-space management.		Structure, Understand the	
	Disk Management:		Concept of a File, Explore	
	Disk structure, Disk scheduling, Disk		File Access Methods,	
	reliability, Disk formatting, Boot-block,		Comprehend File	
	Bad blocks.		Operations, Understand	
			Directory Structure, Explore	
			File System Structure,	
			Understand File Allocation	
			Methods, Comprehend Free-	
			Space Management,	
			Understand Disk Structure,	
			Explore Disk Scheduling,	
			Comprehend Disk	
			Reliability, Understand Disk	
			Formatting, Explore the	
			Boot Block and Bad Blocks,	

- 1. Operating System Concepts Essentials, 9th Edition by Avi Silberschatz, Peter Galvin, Greg Gagne, Wiley Asia Student Edition.
- 2. Operating Systems: Internals and Design Principles, 5th Edition, William Stallings, Prentice Hall of India.

REFERENCE BOOKS:

- 1. Operating System: A Design-oriented Approach, 1st Edition by Charles Crowley, Irwin Publishing.
- 2. Operating Systems: A Modern Perspective, 2nd Edition by Gary J. Nutt, Addison-Wesley
- 3. Design of the Unix Operating Systems, 8th Edition by Maurice Bach, Prentice-Hall of India
- 4. Understanding the Linux Kernel, 3rd Edition, Daniel P. Bovet, Marco Cesati, O'Reilly and Associates.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Explain the basic concepts of Operating Systems and related concepts.	2, 3, 5,6,8
2	Summarize the concepts of processes and threads, process scheduling including Throughput, Turnaround Time, Waiting Time, Response Time.	1, 2, 3, 5, 6, 8
3	Identify the concept for optimally allocating memory to processes by increasing memory utilization and improving the access time.	2, 3, 5, 6, 8
4	Demonstrate and implement the concepts of deadlocks and related concepts	1,2
5	Implement various techniques of memory and file management.	1,2

		SEMESTER – I	II						
Course Title	ENGL	ISH LANGUAGE FOR	REX	CEL	LEN	CE (Comn	nunicativ	e
		English	& S0	oft Sk	ills)				
Course code	22UBPD212R	Total credits: 2	L	T	P	S	R	O/F	С
		Total hours:	0	0	4	0	0	0	2
		60P							
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of Computer Applications							
Semester		Fall/ I semester of the second year of the program							
Course		lents to learn, understan		nd pr	actice	e diff	erent	ways of	
Objectives	presentation and use of correct grammar.								
	~	writing skills in differen				-			er writing.
	•	ctivity and performance	at w	ork, v	hich	assist	ts in th	ne	
		professional goals.							
901		required attributes in a c							
CO1	•	tening skills and enhance							
CO2		tive and negative nonver							
CO3		presentation skills by	•	eticing	g del	livery	, refi	ning cor	nmunication
		suring clarity of express							
CO4	_	abilities and develop t				_			expressions
	-	al errors, and enhance th					•		
CO5		or discussions in differen	nt pla	atforn	is by	enha	ncing	their thou	aght process
	and problem-solvi	ng skills.			. 1				1
Unit-No.	C	Content		ontac •	t I	Learn	ing O	utcome	KL
I	Grammar:		1	Hour 10	D	escrit		illustrate,	1,2
1	I. Use of Pre	anositions		10	an		je,	explain	-
	II. Tag questi	-					tions	types of	
	0 1	complex, compound				ntenc		types of	
	sentences	-				пспс	Co		
II	Grammar:			15	D	escrib	e.	illustrate,	1,2
		d Passive Voice					xplain		
	II. Direct and	I Indirect Speech				ypes	of	voice,	
		•			-	eech			
III	Writing Skills:			15	D	escrib	e,	illustrate,	1,2,3
	The Basics of Wri	ting; avoid			an	ıd e	explair	n about	
	ambiguity and vag	gueness			Pa	aragra	ıph	writing,	
	I. Paragraph	Writing			let	tter		writing,	
	II. Letter Wr	iting			Cı	reatio	n of	resume,	
	III. Resume, CV	and Cover Letter			co	ver le	etter.		
IV	Self- Managemen	nt Skills		10		escrib		illustrate,	1,2,3,4
	SWOT Analysis					_		and apply	
	Self- Regulation						anagei	ment	
	Personal Hygiene					ills			
V		nmunication- Sciences		10		escrib		illustrate,	1,2,3,4
	of Body Languag					_		and apply	
	i. What is Non- V					on-ve			
	Communication	& Body Language,			co	mmu	nicati	on.	<u> </u>

ii. Elements of Communication,
iii. Types of Body Language,
iv. Importance and Impact of Body
Language,
v. Types of Communication through
Body Language,
vi. Body Language Do's and Don'ts,
Doubt Clearing Session.

- 1. What Employers Want: The Work skills Handbook- Karen Holmes, 2011
- 2. English Grammar in Use, Raymond Murphy 4th edition, CUP

REFERENCE BOOKS:

1. Professional Communication, 2015, by Dr. Prachi Dr. S. K. Singh

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop better listening skills and enhance writing abilities.	5, 6, 8
2	Identify both positive and negative nonverbal gestures and	5, 6, 8
	signs.	
3	Improve adept presentation skills by practicing delivery,	3,5,6,7,8
	refining communication techniques, and ensuring clarity of	
	expression.	
4	Enhance writing abilities and develop the ability to	5,6,8
	recognize awkward expressions, correct grammatical errors,	
	and enhance the overall coherence of your writing	
5	Plan efficiently for discussions in different platforms by	2, 3, 5, 6, 7, 8
	enhancing their thought process and	
	problem-solving skills.	

Course code Course code Course code Course code Course code Course code Course code Course code Course code Course code Course code Course code Course code Course Course code de code code code code code cod
Pre-requisite Nil Co-requisite Nil Co-requisite Semester Fall/ I semester of the second year of the program Fall/ I semester of the second year of the program I. To understand the transition from traditional to digital marketing strategies and its significance in modern business. 2. To learn about key digital marketing technologies and platforms, including search engines and social media. 3. To analyze the customer journey and how digital marketing influences purchase decisions. 4. To develop skills for creating compelling digital content that resonates with consumers. 5. To explore strategies for businesses to differentiate themselves using digital marketing in competitive markets. Explain the shift from traditional to digital marketing and its impact on business practices. Other lands with the program Other lands with the program Other lands with the program Other lands Oth
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conversion rates. Create engaging digital content tailored to target audiences that enhances brand presence.
Create engaging digital content tailored to target audiences that enhances brand presence.
presence.
*
cos implement digital marketing strategies that help businesses stand out in competitive environments.
Unit-No. Content Contact Learning Outcome KL
Hour
I Search Engine Marketing - Can 8 Describe, illustrate, and 1,2
Customers Find You? Welcome Explain Search Engine,
to Module 1. Search Engine SEM, SEO
Marketing, (SEM), allows
businesses to be found online.
With millions of businesses out
there vying for the same eyeballs,
SEM's two main elements,
Search Engine Optimization
(SEO) and Pay-per-click (PPC)
strategies can lead to online marketing success through
discovery.
II Social Media - Two-Way 8 Describe, illustrate, and 1,2
Communication with explain social media,
Customers: social media Communication with
facilitates the sharing of ideas, customer.

	the building of networks. It is two- way communication between the			
	brand and its audience. In this			
	module, you will learn techniques			
	to effectively communicate and			
	engage with audiences through			
	social media			
III	Reputation Management - You	8	Describe, illustrate, and	1,2,3
	Are Who Your Customers		explain map customer	
	Think You Are: While		journey, optimize	
	marketing is essential for		marketing strategy.	
	communication with audiences,			
	"word of mouth" remains the			
	most powerful voice. Online			
	reviews are today's "digital word			
	of mouth". It's easier than ever			
	for customers to tell others about			
	their best (and worst)			
	experiences, which can make or			
	break a business. In this module			
	you will explore how to harness			
137	this tool.	0	Describe illustrate and	1 2 2
IV	Content Marketing - Storytelling is the Key to Great	8	Describe, illustrate, and explain Content	1,2,3
	Content: The key to any		explain Content Marketing, enhance	
	effective marketing is to capture		brand presence.	
	and keep the attention of an		brand presence.	
	audience. Digital stories			
	incorporate essential			
	communication and marketing			
	elements to create a compelling			
	narrative. Stories about a brand			
1				
	can attract a target audience by			
	can attract a target audience by differentiating it in the			
	-			
	differentiating it in the			
	differentiating it in the marketplace. Digital sharing is			

1.Digital Marketing: Strategy, Implementation and Practice by Dave Chaffey and Fiona Ellis-Chadwick

REFERENCE BOOKS

1.Marketing 4.0: Moving from Traditional to Digital by Philip Kotler, Hermawan Kartajaya, and Iwan Setiawan

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Explain the shift from traditional to digital marketing and its impact on business practices.	2,3,4,5,6,7,8					
2	Utilize key digital marketing platforms and technologies effectively in marketing campaigns.	2,3,4,5,6,7,8					
3	Analyze and map the customer journey to optimize marketing strategies and improve conversion rates.	2,3,5,6,7					
4	Create engaging digital content tailored to target audiences that enhances brand presence.	2,3,4,5,6,7,8					
5	Implement digital marketing strategies that help businesses stand out in competitive environments.	2,3,4,5,6,7,8					

		SEMESTER	– III	[
Course		Techno Pro			Skills	II			
Title		,							•
Course	22BCAO215R	Total credits: 1	L	T	P	S	R	O/F	<u>C</u>
code		Total hours:	0	0	2	0	0	0	1
D	NT21	30P					NISI		
Pre- requisite	Nil	Co-requisite					Nil		
Programme		Rechalor of Co	mnu	tor A	nnlie	otion	C		
Semester	Bachelor of Computer Applications Fall/ I semester of the second year of the program								
Course	1. To understand the basic syntax, semantics, and structure of the C programming								
Objectives	language.	the busic sylitan, ser		.c., a.	iid St	racta	01	une e p	ogrammi,
		fundamental program	ming	cons	tructs	s suc	h as	variables,	data types
		ol flow statements, and							• •
		and implement compl	ex d	ata st	ructu	res si	uch a	s arrays,	linked lists
	trees, and hash t								
		ong problem-solving	skill	s by	tackl	ing a	a vari	iety of p	rogrammin
		real-world scenarios.	-4		~ 4	a - 1		1	
	problems efficie	algorithms and data	stru	ıcture	s to	SOIV	e coi	mpiex co	mputationa
CO1		omprehensive unders	tandi	ing o	of the	e nro	nerti	es advai	ntages and
COI	limitations of each		tana	ing o	/1 til	pre	perm	cs, advai	itages, and
CO2	•	Apply algorithmic analysis to assess the efficiency of various data structure operations.							
CO3		skills by implement							_
		combination of data str			On un	501111		ina sorvii	ig praetical
CO4		offs and use cases for o			rting	and s	search	ning techr	iques.
CO5		kills by solving prac							_
	structures.								
Unit-No.	Co	ontent		ontac	t L	æarn	ing C	Outcome	KL
I	Introduction t	o Advanced C		Hour 6	D	ocori1	- i	llustrate,	1,2
1	Programming	o Auvanceu C		U				Advance	1,2
	Trogramming				C			amming,	
	Review of C	Basics. Data types,					nberir	<u> </u>	
	operators, and con	ntrol flow. Functions,						pt of C	
		memory allocation.				ograi		_	
	Standard libraries	and I/O operations				nders		the	
	Environment Setup				er	viror	nment	set up.	
	 Development 	environments and							
	tools								
	G ''								
		ions and debugging							
	techniques								
II	Functions			6				llustrate, Function	1,2,3
	Function Definition	n and Declaration			of pa	C, arame	, ur eter	nderstand passing,	
	Return types an	nd narameters			R	ecurs	ion F	unction.	
	- Return types at	na parameters							
	. 0. 1110								
	Scope and lifet	time of variables							

	Parameter Passing			
	Call by value vs. call by reference			
	Recursion			
	Understanding and implementing recursive functions			
III	Arrays and Strings	6	Describe, illustrate, and explain Data	1,2,3
	Arrays		types in C, Arrays, String.	
	• Declaration, initialization, and			
	accessMultidimensional arrays			
	-			
	Strings			
	• String handling functions (strlen, strcpy, strcat, strcmp)			
	 Common string manipulation techniques 			
IV	Pointers	6	Describe, illustrate,	1,2,3,4
	Basics of Pointers		and explain Pointers in C,Types of	
	 Pointer declaration and initialization 			
	• Pointer crithmetic		Pointers.	
	 Pointer arithmetic Pointers and Arrays 		Pointers.	
			Pointers.	
	Pointers and Arrays • Pointer to arrays and array of		Pointers.	
	Pointers and Arrays • Pointer to arrays and array of pointers		Pointers.	
	Pointers and Arrays • Pointer to arrays and array of pointers Function Pointers • Declaring and using function		Pointers.	
V	 Pointers and Arrays Pointer to arrays and array of pointers Function Pointers Declaring and using function pointers Practical applications of function 	6	Describe, illustrate,	1,2,3,4
V	 Pointers and Arrays Pointer to arrays and array of pointers Function Pointers Declaring and using function pointers Practical applications of function pointers 	6	Describe, illustrate, and explain and apply Structures, Unions in C	1,2,3,4
V	 Pointers and Arrays Pointer to arrays and array of pointers Function Pointers Declaring and using function pointers Practical applications of function pointers Structures and Unions 	6	Describe, illustrate, and explain and apply Structures,	1,2,3,4
V	 Pointers and Arrays Pointer to arrays and array of pointers Function Pointers Declaring and using function pointers Practical applications of function pointers Structures and Unions 	6	Describe, illustrate, and explain and apply Structures, Unions in C	1,2,3,4

	Defining and using unions			
	Differences between structures and			
	unions			
	Practical Comp	onent		
Practical 1	Write a program in C to implement the	2	Differentiate	1,2,3
1 ractical 1	following.	4	between different	1,2,5
	Tollowing.		random number	
	A bank stores the customer ids in a		generation methods	
	single dimensional array. The customer		and their use cases.	
	ids are generated using a random		Examine the	
	number generator. Each customer		efficiency of the	
	number is a 4-digit number. When a new customer id is to be entered, first the		program in handling	
	array needs to be checked sequentially.		the addition of new	
	If the randomly generated 4-digit		customer IDs.	
	customer id already exists in the array,			
	then the number to be regenerated (using			
	a random number generator). This			
	process is to be continued till it is			
	ensured that the newly generated			
	customer id does not already exist in the			
	array. The new customer id is to be			
	inserted into the array only if there is no			
Practical 2	repetition. Write a program in C to do the	2	Design an algorithm	1,2,3,4
Fractical 2	following	<u> </u>	to fill the matrix	1,2,3,4
	Tollowing		with sequential	
	Initialize all cells of a 5X5 matrix.		numbers along	
	Then enter a few positive numbers		diagonals,	
	arbitrarily to some of the cells of the		considering	
	matrix. Now start from the middle cell		constraints.	
	of the top- most row i.e. 0 th row and		Evaluate the	
	start entering the numbers 1,2, 3 etc. in		effectiveness of the	
	sequence along the four diagonals (When one diagonal goes out of scope,		algorithm in	
	change direction and move along the		correctly filling the	
	next lower/upper diagonal).		matrix as per the specified rules	
	Note that along the diagonals, you are		specified fules	
	allowed to overwrite a cell if it contains			
	0. Otherwise you need to jump the cell			
	and go to the next cell on the diagonal			

Practical 3	You want to keep track of the number of hours a worker in your company has worked per day. Note that Sundays are holidays. At the end of the month, you want to give awards to the following: i. Workers who have worked the maximum hours in a week. i. Workers who have worked the maximum hours in a month i. Workers who have not missed a 2single work day provided they have worked at leasts8 hours per day of the week. Implement the above using a suitable data structure. Also explain in brief why you have chosen that data structure for your program.	2	Apply the chosen data structure to store and manage the workers' daily working hours. Use loops and conditional statements to calculate weekly and monthly working hours. Implement the logic to check if a worker has worked at least 8 hours every day in a week.	1,2,3,4
Practical 4	Write a program in C to implement the following (using linked list) A bank stores the customer ids in a single dimensional array. The customer ids are generated using a random number generator. Each customer number is a 4-digit number. When a new customer id is to be entered, first the array needs to be checked sequentially. If the randomly generated 4-digit customer id already exists in the array, then the number to be regenerated (using a random number generator). This process is to be continued till it is ensured that the newly generated customer id does not already exist in the array. The new customer id is to be inserted into the array only if there is no repetition.	2	Differentiate between various methods of data storage and retrieval for dynamic datasets. Design a program that utilizes linked lists to store unique customer IDs. Integrate random number generation and duplication checks into a cohesive solution. Develop an algorithm to handle the insertion of unique customer IDs into the linked list.	1,2,3,4,5
Practical 5	Write a program in C using linked list to implement the following: Store a route containing different stops/places one after another. A user will be asked to enter a start place and a destination place. The program will then print the route from the user given start point to the user given destination point in any direction. For eg, supposed in our route, we have stored chandmari, silpukhuri, ghy club, ambary etc. Now the user should be able to give as start point — chandmari and destination as	2	Design a linked list structure to represent the route with stops/places as nodes. Integrate user input handling and linked list traversal into a cohesive program. Develop a function to print the route between the specified start and destination points in	1,2,3,4,5

	ambari and also, he must be able to give starting point as Ambari and destination as Chandmari. However, if the user given start point and /or destination does not exist in the stored route, then an appropriate message has to be displayed.		both forward and reverse directions.	
Practical 6	You are conducting a meeting for n people in a room where they sit in a circular table. Later you want to find out if any two people X and Y were sitting adjacent (i.e. immediately next) to reach other. What data structure will you use to implement this? The program should take as input the value of N, it should take as input the names of the N people and information as to who was sitting next to whom. After this, it should take as input a pair of names and then tell whether they were sitting adjacent to each other or not.	3	Design a data structure and algorithm to effectively manage and query adjacency in a circular table setup. Develop a program that provides accurate responses regarding whether two specified individuals were adjacent to each other during a meeting.	1,2,3,4,5

- 1. Programming in ANSI C", E. Balaguruswamy, 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- 2. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University Press, ISBN: 978-01-9949-147-6.

REFERENCE BOOKS:

- 1. M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- 2. Archana Kumar, Computer Basics with Office Automation, Willey.
- 3. Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- 4. Stallings, Computer Organization & Architecture, Pearson.
- 5. M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
- 6. Godbole and Khate, Web Technologies, McGraw Hill Education.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate a comprehensive understanding of the properties, advantages, and limitations of each data structure.	1,2,7,8					
2	Apply algorithmic analysis to assess the efficiency of various data structure operations.	1,2,7,8					

3	Develop hands-on skills by implementing complex	1,2,7,8
	algorithms and solving practical problems using a	
	combination of data structures.	
4	Outline the trade-offs and use cases for different sorting and	1,2,7,8
	searching techniques.	
5	Build hands-on skills by solving practical problems using a	1,2,7,8
	combination of data structures.	

		SEMESTER	2 – III	T								
Course Title	Mo	OOCS II (Writing, F			ıd Fi	xing (Code	e in C)				
Course code	22MOSY211R	Total credits: 1	L	T	P	S	R	O/F	C			
		Total hours: 30P	0	0	2	0	0	0	1			
Pre-requisite	Nil	Co-requisite					Nil					
Programme		Bachelor of C	omputer Applications									
Semester	I	Fall/ I semester of the	e second year of the program									
Course	1. To understand	the basic syntax and	struct	ure of	the (C prog	gram	ming languag	e.			
Objectives		o write, compile, and			_							
		lls for debugging and										
		iency in using control					-	_	rs in C.			
001		memory managemen				nemor	y alle	ocation in C.				
CO1	Explain syntactical	lly correct and efficient	nt C p	orograi	ns.							
CO2	Analyse Compile a	and execute C program	ns usi	ing dif	ferer	nt com	pile	rs.				
CO3	Debug C programs	and fix common syn	tax ar	nd logi	c err	ors.						
CO4		ctures, functions, arra					tivel	y in C code.				
CO5		ms that effectively n	•						nemory-			
	related issues grace	efully.										
Unit-No.	C	ontent		Contac	et	Lea	rnin	g Outcome	KL			
				Hour								
I	Writing Code:	In this module, you	1	4				write code,	1,2			
		te code and do you				Descr	ibe	writing of C				
	_	t in the Practic				progra	am.					
		vironment. You have										
		st four steps of the										
		e previous course, and										
	•	them here before										
	Algorithm to	5: Translating You Code. Exper										
	O	nd most of their time										
		they begin writing										
		will learn to do the										
	same.	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,										
II	Compiling and	Running: Now that	t	4		Descr	ibe,	illustrate,	1,2			
	you know how	to plan an algorithn	ı			and	expla	ain different				
		to code, you need to				comp	iler,	algorithm.				
		npile and run it! You										
		the compiler, which										
	-	u wrote and translate										
		ons a machine car										
		ou can then run. You bout different option										
		compiler, as well a										
		run your program tha										
	give you debuggi											
	J J	<u></u>										
III	Testing and de	bugging: Two skill	S	4		Descr	ibe,	illustrate,	1,2,3			
	that are crucial t	o good programming	3			and e	xplai	in debugging				
		ding problems with				of	C	programs,				
		d debugging—fixing				comm	non	syntax and				
	them. In this m	odule you will lear	1									

	systematic ways to identify problems in your code, as well as how to apply the scientific method to fix your program when you do find a bug.		logic errors.	
IV	Project: In this module you will begin the project you will complete over the course of the rest of the specialization. At the end of each course, you will write a piece of a program that will calculate the odds of different poker hands winning with a Monte Carlo simulation—a way to calculate complicated probabilities by generating random data.	3	Describe, illustrate, and explain control structures, functions, arrays, and pointers effectively in C code, understand memory-related issues in C.	1,2,3

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Explain syntactically correct and efficient C programs.	1,2,3,8					
2	Analyse Compile and execute C programs using different compilers.	2,3,8					
3	Debug C programs and fix common syntax and logic errors.	2,3,8					
4	Utilize control structures, functions, arrays, and pointers effectively in C code.	2,3,8					
5	Develop C programs that effectively manage dynamic memory and handle memory-related issues gracefully.	2,3,8					

		SEMESTE	ER – III							
Course Title		CO-CURRI	CULAI	RAC	TIV	TIE	S			
Course code	22UBCC211	Total credits: 1	L	T	C					
		Total hours: 4 hr	rs	0	0	4	0	0	1	
Pre-requisite	Nil	Co-requisite					Nil			
Programme	Bachelor of Computer Applications									
Semester]	Fall/ I semester of the second year of the program								
Course	1. To develop the	e social and soft skil	ls							
Objectives	2. To promote a l	nolistic developmen	t of the l	learn	ers					
	_	portunities to apply					n real	-world so	enarios.	
CO1	Connect and adapt	cultural diversity ar	mong co	mmu	ınities	S.				
CO2	Developed team for	or working toward a	shared v	visio	1					
CO3		pply interdisciplina ity to achieve goals	ry conne	ection	ıs and	Cult	ivate	spirit of c	reative	
CO4	Build effectively c	ommunicate, delega	ite respo	nsibi	lities	and r	notiva	ate team i	members.	
CO5	Improve strong tea	mwork and collabor	ration sk	tills t	y eng	gaging	g in g	roup activ	vities.	
Unit-No.	Cor	tent	Contac Hour	et	Lea	rnin	g Out	come	KL	
I	aimed to develor soft skills of students. Keeping degree learning students are engactivities other to classes. Experts conduct workshot students. Technical semining semining to the conducted to knowledge of Technical semining to the conducted t	activities that are p the social and lents and promote lopment of the in mind the 360-methodology, the aged in different han their regular are invited to ps that benefit the ical quizzes are enhance the students. ars help them to public speaking	4	p d o to A k p	f var ools a apply nowle roble roject	ency mmir pmen ious nd pla edge ms	ag, tt, and techr atform th to re	in software al the use cological al-world through aips, and actions.	1,2,3,4	

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
CO1	Connect and adapt cultural diversity among communities.	4,5,6,7,8						
CO2	Developed team for working toward a shared vision	4,5,6,7,8						
CO3	Demonstrate and apply interdisciplinary connections and Cultivate spirit of creative thought and curiosity to achieve goals	4,5,6,7,8						
CO4	Build effectively communicate, delegate responsibilities and motivate team members.	6,7,8						
CO5	Improve strong teamwork and collaboration skills by engaging in group activities.	6,7,8						

		SEMESTI	ER – III						
Course Title		Extra-Cu	ırricular	· Act	ivity				
Course code	22UBEC211	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 4	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of							
Semester		Fall/ I semester of							
Course		oblem-solving abili		-	_		_	s and hacl	kathons.
Objectives		in app developmen			exhib	oition	ıs.		
201	3. To develop en	trepreneurial skills	and mine	dset.					
CO1	Importance of diffe	erent activities unde	er differe	ent cl	ubs.				
CO2	Formulate regular hobbies.	activities like wo	orkshops	, cor	npetit	ions	as pe	er their i	nterest and
CO3	Adapt to represe	nt ADTU in var	ious int	er u	nivers	sity,	state	and nat	ional level
	competitions.					-			
CO4		ed experts in their re	•						
	Develop an apprec	iation for diverse for	orms of a	ırtisti					
Unit-No.	Con	tent	Contac		Lea	rnin	g Out	come	KL
			Hour		_				
I	AdtU encourage	-	2		Demor			mproved	1,2,3,4
	activities outsic	C		_	rofici	•		in	
		ended to meet			rogra		-	software	
		These activities alop the social and				_		the use nological	
		romote a holistic			ools a			_	
	development of				Apply	_		eoretical	
	•	the 360 degree			110			al-world	
		ology the students			roble	-		through	
	_	lifferent activities		_			ternsh	ips, and	
		fferent clubs viz.			-			ations.	
	Dance, music.	, photography,							
	drama, literary e	tc., The students							
	are encouraged	to participate in							
	regular club activ	vities, workshops,							
	_	per their interest							
		student members							
		trained represent							
		inter University							
	student and	national level							
	competitions,	Renewed							
	workshops tha	invited to conduct t benefit the							
	•	udents by giving							
		m to learn from							
	experts.	to louin moin							
	спрого.								

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Students' engagement in different activities under different clubs.	2,3,4,5,6,7							
2	Role play in regular activities like workshops, competitions as per their interest and hobbies.	2,3,4,5,6,7							
3	Adapt and trained to represent ADTU in various inter university, state and national level competitions.	2,3,4,5,6,7,8							
4	The students will be given a platform to earn from invited experts in their respective fields.	2,3,4,5,6,7,8							
5	Develop an appreciation for diverse forms of artistic expression.	2,3,5,6,7,8							

		SEMESTE	R – III						
Course Title		Personal		al P	lanni	ng			
Course code	22UUFL202R	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	2	0	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of	Comput	er A	pplic	atior	ıs		
Semester		Fall/ I semester of t							
Course		eness among studen	its about	the	need f	or po	ossess	ing finan	cial literacy
Objectives	education.								
		on of money as a wo			: _: _				
CO1	1	ability to make bette					o tho	homa or	outomobile
COI	buying	anagement strategy	and a p	ian	to rac	maı	e me	nome or	automobile
	process.								
CO2	•	ed investment port	folio tha	t ad	dresse	es se	veral	different	investmen
	objectives.	F							
CO3	Differentiate betw	een open- and close		utua	al fun	ds, e	xchan	ge-tradec	funds, and
		eal estate investmen							
CO4		plan that covers yo	our incon	ne n	eeds	in ret	tireme	nt and h	elps protec
Unit-No.	you and your estat	e. tent	Contact	.	Loc	rnin	g Out	como	KL
Omt-No.	Con	itent	Hour		Lea	1 11111	ց Ծաւ	come	KL
I	Introduction:		7	Г	Descril	oe, il	llustra	te, and	1,2
					xplair		oncep		,
		ed and importance		n	noney	, In	porta	nce of	
	of Financial I							y their	
		components of					s to fi	nancial	
	Financial Lite	•		p	lannir	ıg.			
	iii. Prerequisites literacy;	of financial							
	iv. Savings –	Meaning and							
	_	petween savings							
	and investme	_							
	* *	ancial Institutions							
		vices provided -							
		Non-Banking;							
	vi. Different inv	estment avenues.							
II	Financial Planni	ng:	6				llustra	te, and	1,2
		d and importance			xplair			nancial	
	for financial j							s, the	
		needs, balancing nomic need and			•			nancial	
	resources;	nomic need and					metn ement	ods of	
	iii. Three pillars	of investments-		B	our ac	111C V		•	
	risk, return, li								
		nd its importance							
	in financial p								
	_	red in Financial							
	Planning Prod								
	vi. Preparation	of personal lget surplus and							
		eit, avenues for							
		surplus, sources							
<u> </u>	23.11.50 110111	True, sources							1

	for meeting deficit.			
	vii. Informal Society funds and			
	crowd funding			
III	Banks & Post Office - As financial service provider: i. Meaning and evolution of money, ii. Banks – meaning, types & functions; types of accounts; Formalities to open various accounts. iii. Different types of Post Office saving schemes: Recurring deposit, savings, term deposit; NSC; Kisan Vikas Patra; Monthly Income scheme (MIS) Account, iv. ublic Provident Funds (PPF), Senior citizen savings scheme (SCSS), Sukanya Samriddhi Accounts, v. Indian Postal Order; International Money transfer service; Forex Services;	6	Describe, illustrate, and explain Formulation of budget, record keeping system, and tax planning strategy based on current financial goals.	1,2,3
	vi. Money remittance services;			
***	Jansuraksha Scheme.		D 11 11 4 4 1	1004
IV	Insurance - As financial service provider: i. Different types of Risks and their Management, Diversification of risk; ii. Meaning, need and importance of Insurance; Types of Insurance - Life Insurance, Health Insurance, General Insurance, Term Insurance, iii. Pension and retirement policies; iv. Post office life insurance schemes, Postal life insurance and rural postal life insurance.	6	Describe, illustrate, and explain and Creation of financial plan that covers Risk management, importance of Insurance.	1,2,3,4
V	Transformations in Digital	5	Explain the Digital	1,2,3
	Money market:		money market , credit score, CIBIL score.	
	 i. Various functions & innovative services of Banks; Mobile Banking, NEFT, IMPS, RTGS, ii. Money transfer, Different types of cards- Debit & Credit, E-Banking, Unified payment interface(UPI), iii. Credit Scoring - CIBIL, 		score, CIBIL score.	

	currency and transactions,	related		
iv	V. Fintech, Block Understanding Payments.	chain; Digital		

- 1. Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems and the Million Dollar Financial Advisor: Powerful Lessons and Proven Strategies from Top Producers by David J. Mullen Jr.
- 2. Personal Finance and Planning by Dr. Rajni
- 3. Peaceful Personal Finance: A short read on the basics of personal finance and planning Kindle Edition by Hema Singh.
- 4. Be your own financial advisor: Financial Planning, Investment Options, Risk Management, Tax Management, Succession Planning Kindle Edition y Sushil Bali.
- 5. The dumb things smart people do with their money: Thirteen ways to right your financial wrongs Kindle Edition y Jil Schlesinger.

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Develop a cash management strategy and a plan to facilitate the home or automobile buying process.	1,2,4,5,6,7,8			
2	Design a diversified investment portfolio that addresses several different investment objectives.	2,3,4,5,6,7			
3	Differentiate between open- and closed-end mutual funds, exchange-traded funds, and direct or indirect real estate investments.	4,5,6,8			
4	Create a financial plan that covers your income needs in retirement and helps protect you and your estate.	1,2,3,4,5,6,7,8			
5	Develop a cash management strategy and a plan to facilitate the home or automobile buying process.	1,2,3,5,6,7,8			

	SEMESTER – III								
Course Title		BASIC LIFE S			ILL	S(BL	SS)		
Course code	22UULS202R	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours:	0	0	2	0	0	0	1
Pre-requisite	Nil	30P Co-requisite					Nil		
1 re-requisite	1411	Co-requisite					1411		
Programme	Bachelor of Computer Applications								
Semester		Fall/ I semester of the							1 . 1
Course	The aim of the course is to provide the learners with basic knowledge and practical								
Objectives	skills needed in an emergency fire situation, and to provide appropriate basic								
CO1	management and treatment for injuries Understand the angelife skills of Posic lifesoving skill and Impulades that individuals								
COI	Understand the specific skills of Basic lifesaving skill and knowledge that individuals should acquire and demonstrate after completing a BLS training course.								
CO2	_	kill attributes and ab							offoctivoly
COZ		with others, both per						o interact	effectively
CO3	·	nowledge and skills			_			comize o	accecc and
		pes of traumatic inju					1y 100	coginze, a	assess, and
CO4	Understand the pr	inciples and purpose	of the	Triag	e sys	tem i	n heal	thcare set	tings.
	_	rent levels of triage a		_	•				•
CO5	-	medical conditions a	-			_			
	those that can be r	nanaged at a later sta	ige. Re	cogni	ze the	e imp	ortan	ce of accu	rate and
	timely patient asse	essment during triage	e.						
Unit-No.	Cor	itent	Contac	ot	Loc	mnin	a Out	tcome	KL
UIIIt-No.	Cor	itent	Hour		Lea	11.11111	ig Oui	icome	KL
I	Basic Life Suppo	ort (BLS)	5		Basic	Life	Suppo	ort (BLS)	1,2
	Introduction of B			a	re the	e spec	cific s	kills and	
	Chain of survival				nowl	_		that	
	ABCs Assessmer	nt			ndivio	_		should	
	CPR and Ventilat	tion Technique		a	cquir	e an	d den	nonstrate	
	AED	1			_			a BLS	
	Choking for adul	t and children				_	ourse		
	choming for unun					_		essential	
								ho may	
					ncou	-	a	medical	
								need to	
					rovid			nmediate	
				_	ssista		111	before	
							ıl mad	lical help	
				1 ^	rrives		ii iiicu	near neip	
II	Soft skills		4				arc	a set of	1,2
11	Introduction		4						1,2
	Communications	Claille		_	erson bilitie			ites and enable	
							that		
	Situational Skills				tuden		to	interact	
	Team Work				ffecti	-		and	
	Other Soft Skills				armo		•	with	
				О	thers.	, bo	th po	ersonally	

			and professionally. These	
			skills are highly valued	
			and can lead to better	
			communication,	
			collaboration, and overall	
			success in various aspects	
			of life	
III	Trauma emergencies	10	Focus on the knowledge	1,2,3
	Introduction Priorities of Initial		and skills needed to	
	approach in pre-hospital care		effectively recognize,	
	Scene safety Primary assessment		assess, and manage	
	Bleeding control Helmet removal		various types of	
	Care of amputated body part		traumatic injuries and	
	Extrication of victims and safe		emergencies. Essential	
	transfer Cervical spine		for healthcare	
	stabilization Cervical collar		professionals, first	
	application Splinting of broken		responders, and anyone	
	Limbs		involved in emergency	
			care.	
IV	Triage system	5	Understand the principles	1,2,3,4
_ ,				1,2,0,
	Introduction		Land nurnose of the Triage 1	
	Introduction Flow chart approach of Triage		and purpose of the Triage	
	Flow chart approach of Triage		system in healthcare	
	Flow chart approach of Triage Triage of Multiple Casualties in		system in healthcare settings.	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different	
	Flow chart approach of Triage Triage of Multiple Casualties in		system in healthcare settings. Describe the different levels of triage (e.g.,	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed,	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care.	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later stage.	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later stage. Recognize the	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later stage.	
	Flow chart approach of Triage Triage of Multiple Casualties in Pre-Hospital setting		system in healthcare settings. Describe the different levels of triage (e.g., immediate, delayed, minimal, expectant) and their significance in prioritizing patient care. Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later stage. Recognize the	

V	Medical emergencies	6	Identify common medical	1,2,3,4
	Introduction Victim centred		emergency conditions:	
	approach in medical emergency		Learners should be able	
	Management of: - a) seizures b)		to recognize and	
	heart attack c) asthma diabetic		differentiate between	
	emergencies emergency childbirth		common medical	
	stroke recovery position		emergencies, including	
			myocardial infarction	
			(heart attack), stroke,	
			diabetic emergencies,	
			anaphylaxis, respiratory	
			distress, seizures, and	
			allergic reactions.	

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Understand the specific skills of Basic lifesaving skill and knowledge that individuals should acquire and demonstrate after completing a BLS training course.	5,6				
2	Explain the soft skill attributes and abilities that enable students to interact effectively and harmoniously with others, both personally and professionally.	5,6				
3	Implement the knowledge and skills needed to effectively recognize, assess, and manage various types of traumatic injuries and emergencies.	5,6				
4	Understand the principles and purpose of the Triage system in healthcare settings. Describe the different levels of triage and their significance in prioritizing patient care.	5,6				
5	Identify common medical conditions and injuries that require immediate attention and those that can be managed at a later stage. Recognize the importance of accurate and timely patient assessment during triage.	5,6				

MAPPING TABLE

Course code	Course Name	PO1*	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO211R	Database Management Systems		2.2	2				1.6	3
22BCAO212R	Operating Systems	2.67	2	1.67		2	2		2
22BCAO213R	Introduction To Linux	2	2	1.4	2.5	2			
22BCAO214R	Object Oriented Programming Using C++		2	1.8	1.25	1.5	1.8	1.5	2
22BCAO215R	Techno Professional Skills Ii	1	1.6					2	2.8
22UBPD212R	English Language for Excellence		1.96	1.72		1.83	1.9	1.7	2.45
22UBCC211	Co-Curricular Activity				2	1	2.6	2.4	2.4
22UBEC211	Extra-Curricular Activity		1	2	2	2	3	2	2
22UUFL213R	Personal Financial Planning	1	1.5	1.5		2	2	1.75	1
22UULS212R	Basic Life Saving Skills		1.33	1		1.4	2.25	1	1
22MOSY212R	Mooc I (Writing, Running and Fixing Code In C)	1	3	2					1
22BCAO216R	Generic Elective I (Introduction to Digital Marketing)		1	2	1	1	2	1	1

		SEMESTE	R – IV							
Course Title	Computer Netwo							•		
Course code	22BCAO223R	Total credits: 3		T	P	S	R	O/I	?	C
		Total hours: 45L		0	0	0	0	0		3
Pre-requisite	Programming Skills	Co-requisite	LINU	J X						
Programme	Bachelor of Com	puter Application								
Semester	Fall/ IV semester	of the second year	r of the p	orog	ram					
Course	1. Understand th	e fundamentals of	data com	mur	nicati	ons p	rincip	les of	f med	ia access,
Objectives		iting and flow conti								
		e basics of network								
		ith the TCP/IP prot								otocols.
		te network-capable								
		ne structure of clie	ent-serve	r sy	stem	s and	l be a	ible t	o bui	ld client-
001	server program		•		1	1		TO)/ID	1 001
CO1	Demonstrate com	puter network ba	sics, ne	twor	k ar	chite	cture,	TCI	?/IP	and OSI
	reference models.									
CO2	Examine various to	ahniques and mod	os of troi	nami	ccior	Do	ariba	doto	link ı	arotocole
COZ	multi-channel acce							uata	шк	protocois,
CO3		nd congestion in ne						orithr	ns an	d classify
003	IPV4 addressing so		twork ia	ycı	VV I LII	Outil	ig aig	OHILIII	iis aii	a classify
CO4	Discuss the elemen		transpor	t lav	er					
CO5		ent protocols used				er i.e	. HT	ΓP. S	NMP	P. SMTP.
	FTP, TELNET and	•	и иррпс	uu	11 143	01 1		11, 5	1 (1/11	, 51,111,
TI	·		Contac	t	т.		0	4	_	T/T
Unit-No.	Con	tent	Hour		Le	arnii	ıg Ou	tcom	e	KL
I	Introduction to n	·	8		nders				puter	
	protocols and sta						nterne			
	model, layers in C			•			ite, C			
	_	Analog and digital					ven	-		
	signals.						inclu			
	Physical Layer: d						og ai		-	
	multiplexing, tra				-		ital tra			
	circuit switched no				ethod		nd t		_	
	networks, virtual switch and Telepho			ar	rcuit-	swite			work ation,	
	Switch and Telepho	one network.			iu itagra		netwo	•	and	
					_		it net			
II	Data link layer: I	ntroduction. Block	8		nders		Da		Link	1,2
	coding, cyclic	•	Ü				ck co			
	framing, flow as				•		echni	_		
	Noiseless channel				r e				and	
	HDLC, point to po			cc	rrect	ion,	Defin	e nois	seless	
				ar	id no	isy c	hanne	ls in t	terms	
				of	er	ror	rates	, H	DLC,	
				_			ke PPI			
III	Network Layer: I	•	8		nders			10	gical	1,2
	internetworking, t				ldres	_				
	mapping, ICMP, I						king,			
	uni-cast routing p	rotocols, multicast					P, IGN	_		
	routing protocols.						unica			
							.g., R			
				B	GP),	mu	lticas	t ro	utıng	

		protocols (e.g., PIM, DVMRP)	
IV	Transport Layer: Process to process delivery, UDP and TCP protocols, SCTP, data traffic, congestion, congestion control, QoS, integrated services, differentiated services, QoS in switched networks.	Understand Transport Layer, UDP, TCP, SCTP, data traffic, congestion control mechanisms, QoS, how QoS principles are applied in switched networks.	·
V	Application Layer: Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multi-media, network security	Understand DNS, email communication (e.g., SMTP, IMAP, POP3), FTP, World Wide Web, HTTP, SNMP, multimedia content (e.g., audio, video), network security, authentication, encryption, and access control.	,

- 1. Data Communications and Networking Behrouz A. Forouzan, Fourth Edition TMH.2006.
- 2. Computer Networks -- Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCE BOOKS:

- 1. An Engineering Approach to Computer Networks-S. Keshav,2nd Edition, Pearson Education
- 2. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning.
- 3. Computer and Communication Networks, Nader F. Mir, Pearson Education
- 4. Computer Networking: A Top-Down Approach Featuring the Internet, James Kurose, K.W.Ross,3rd Edition, Pearson Education.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate computer network basics, network architecture, TCP/IP and OSI reference models.	1,2,3,8
2	Examine various techniques and modes of transmission. Describe data link protocols, multi-channel access protocols and IEEE 802 standards for LAN.	1,2,3,8
3	Describe routing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme	1,2,3,8
4	Discuss the elements and protocols of transport layer	1,2,3,8
5	Analyse the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN	1,2,3,8

		SEMESTE	R – IV						
Course Title	Design & Analysis								
Course code	22BCAO221R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 45L	3	0	0	0	0	0	3
Pre-requisite	Data Structures	=	C/C	++ P	rogr	amm	ing		
Programme	Bachelor of Comp								
Semester	Fall/ IV semester								
Course	1. Analyze the asyr		_						
Objectives	2. Demonstrate a fa	•	_						
001	3. Apply important	-	_	-				-	
CO1	Classify worst-case			mpto	otic a	nalysi	is and	l justify th	e
CO2	correctness of algor					1' -		1 11-11-	1
CO2	Explain the greedy	paradigm, dynamic	c-progra	ımmı	ng pa	ıradıg	m and	a divide-a	na-
CO3	conquer paradigm. Design a given mod	al anginagring pro	hlom no	ina	rronh	and r	unita t	ha aarrasi	aondina
COS	algorithm to solve the		bieili us	ing g	grapii	anu v	viite t	ine corres _j	politiling
CO4	Identify NP comple		nt NP co	mnle	ete nr	ohlen	18		
CO5	Illustrate various ad				te pr	ooicii	15.		
Unit-No.	Cont		Contac		Ιο	arnin	σ Ου	tcome	KL
Omt-140.	Cont	cnt	Hour		LC	ai iiii	ig Ou	icome	IXL
I	Introduction: Cl	naracteristics of	4		nders	tand	a	lgorithms	, 1,2
_	algorithms. Analys		-		sympt			ysis, us	
	Asymptotic analys	~			•			asure the	
	bounds – best, av	•		ре	erforn	nance	of a	lgorithms	
	case behaviour:	•						uch as the	
	measurements of	Algorithm, Time				ution		Method	
	and space trade-o	-		R	ecurs	ion	Tree	Method	
	recursive algori	-		ar	nd Ma	aster's	Theo	orem	
	recurrence relatio	ns: Substitution							
	method, Recursion	tree method and							
	Masters' theorem.								
II	Fundamental	Algorithmic	12	U	nders	tand	ł	orute-force	e 1,2
	Strategies: Brute	-Force, Greedy,		al	goritl	nms,		greedy	y
	Dynamic Programm	ning, Branch and		al	goritl	nms,		dynami	e
	Bound and	Backtracking		pı	ograi	mmin	g, bi	anch and	1
	methodologies for	the design of		bo	ound		t	echniques	,
	algorithms; Illustrat	ions		ba	acktra	cking	g, b	rute-force	,
	of these techniques	for Problem-		gr	reedy	,		dynami	
	Solving, Bin Packin	g, Knap Sack		pr	ograi	mmin	g, bı	ranch and	1
	TSP. Heuristics –ch	aracteristics and		bo	ound,		bac	cktracking	,
	their application do				eurist				
III	Graph and Tr	Ü	8					and BFS	
	Traversal algorith	•			ortes		ath,	transitiv	
	Search (DFS) an							opologica	1
	Search (BFS);	Shortest path		SC	orting	, netv	vork f	low.	
	,	sitive closure,							
	Minimum Spanning	Tree,							

	Topological sorting, Network Flow			
	Algorithm.			
IV	Tractable and Intractable	6	Understand Church-Turing	1,2
	Problems: Computability of		thesis, P, NP, NP-complete,	
	Algorithms, Computability classes -		NP-hard, Cook's theorem,	
	P, NP, NP-complete and NP-hard.		SAT (Boolean	
	Cook's theorem, Standard NP-		Satisfiability), Traveling	
	complete problems and		Salesman Problem (TSP),	
	Reduction techniques		and Subset Sum, reduction	
			techniques.	
V	Advanced Topics: Approximation	5	Understand approximation	1,2
	algorithms, Randomized algorithms,		algorithms, randomized	
	Class of problems beyond NP - P		algorithms, explore	
	SPACE		complexity classes beyond	
			NP, focusing on PSPACE	
			(polynomial space).	

- 1. Introduction to Algorithms, 4TH Edition, Thomas H Cormen, Charles E Lieserson,
- 2. Ronald L Rivest and Clifford Stein, MIT Press/McGraw-Hill.
- 3. Fundamentals of Algorithms E. Horowitz et al.

REFERENCE BOOKS:

- 1. Algorithm Design, 1ST Edition, Jon Kleinberg and ÉvaTardos, Pearson.
- 2. Algorithm Design: Foundations, Analysis, and Internet Examples, Second Edition, Michael T Goodrich and Roberto Tamassia, Wiley.
- 3. Algorithms -- A Creative Approach, 3RD Edition, UdiManber, Addison-Wesley, Reading, MA.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Classify worst-case running time based on asymptotic analysis and justify the correctness of algorithm for a given problem.	1,2
2	Explain the greedy paradigm, dynamic-programming paradigm and divide-and-conquer paradigm.	1,2
3	Design a given model engineering problem using graph and write the corresponding algorithm to solve the problems.	1,2,3,8
4	Identify NP completeness and different NP complete problems.	1,2,3
5	Illustrate various advanced topics on algorithms	1,2,3

		SEME	STER -	IV						
Course Title	Basics of pythor				1					
Course code	22BCAO222R	Total credits:		L	T	P	S	R	O/F	C
		Total 45L+30P	Hours:	3	0	2	0	0	0	3
Pre-requisite	Data	Co-requisite		NIL	ı					
	Structures									
Programme	Bachelor of Cor									
Semester	Fall/ IV semeste									1
Course		the programm	ing basi	cs (o	perat	tions,	cont	rol st	ructures, o	lata types,
Objectives	etc.)									
		and begin to in								
CO1		to files and lea								
CO1	Develop proficie	ncy in writing	simple i	'ytno	n pro	ogram	is to	solve	basic com	putational
CO2	problems. Explore control	Flore stanistimas	inaludir		النائد ا	ono1a	(:f a:	otomo	nta) laan	a (for and
COZ	while loops), and		meruan	ig co	iaiti	onais	(II S	ateme	ents), 100p	s (for and
CO3	Demonstrate the		modular	nrog	ramr	ning	throu	oh the	creation	and use of
COS	functions.	importance or	modulai	prog	ı amı	inng	unou	gii tiic	cication	and use of
CO4	Evaluate the ess	ential data str	uctures	in P	vthor	ı inc	ludir	g list	s tuples	sets and
	dictionaries.	ontial data st	actares	··· ·	, 11101	, , ,	74411	5 115	s, tapies,	sets, and
CO5	Examine key Pyt	hon libraries a	nd modu	les, s	uch	as Nı	ımPy	for n	umerical o	computing
	and Pandas for da			, ,			,			Ι Β
Unit-No.	Content	*		ntac	Le	arnin	ıg Oı	itcom	e	KL
				ur						
I	Introduction to	Python: U	nique		Ide	ntify	ar	d e	xplain 1	he
	features of Pyt								s of Pyth	
	Python-3 differe								g langua	
	and Environment	•				ludin	_	its	simplici	ty,
			ifiers,	6	rea	ıdabıl	ity, a	nd vei	satility.	1,2,3
	Keywords and In									
	comments in pyt arguments, Getti									
	types, Operators									
	associativity	s, Frecedence	anu							
II	Conditional	execution	and		IJn	derst	and		Boole	an
11		oolean expres						and 1	their use	
	logical operator	•				cision			witl	
	alternative exec			_				ogical		re
	nested condition	onals, the	while	6	COI	nditio	nal st	ateme	ents.	1,2
	statement, infinit	te loops and l	break,							
	finishing iteration	ns with <i>continu</i>	ıe, for							
	loops									
III	Functions: pytho					entify		ython'		
	defining and c	-		0					fruitful a	
	parameters and			8	and	onym	ous f	unctio	ns.	1,2,3
	functions and		ctions,							
IV	anonymous funct				T a	arnin	a obo	ut Do	ta Structur	rac
1 1 1	Data Structures Python:	and strings in	·			arnıng İsts,	-	ut Da tionar	ta Structui ies, tupl	
		cina a list	list	12					perations	1 1 2
	Lists – traver operations, list sl	•			Da	•		ctures		
	operations, list SI	ices, fist ffietifo	us				~ · · · ·		, 24111	ייכי

V	Dictionaries – dictionary as a set of counters, looping and dictionaries, Tuples – tuple assignment, dictionaries and tuples, using tuples as keys in dictionaries Strings – string slices, looping and counting, the <i>in</i> operator, string comparison, string method Basic File and Exception Handling in python: Reading and Writing to Files, Exception Handling Introduction to basic libraries for data analysis: Introduction to		Advanced Data Structures, Performance and Efficiency, Applications and Use Cases. Understanding File Handling, Reading and Writing Files, File Navigation and Management, Exception Handling, Error Handling Strategies, File	1,2
	Matplotlib library, NumPy, Pandas		Handling in Context, Exception	
	Practice		Handling Best Practices.	
	Practica	aı		
Practical 1	Program to find area and circumference of a circle.	1	Creating a python program to find the area and circumference of a circle.	5
Practical 2	Program to convert temperature from degree centigrade to Fahrenheit	1	Creating a python program to convert degree to Fahrenheit.	5
Practical 3	Program to calculate Sum of 5 subject and find Percentage	1	Creating a python program to calculate the sum of 5 subjects and find the percentage.	5
Practical 4	Program to show swap of two numbers by using third variable	1	Creating a python program to swap two numbers using a third variable.	5
Practical 5	Program to show swap of two numbers by without using third variable	1	Creating a python program to swap two numbers without using the third variable.	5
Practical 6	Program to reverse a given number	1	Creating a python program to reverse a given number.	5
Practical 7	Program to find greatest among 3 Numbers	1	Creating a python program to find the greatest number from three inputs.	5
Practical 8	Program to find whether the given number is even or odd	1	Creating a python program to find the given number is odd or not.	5
Practical 9	Program to use switch statement	1	Creating a python program to make use of the switch case statement.	3, 5
Practical 10	Program to display first 10 natural number and their sum	1	Creating a python program for displaying the natural numbers and its sum.	5
Practical 11	Program to find Fibonacci series up to a range	1	Creating a python program to print the Fibonacci series.	5
Practical 12	Program to count Number of digits	1	Creating a python program to count the number of digits.	5
Practical 13	Program to find factorial of a number	1	Creating a python program to find the factorial of a given number.	5

		1	12.	1
Practical 14	Program to check whether the given number is palindrome or not	1	Creating a python program to check a palindrome number	5
Practical 15	Program to find whether the given number is prime or not	1	Creating a python program to check for a prime number	5
Practical 16	Program to show dynamic list implementation	1	Creating a python program for dynamic lists.	5
Practical 17	Program to find dynamic array implementation	1	Creating a python program for dynamic array	5
Practical 18	Program to display matrix	1	Creating a python program to display a matrix	5
Practical 19	Program to show the sum of 10 elements of array and show their average	1	Creating a python program to calculate the sum of 10 elements of an array and show their average.	5
Practical 20	Program to show the sum of 10 elements of list and show their average	1	Creating a python program to calculate the sum of 10 elements of a list and show their average.	5
Practical 21	Program to find the maximum and minimum number in an array	1	Creating a python program to find the maximum and minimum number in an array	5
Practical 22	Program to find the maximum and minimum number in a list	2	Creating a python program to find the maximum and minimum number in a list	5
Practical 23	Program to create a list and perform the following operation Insert a new value in 4th index Delete the value from the 2nd index Replace the existing value of 1st position Insert the value at the end of the list Sort the list in ascending order Print the reverse of the list	2	Creating a python program insert, delete, and replace the value in the list.	5
Practical 24	Program to implement queue using list	2	Creating a python program to implement a queue.	5
Practical 25	Program to implement stack using list	2	Creating a python program to implement a stack	5
Practical 26	Program to show the sum of two matrices	2	Creating a python program to display the addition of two matrices.	5
Practical 27	Program to calculate the square of the elements of a list by using list comprehension method and print the final list	2	Creating a python program to calculate the square of the element of a list.	5
Practical 28	Program to explain tuple conversion function	2	Creating a python program understand the tuple conversion function.	5
Practical 29	Program to perform the following operation Creation of a tuple Updation of a tuple	2	Creating a python program for a different operation on a tuple.	5

 Deletion of a tuple 	
 Slicing of a tuple 	

- 1. Think Python, Allen B. Downy, O'Reilly
- 2. Python for Everybody: Exploring Data Using Python 3 Book by Charles Severance

REFERENCE BOOKS:

- 1. Python Data Science Handbook, Jakes Vander Plas O' Reilly
- 2. Eric Matthes, "Python Crash Course, A Hands on Project Based Introduction to Programming", 2nd Edition, No Starch Press, 2019

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop proficiency in writing simple Python programs to solve basic computational problems.	1,2,3,8
2	Explore control flow structures including conditionals (if statements), loops (for and while loops), and exceptions.	1,2,8
3	Demonstrate the importance of modular programming through the creation and use of functions.	1,2,8
4	Evaluate the essential data structures in Python, including lists, tuples, sets, and dictionaries.	1,2,8
5	Examine key Python libraries and modules, such as NumPy for numerical computing and Pandas for data manipulation	1,2,8

	SEMESTER	– IV										
Course Title	Techno Professional Skills III											
Course code	22BCAO224R Total credits:	1	L	T	P S	R	O/F	C				
	Total hours: 3	80P	0	0	2 0	0	0	1				
Pre-	Co-req	uisite				Nil						
requisite												
Programme	Bachelor of Co	mputer Ap	plic	ation								
Semester	Fall/ IV semester of the second year of the program											
Course	1. To have a detailed revision of C	omputer Sc	ieno	ce & 1	Inform	nation	n Tec	hnology				
Objectives	concepts learnt so far.		_			_						
	2. To become confident in Computer S		ifor	mation	Tech	nolog	gy cor	icepts to				
	solve problems in real-life situations		c	· ·	1 .	1 1		1 .				
	3. Teaching students how to mana				-			_				
	execution, and monitoring, as well	as undersu	anu	ing pro	ject ii	песу	cies,	resource				
CO1	management, and risk assessment. Apply Network Programming to make e	efficient use	of	variou	c raco	urca	a vai	lable on				
	different machines in a network.	illelellt use	01	variou	5 1050	urces	s avai	iable on				
	Implementation of object-oriented based	nroiects										
	-		nies	s / insti	tution	S						
	Design and develop databases applications for companies / institutions Implement normalization algorithms using database design theory for different											
	applications											
	Analyse and implement transaction processing, concurrency control and database											
	recovery protocols in databases.											
Unit-No.	Content	Contact		Learn	ing O	utcor	ne	KL				
		Hour			Ö							
I	Computer Application Fundamentals and	4	Uno	derstan	d hard	lware	and	1,2				
	Office automation and Web Technology		soft	ware,	Micros	soft		,				
			Off	ice, Go	ogle							
			Wo	rkspac	e, HTI	ML.						
II (C Programming and Data Structures in C	6	Uno	derstan	d Fun	dame	entals	1,2				
		C Programming and Data Structures in C 6 Understand Fundamentals 1,2 of C Language, Data										
	Types and Operators,											
			Typ	es and	Opera	ators,						
			Typ Cor	es and ntrol St	Opera ructur	ators, es,	,					
			Typ Cor Fun	oes and ntrol St actions.	Operaructur Array	ators, es, /s an	,					
			Typ Cor Fun Stri	pes and ntrol St actions, ngs, Po	Operaructur Array	ators, es, ys and	, d					
			Typ Cor Fun Stri Stri	nes and ntrol St nctions, ngs, Po nctures	Operaructur Array ointers and U	ators, es, ys and	, d					
	Digital Electronics and Computer		Typ Cor Fun Stri Stri File	nes and ntrol St nctions, ngs, Po nctures Hand	Operation of the Control of the Cont	es, ys and ynion	d s,	1.2				
	Digital Electronics and Computer	6	Typ Cor Fun Stri Stri File	nes and ntrol St nctions, ngs, Po nctures Hand derstan	Operaructur, Array ointers and Uling.	ators, es, ys and ys Union	d s,	1,2				
	Digital Electronics and Computer Organization and Architecture	6	Typ Cor Fun Stri Stri File Und Sys	pes and actions, ngs, Pouctures e Hand derstan tems, I	Operaructur, Array ointers and Uling.	es, ys and ys and Jnion of Dig	d s,					
	~	6	Typ Cor Fun Stri Stru File Und Sys and	pes and actions, ngs, Ponctures e Hand derstan tems, I	Operaructur, Array ointers and Uling. ding o	es, ys and Jnion of Dig er Sy	d ss, gital stems					
	~	6	Typ Cor Fun Stri Stru File Und Sys and Alg	pes and ntrol Stactions, ngs, Ponctures Hand derstand tems, I Codes ebra an	Operaructur, Arrayointers and Uling. ding on Numbers, Booland Log	es, ys and ynion of Dig er Sylean gic G	d s, gital stems ates,					
	~	6	Typ Cor Fun Stri Stru File Und Sys and Alg Cor	pes and actions, ngs, Ponctures e Hand derstan tems, I	Operaructur, Arrayointers and Uling. ding o Number, Bool nd Log Organ	es, ys and Jinion of Dig er Sy lean gic G nizati	d ss, gital stems ates, on,					
	~	6	Typ Cor Fun Stri Stri Elle Und Sys and Alg Cor CPI	pes and actions, ngs, Ponctures e Hand derstan tems, I Codes ebra an mputer	Operaructur, Array ointers and Uling. ding of Numbers, Bool and Log Organitecturing.	es, ys and ys and of Dig er Sy lean gic G nizati re and	d ss, gital stems ates, on,					

			Process and Memory	
			Management, Linux -	
			Installation and	
T 7	DDMG 100D' G		Configuration.	1.0
V	DBMS and OOP in C++	6	Understanding DBMS -	1,2
			Database Models, SQL,	
			OOP - C++ Syntax and	
			Structure, Classes and	
			Objects,	
	Practical			
Practical 1	Write a program of matrix operation (+,	2	Creating C++ program to	5
	-, *) using operator overloading whose		perform different matrix	
	class name is Matrix. Defining the rows		operations (+ - / *)	
	and column size as 100.			
Practical 2	Write a C++ program using Virtual	2	Creating a C++ program	5
	function to display car or scooter from		using virtual functions to	
	Vehicle class		display scooter from	
			vehicle class	
Practical 3	Write a C++ program of multiplication	2	Creating a C++ program to	5
	of two metric using multiple	_	perform matrix	
	inheritance. That is one matrix form		multiplications using	
	class A and another matrix from class		multiple inheritance.	
	B		muniple infernance.	
D 4: 14			Constitute Contraction	
Practical 4	A supermarket chain has asked you to	2	Creating a C++ program	5
	develop an automatic checkout system.		to find the solution to the	
	All products are identifiable by means		given problem.	
	of a barcode and the product name.			
	Groceries are either sold in packages or			
	by weight. Packed goods have fixed			
	prices. The price of groceries sold by			
	weight is calculated by multiplying the			
	weight by the current price per kilo.			
	Develop the classes needed to represent			
	the products first and organize them			
	hierarchically. The Product class, which			
	contains generic information on all			
	products (barcode, name, etc.), can be			
	used as a base class. The Product class			
	contains two data members of type long			
	used for storing barcodes and the			
	product name. Define a constructor			
	with parameters for both data members.			
	Add default values for the parameters to			
	provide a default constructor for the			
	class. In addition to the access methods			
	setCode() and getCode(), also define			
	the methods scanner() and printer(). For			
	printer(). Tot		l .	

	4-4			
	test purposes, these methods will			
	simply output product data on screen or			
	read the data of a product from the			
	keyboard. The next step involves			
	developing special cases of the Product			
	class. Define two classes derived from			
	Product, PrepackedFood and			
	, <u>*</u>			
	FreshFood. In addition to the product			
	data, the PrepackedFood class should			
	contain the unit price and the			
	FreshFood class should contain a			
	weight and a price per kilo as data			
	members.			
	In both classes define a constructor with			
	parameters providing default-values			
	for all data members. Use both the base			
	and member initializer.			
	Define the access methods needed for			
	the new data members. Also redefine			
	the methods scanner() and printer() to			
	take the new data members into			
	consideration.			
	Test the various classes in a main			
	function that creates two objects each of			
	the types Product, PrepackedFood and			
	FreshFood. One object of each type is			
	fully initialized in the object definition.			
	Use the default constructor to create the			
	other object. Test the get and set			
	methods and the scanner() method and			
	display the products on screen.			
Practical 5	Derive two classes, DepAcc and	2	Creating a C++ program to	5
	SavAcc, from the Account class, which		find the solution to the	
	was defined. Additionally define an		given problem using class.	
	overdraft limit and an interest rate for			
	the DepAcc class. The SavAcc contains			
	the members of the base class and an			
	interest rate. For both classes, define			
	constructors to provide default values			
	_			
	for all parameters, add access methods,			
	and add a display() method for screen			
	output. Test the new classes by			
	initializing objects of the DepAcc and			
	SavAcc types in the object declarations			
	and outputting them. Then modify both			
	a savings and a deposit account			
	interactively and display the new			
L	l .		ll	

	values.						
Practical 6	The cla	asses Car	and PassCa	r are to	2	Creating a C++ program to	5
	modify	to allow	objects to be	e created		find the solution to the	
	and de	stroyed. Ir	addition,	the class		given problem using class	
	Truck	is to be	added to t	he class		and object.	
	hierarcl	hy.					
	Change	the classes	Car and Pa	assCar to			
	make	the con	structor iss	sue the			
	followi	ng message	e: "Creating	an object			
	of type	"					
	Define	a destruct	or for the	Car and			
	PassCa	r classes. T	The destructo	or should			
	issue	the fo	ollowing	message:			
	"Destro	ying an ob	ject of type	"			
	Then de	efine the c	lass Truck,	which is			
	derived	from C	ar, using t	the data			
	membe	rs shown o	pposite, a con	nstructor,			
	a destru	actor, and the	he additional	methods			
	shown	opposite.					
	Implem	ent the con	structor for t	he Truck			
	class—	the constr	ructor shoul	ld again			
	issue a	suitable m	essage. Use	the base			
	initializ	er to initial	lize the data	members			
	of Car.	Define a d	estructor for	Truck—			
	the de	structor sh	ould again	issue a			
	suitable	e message f	or trucks.				
		•	create and				
			ect in you				
		•	ed by the use				
	-	-	create and				
		• •	s PassCar an				
Practical 7			ry to display		2	Create a program for	5
	_		om Employ			creating tables and find the	
	(Emp_l	•	-	partment,		solution to the query for	
		? (Nested C	(uery)			finding the second highest	
	Or Write a	COL Ower	, to disular T	71		salary.	
			to display E king second				
	salary?		king second	i ilighest			
	Sarary:						
	Emp	Emp_	Dept	Salar			
	_Id	name	Бері				
	1	Ram	IT	y 2000			
	1	IXIIII	11	0			
	2	Tom	Civil				
	~	10111	CIVII	3000			
]	<u> </u>	U			

	3	Anita	HR	4000			
				0			
	4 5	Sobha	Mechani	3000			
		7 1	cal	0			
	5	Sandya	Electrica 1	5000			
			1	0			
Practical 8		long wi	display all th the nung in that?	_	2	Creating a table and find the query to display all the department names along with the number of	5
	Emp_I	Emp_	Dept	Salar		employees.	
	d	name		У			
	1	Ram	IT	2000			
	2	Tom	Civil	3000			
	2	10111	Civii	0			
	3	Anita	HR	4000			
				0			
	4	Sobha	HR	3000			
				0			
	5	Sandya	IT	5000			
				0			
Practical 9	Write a o	nnery to	display all	the dept	2	Creating a table and	5
2100020029			ers of emplo		_	display the department	
	less than					name where numbers of	
	Or					employees are less than 2	
			lisplay all th				
	employee		where num	ibers of			
	employee	s are 1688	man 2.				
	Г .	Tr	F	l a 1			
	Emp_I d	Emp_ name	Dept	Salar			
	1	Ram	IT	у 2000			
		Kuili		0			
	2	Tom	Civil	3000			
		<u></u> _		0			
	3	Anita	HR	4000			
				0			
	4	Sobha	HR	3000			

						0							
	5		Sandya	IT		5000							
		'	Janaya	. 11		0							
Practical 10	Write	guer	v to d	isplay hi	ahesi		2	Creating a table and	5				
1 Tactical 10				id name o			display the highest salary		3				
	_			est salary.		ipioyee		department wise, and					
	WIIO IS	iakiii	g mgne	st salaiy.				highest salary among					
	Emp. I	Enn I Enn n D (C1				Emp_I Emp_n Dept Salar						employee.	
	d d	1	-	Бері				employee.					
	1		ame	IT		y 2000							
	1		Ram	IT		2000							
	2	-	Т	C::1									
	2		Гот	Civil		3000							
				***		0							
	3	4	Anita	HR		4000							
						0							
	4		Sobha	HR		3000							
						0							
	5		Sandya	IT		5000							
						0							
Practical 11	Find the	nam	e of th	e employ	2	Creating a table and	5						
	working	g on a	a proje	ct.				finding the name of the					
								employees who are					
	Employe	ee						working on a project.					
	Emp_I	d	Emp_	name	Address								
	1		Ram		Assam								
	2		Tom		Delhi								
	3		Anita		Kolkata								
	4		Anus	ka	Manipur								
	5		Romi			galan							
					d	<i>6</i>							
	6		Sarm	ila		pura							
	7			handr		sam							
	'		a	manar	7 10	3 u 111							
	Project												
	Pro_	Pro	na	Location	<u> </u>	Em							
	Id	me		Location	1								
	Iu	IIIC	,			p_ Id							
	P1	Dat	0	Bangalor		1							
	FI			Dangaro	16	1							
			aly										
	D2	st		TT1. 1	1	_							
	P2	ΑI		Hyderab	oaa	5							
	D2	777		C1 '		2							
	P3	We	b	Chennai		3							

		Devel opmen						
		t						
	P4	Big Data	Mumbai	ĺ	4			
	P5	Androi d	Delhi		1			
Practical 12	Find th	e detail o	f Employ	/ee	who is	2	Creating a table and	5
	working	g on at leas	t one Proj	ect.			finding the detail of an	
	Employe	ee					employee who is working on at least one project.	
	Emp_I	Emp_r	name	Ad	dress			
	d							
	1	Ram			sam			
	2	Tom		De				
	3	Anita			lkata			
	4	Anusk			ınipur			
	5	Romit	a		galan			
	6	Sarmi	0	d	pura			
	7	Ramel			sam			
	/	Kanici	lanura	Asi	Saiii			
	Project							
	Pro_	Pro_na	Location		Emp_			
	Id	me			Id			
	P1	Data	Bangalo	r	1			
		Analy st	e					
	P2	AI	Hyderab	,	5			
	12	111	ad		J			
	P3	Web	Chennai		3			
		Devel						
		opmen						
		t						
	P4	Big Data	Mumbai		4			
	P5	Androi	Delhi		2			
		d						
Practical 13		_	yees who	wo	rk in a	2	Creating a table and	5
	departn	nent.					finding the employees who	
	Employe	26					work in the department.	
	Emp_I		_name	Ad	dress			
	1	Ram			sam			
	2	Tom		De				
<u> </u>	1	I					1	

	3		Anita	1	Ko	lkata			
	4		Anus	ka		nipur			
	5		Rom	ita		galan			
					d				
	6		Sarm	ila	Tripura				
	7		Ramo	chandr	Ass	sam			
			a						
	De	_	ment						
	Dep	Dep	pt_n	Location	n	Em			
	t_I	am	ne			p_I			
	d	-				d			
	D1	Dat		Bangalo	re	1			
			naly						
	D2	st AI		Hyderat	and.	5			
	D2	AI		Tryuciau	au	3			
	D3	We	b	Chennai	ĺ	3			
		De	evel						
		op	men						
		t				4			
	D4	Big Da		Mumbai	Mumbai				
	D5	And	droi	Delhi		2			
		d							
Dunatical 14	Calast C	41	4 Т.1 -	l		عميد الم	2	Cuestine e table and	
Practical 14				rom Stud				Creating a table and displaying the student id	
	Join)	0 00	urses r	iom stud	y tao	16.(3611		who is enrolled in at least	
	Study							two courses.	
	Studen	t	Cours	e Id	Time	_Sinc			
	_Id				e				
	S1		C1		2015				
	S2		C2		2018				
	S1		C2		2018				
	S3		C3		2016				
Practical 15	Find th	ie e	mploy	ee name	e, A	ddress,		Creating a table and	5
	_			and Loca				finding the employee	
		ork i	in a de	epartment	usir	ng Left		details from the table	
	join.							using left join.	
	Employ		F		A 11.				
	Emp_I d		Emp_r	iame	Addr	ess			
	1		Ram	+	Assa	m			
	2		Tom		Delh				
	3		Anita		Kolk				
			. x1111U		17011	uu			

	4	An	uska	1	M	anipur						
	5 Rom											
						galand						
	6		rmila mchandr			ipura						
	7		nch	andr As		anur As		anur Ass		sam		
		a										
	Departm	nent										
	Dep	Dept_1	1	Locati	on	Emp_						
	t_I	ame	.1	Locan	OII	Id						
	d	anne				10						
	D1	Data		Banga	lor	1						
		Analy	,	e	101	1						
		st		•								
	D2	AI		Hydera	ah	5						
				ad								
	D3	Web		Chenn	ai	3						
		Devel										
		opme	n									
		t										
	D4	Big		Mumb	ai	4						
		Data										
	D5	Andro	i	Delhi		2						
		d										
Practical 16							Creating a table and	5				
						on details	finding the name, address,					
		ork in a	dep	artmen	t usi	ing Right	department name, and					
	join.						location using right join					
	Employ		г		ı	A 1 1						
	Emp_I	a		Emp_nam		Addres						
	1		e Do			S						
	1		Ra			Assam						
	2		То			Delhi						
	3		An	nita		Kolkat						
	4			1		a Maniana						
	4		An	nuska		Manipu						
			D			r No1-						
	5		Ko	mita		Nagala						
			C -			nd						
	6		Sa	rmila		Tripura						
	7		Pa	mchand	1	Assam						
	<i>'</i>		ra		*	2 1 334111						
			Tu	•								
	Departm	nent										
	- Sparan											

Dept_	Dept_n	Locatio	Emp_
Id	ame	n	Id
D1	Data	Bangal	1
	Analy	ore	
	st		
D2	AI	Hydera	5
		bad	
D3	Web	Chenna	3
	Devel	i	
	opmen		
	t		
D4	Big	Mumb	4
	Data	ai	
D5	Androi	Delhi	2
	d		

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- 2. Pradip Dey, Manas Ghosh, "Programming in C", 2nd Edition, 2018, Oxford University
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- 3. M. Morris Mano and Michael D. Ciletti, Digital Design- With an Introduction to the Verilog HDL, VHDL, and SystemVerilog, Pearson.
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- 5. Horowitz and Sahni, Fundamentals of Data Structures in C, University Press.
- 6. Stallings, Computer Organization & Architecture, Pearson.
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	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Apply Network Programming to make efficient use of various resources available on different machines in a network.	1,2,3							
2	Implementation of object-oriented based projects.	1,2,3,4							
3	Design and develop databases applications for companies / institutions	1,2,3							

4	Implement normalization algorithms using database design	1,2,3
	theory for different applications	
5	Analyse and implement transaction processing,	1,2,3
	concurrency control and database recovery protocols in	
	databases.	

		SEMESTI	ER – IV						
Course Title		CO-CURR	ICULAI	RAC	TIV	ITIE	S		
Course code	22UBCC211	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 4		0	0	4	0	0	1
		hrs							
Pre-requisite	Nil	Co-requisite					Nil		
Programme	Bachelor of Computer Applications								
Semester	Fall/ I semester of the second year of the program								
Course	•	e social and soft ski							
Objectives	_	holistic developme							
	3. To Provide scenarios.	opportunities to	apply t	heore	etical	kno	owled	ge in r	eal-world
CO1	Connect and adap	t cultural diversity	among c	omn	nuniti	es.			
CO2	Develop team for	working toward a s	shared vi	ision					
CO3		apply interdiscipling	•	necti	ions a	and C	Cultiva	ate spirit	of creative
CO4	Build effectively	communicate, deleg	gate resp	onsil	bilitie	s and	l moti	vate tean	n members.
CO5	Improve strong te	amwork and collab	oration s	skills	by e	ngagi	ng in	group ac	tivities.
Unit-No.	Con	tent	Contac Hour		Lea	rnin	g Out	come	KL
I	AdtU encourages	activities that are	4	Г	emo	nstrat	e im	proved	1,2,3,4
	aimed to develop	the social and soft		p	rofici	ency		in	
	skills of students	and promote a		p	rogra	mmi	ng, so	oftware	
	holistic developme	ent of the learners.		d	evelo	pmei	nt, aı	nd the	
	Keeping in mind	~			se	of		various	
	learning methodo					_	al too	ols and	
	0 0	lifferent activities		•	latfor				
	other than their	~			pply			oretical	
	Experts are inv				nowl	edge	to	real-	
	workshops that be				orld	1	•	oblems	
	_	are conducted to			roug		_	rojects,	
	enhance the kn	•			nterns	•		and	
		al seminars help		11	ndusti	ry co.	Habor	ations.	
	them to develo	op their public							
	speaking abilities.								

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
CO1	Connect and adapt cultural diversity among communities.	4,5,6,7,8
CO2	Developed team for working toward a shared vision	4,5,6,7,8
CO3	Demonstrate and apply interdisciplinary connections and Cultivate spirit of creative thought and curiosity to achieve goals	4,5,6,7,8
CO4	Build effectively communicate, delegate responsibilities and motivate team members.	6,7,8
CO5	Improve strong teamwork and collaboration skills by engaging in group activities.	6,7,8

		SEMESTE	ER – IV						
Course Title		Extra-Curricular							
Course code	23UBEC211	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 4	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		•
Programme		Bachelor of	Compu	ter A	pplic	cation	ns		
Semester	F	all/ I semester of t	he seco	nd ye	ear of	the	progr	am	
Course	1. To develop pro	oblem-solving abili	ties thro	ough	codin	g cha	lleng	es and ha	ckathons.
Objectives	2. To participate	in app developmen	t contes	ts an	d exh	ibitio	ns.		
	To develop en	trepreneurial skills	and mir	idset.					
CO1	Importance of diff	erent activities unde	er differ	ent c	lubs.				
CO2	Formulate regular	activities like wo	rkshops	, cor	npetit	ions	as pe	er their i	nterest and
	hobbies.								
CO3	Adapt to represe	nt ADTU in vari	ous inte	er ui	nivers	sity,	state	and nat	ional level
	competitions.								
CO4		ed experts in their re							
CO5		iation for diverse for							
Unit-No.	Con	tent	Contac		Lea	rnin	g Out	come	KL
			Hour						
	AdtU encourage	-	2		emon			mproved	
	activities outsid	0			rofici	-		in	
	curriculum interest,	nded to meet			rogra		-	software d the use	
	are aimed to deve					_		ndlogical	
	soft skills and p	-					atforr	•	
	development of				pply	na pi		ns. eoretical	
	Keeping in mind					edae		al-world	
	learning methodo	-			roble		10 10	through	
	are engaged in o			_			ternsh	ips, and	
	headed under dif							ations.	
	Dance, music, ph					., •			
	literary etc., The	O 1 0							
	encouraged to par								
	club activities								
	competitions as pe	-							
	hobbies, The stu-	dent members of							
	the club are traine	ed represent AdtU							
	in various inter I	Jniversity student							
	and national le	vel competitions,							
	Renewed personal	ities are invited to							
	conduct workshop	s that benefit the							
	members and stu	idents by giving							
	them the platform	m to learn from							
	experts.								

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students' engagement in different activities under different clubs.	2,3,4,5,6,7
2	Role play in regular activities like workshops, competitions as per their interest and hobbies.	2,3,4,5,6,7
3	Adapt and trained to represent ADTU in various inter university, state and national level competitions.	2,3,4,5,6,7,8
4	The students will be given a platform to earn from invited experts in their respective fields.	2,3,4,5,6,7,8
5	Develop an appreciation for diverse forms of artistic expression.	2,3,5,6,7,8

		SEMESTE	R – IV						
Course Title	ENGLISH FO	R EMPLOYABIL	ITY (Co	mmı	ınica	tive I	Englis	sh, Soft S	kills &
		Logi	cal Reas	onin	g)				
Course code	22UBPD222R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 60P	0	0	4	0	0	0	2
Pre-requisite	English	Co-requisite					Nil		
	Language for								
	Excellence								
Programme		All the Under							
Semester		ter/II Semester of							
Course		e students with Pub	lic Speal	cing a	and he	elping	g then	n overcon	ne stage
Objectives	fear.								
		ne writing skills in o	different	areas	sinclu	ıding	CV a	and cover	letter
	writing.								
		dents, know about t	the email	l etiq	uettes	and	draft j	profession	nal
	emails.	1	. 1	1	. 1			1.4	
	_	productivity of stud	ents by i	ınaer	stana	ıng n	ow to	regulate	
	disagreement 5. To prepare str	· ·	a intomi	orre 1	sv onl	onoi	na int	anzianz alz	;11 ₀
		udents for upcoming n prepare for variou	_		-		-		
	drives.	ii prepare for variou	is public	anu j	privai	e sec	ioi ex	anis & pi	acement
		ne analytical skill ar	nd proble	-m-sc	olvino	skill	of th	e students	2
CO1		cript preparation ar							
	to effective public								F
CO2	_	ability in drafting c	lear, con	cise,	and e	ffect	ive en	nails.	
CO3	•	on, submission, a							esses for
	resumes.				C			0 1	
CO4	Build conflict man	agement skills with	in thems	elves	S.				
CO5	Plan efficiently for	or discussions in d	ifferent	platf	orms	by e	nhan	cing their	thought
	process and proble								
Unit-No.	Con	tent	Contac	t	Lea	rnin	g Out	come	KL
			Hour						
I	Public Speaking:		10	Ur	nderst	and a	nd ov	ercome	1,2
	1.Preparation of	*				_		peaking,	
		onverbal cues of			•		•	gies to	
	Public Speaking				_		deliv	very and	
	- C	and Overcoming		co	nfidei	ice.			
	Fear of Public Spe	-							
	3.Practice strate	gies of Public							
	Speaking								
	Pipe and cistern								
		on of pipes and							
	cistern								
	_	fferent types							
	of questions								

II	Practical session on Resume	10	Students will master the	2,3
	and Cover letter:		creation, submission, and	•
	i. Preparation, submission &		understanding of screening	
	screening of Resume.		processes for resumes.	
	ii. Practical session on cover			
	letter screening session			
	Mixture			
	allegation and Clock			
	i.Introduction of basics			
	ii. Solving questions on			
	mixture			
III	Email Etiquettes	15	Identify, address, and	1,2,3
	I. Different Parts of Email and	10	resolve conflicts	1,2,5
	Usage		effectively, enhancing their	
	ii. Drafting emails effectively		ability to maintain positive	
	Statement and Course of action		and productive	
	i. Revision of syllogism		relationships in both	
	ii. Statement and conclusion Iii.		personal and professional	
	Course of action based on		settings.	
			settings.	
IV	statement Interview Skills (Mosk gassions)	15	Familiarity with Common	2,3
1 V	Interview Skills (Mock sessions)	15	· ·	2,3
	I. Preparing Commonly Asked Interview		Interview Questions,	
			Practice in Answering	
	Questions		Interview Questions,	
	ii. Mock Interview sessions Sitting		Feedback and	
	arrangement (puzzle)		Improvement, Building	
	i.Linear arrangement puzzle		Confidence, Understanding	
	ii.Circular arrangement puzzle		Sitting Arrangement	
	iii. Matrix		Puzzles, Enhancing Logical	
			Reasoning Skills,	
			Teamwork and	
			Collaboration, Preparedness	
			for Assessment Tests	
V	Conflict Management	10	Understand what conflict	1,2,3,4
	i. Definition		management entails,	
	ii.Type of Conflict		including the identification,	
	Management		resolution, and mitigation	
	iii. Effects of Conflict		of conflicts in various	
	Management		contexts, concepts related	
			to profit and loss, including	
	Profit loss and discount		revenue, costs, profit	
	i.Introduction to basics		margin, concept of	
	ii.Introduction to discount		discounting, including types	
	iii. Probems related on the		of discounts and their	
	topic		significance in pricing	
			strategies.	

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- 5. English for Academic CVs, Resumes, and Online Profiles, Adrian Wallwork, Publisher:Springer International Publishing
- 6. Employment & Volunteering: Job Interview Basics, Lisa Renaud, Publisher:Classroom Complete Press

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- 7. Dressology: The Science of Power Dressing, Nandita Pandey, Publisher: Pan Macmillan

OTHER LEARNING RESOURCES:

1. https://learning.shine.com/talenteconomy/career-help/top-group-discussion-skills/https://www.coursera.org/articles/conflict-management

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop skills in script preparation and understand nonverbal communication pivotal to effective public speaking.	1,3 & 4
2	Improve student's ability in drafting clear, concise, and effective emails.	1,2
3	Master the creation, submission, and understanding of screening processes for resumes.	7.9,10
4	Build conflict management skills within themselves.	5,7
5	Plan efficiently for discussions in different platforms by enhancing their thought process and problem-solving skills	5,8

		SEMESTER	– IV						
Course Title		MOOCS III (Inte	ermed	liate l	Postg	reSQ	L)		
Course code	22MOSY222R	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours:	0	0	0	0	0	0	1
Pre-requisite	Nil	Co-requisite		•	•]	Nil	•	•
Programme			BCA						
Semester	Wint	ter/II Semester of S	econd	Year	r of th	ne Pr	ograi	nme	
Course	1. To understand	d advanced SQL te	chniqu	ues b	eyond	l basi	ic CF	RUD ope	rations in
Objectives	PostgreSQL.								
		pply aggregation me			_				
		e use of transacti	ons i	n Po	stgreS	SQL	for o	data inte	grity and
	concurrency c			a a	X 7 C'1				
		iency in reading and	parsii	ng CS	V file	es and	ınse	rting the o	data into a
	PostgreSQL d		COL 's	hond	11in ~ a	ndin	danie	a of tout	doto
	_	d understand Postgre			_			-	
	^	and execute advan				_		•	
	managing data		ca b	QL Ç	[ucrre.	3 101	30111	116, 6104	ping, und
		lar expressions and	other	techn	iques	for w	orkii	ng with te	xt data in
	PostgreSQL.				•			C	
CO1	Advanced SQL Pro	oficiency: Develop a	dvance	ed pro	oficier	ncy in	SQL	techniqu	ies
	beyond basic CRU	D operations, includ	ng ag	grega	tion, t	ransa	ction	s, and dat	a
	manipulation.								
CO2	Effective Data Han	dling: Master the ski	lls to	effici	ently l	handl	e data	a, includii	ng
		g CSV files, inserting	g data	into d	lataba	ses, a	nd m	anaging t	ext data
	through PostgreSQ								
CO3		nent Skills: Gain prac		•			_		emas,
		cedures, and utilizing	ginde	xing f	or opt	timizi	ng da	itabase	
CO4	performance.	· · · · · · · · · · · · · · · · · · ·	, 1		, 1		1.00	, ·	C
CO4		onstruction: Construction analyzing data, e					_	•	ior
	manipulation.	ind analyzing data, e	naom	ig em	cuve	uata	ieuie	vai aiiu	
CO5	•	ation: Apply techniq	iies sii	ıch as	regul	ar ex	nress	ions to m	anipulate
003	•	databases, enhancir			•		•		•
	flexibility.		-6	т. Р	0000	8	ap ac		ie queij
Unit-No.	Content	Contact H	our		Lea	rning	Out	come	KL
I	SQL Techniques	7		Ur	nderst			SQL	2
				Fu	ndam	entals	s,	Database	
				Dε	esign	aı	nd	Schema	ι
				Dε				Retrieval	l
				an		lanip		n, Data	ι
					odific			and	
					ansac	tions,		DL and	
					ML,	. •		formance	
				Op	otimiz	ation	and	Indexing	,

			Data Analysis and	
			Reporting, Security and	
			Access Control.	
			Access Control.	
II	Using SQL Techniques	4	-	1,2,3
			Fundamentals, Data	
			Retrieval, Data	
			Manipulation, Joins and	
			Subqueries, Data	
			Definition, DCL,	
			Transaction Management,	
			Performance Optimization,	
			Data Analysis and	
			Reporting, Advanced SQL	
			Techniques, Integration	
			with Programming	
	T		Administration.	2.5
III	Text in PostgreSQL	2	Understanding Text Data	3,5
			Types, Basic Text	
			Manipulation, Text	
			Functions and Operators,	
			Pattern Matching and	
			Regular Expressions, Text	
			Searching and Full-Text	
			Search, Text Indexing, Case	
			Conversion and Formatting,	
			Text Aggregation and	
			Analysis, Handling	
			Multilingual Text, Practical	
			Applications.	
IV	Regular Expressions	3	Understanding Regular	4,5
			Expression Syntax, Pattern	
			Matching, Text Searching,	
			Text Extraction and	
			Substitution, Advanced	
			Regex Features, Regex in	
			Programming Languages,	
			Regex for Validation,	
			<u> </u>	
			Performance Optimization,	
			Debugging and Testing,	
			Practical Applications.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome

	Advanced SQL Proficiency: Develop advanced proficiency	
1	in SQL techniques beyond basic CRUD operations,	2,3,7,8
	including aggregation, transactions, and data manipulation.	2,3,7,6
	Effective Data Handling: Master the skills to efficiently	
2	handle data, including reading and parsing CSV files,	
2	inserting data into databases, and managing text data	2,3,7,8
	through PostgreSQL.	
	Database Management Skills: Gain practical experience in	
3	altering table schemas, creating stored procedures, and	2278
	utilizing indexing for optimizing database performance.	2,3,7,8
	Complex Query Construction: Construct and execute	
4	advanced SQL queries for sorting, grouping, and analyzing	12270
	data, enabling effective data retrieval and manipulation.	1,2,3,7,8
	Text Data Manipulation: Apply techniques such as regular	
5	expressions to manipulate text data within databases,	
3	enhancing data processing capabilities and query	2,3,8
	flexibility.	

		SEMESTE	R – IV					
Course Title	Ge	eneric Elective II (S	Strategy	of C	ontent]	Marketi	ng)	
Course code	22BCAO225R	Total credits: 1	L	T	P	S R	O/F	C
		Total hours:	0	0	0	0 0	0	1
Pre-requisite	Nil	Co-requisite				Nil		
Programme			BCA					
Semester		nter/II Semester of						
Course		the fundamental str	rategies	used	in conte	ent mark	teting for	acquiring
Objectives	and retaining of						_	
	_	rganize, and implem					-	es.
	•	d measure the effect				•		
CO1	_	rinciples of writing of		_				:.:4:
CO1	and retention.	ontent marketing str	rategies	ana t	neir roie	in cusic	mer acqu	ISILION
CO2		nprehensive content	morkoti	na et	rotogy to	ilorad te	s specific 1	husinoss
CO2	goals.	aprenensive content	mai Kell	ng su	iaicgy la	moreu (specific	ousiness
CO3	-	implement content n	narketin	g nla	ns effect	tively		
CO4	Ŭ	nt marketing perform		<u> </u>			rics and to	ols
CO5	·	ribution plan for cor					ies una to	015.
Unit-No.	^	ntent	Contac			ing Out	come	KL
Omt-110.	Col	itent	Hour		Lain	ing Out	Conic	KL
I	The Content Mark	eting Ecosystem	3		nderstan	ding	Content	2
-		eving 2005) stem			arketing	· ·	lamentals,	_
					_		e Content	
					arketing		cosystem,	
				Αι	ıdience	Resea	rch and	
				Pe	rsona	Deve	elopment,	
				Co	ontent		Strategy	
				De	evelopm	ent,	Content	
				Cr	eation	and Sto	orytelling,	
							, Content	
							romotion,	
				SE		and	Content	
					otimizati		Content	
					easurem		and Content	
					nalytics,		ology and	
					_		and Best	
					actices.	icius a	ina Dest	
II	The Strategic (Context (The 7A	3			ding the	Content	1,3
11	Framework)	Sometic (The //1	J			_	stem, 7A	1,5
	2 1 11111				_	•	ration of	
						mework		
III	Mapping the Jo	urney: Crafting a	6		nderstan		the	3,4
	Content Marketing	•				_	Content	•
					arketing		Strategy,	
				Co	onductin	g	Audience	

			Research, Setting Clear Objectives and Goals, Content Audit and Gap Analysis, developing a	
			Content Plan, Creating Engaging and Valuable Content, Content	
			Distribution and Promotion, Utilizing Content Management Tools and Platforms, Measuring and	
			Analyzing Performance, Optimizing and Refining the Strategy, Developing a Content Calendar.	
IV	The Strategic Types of Content	6	Advanced Technical Proficiency, Professional Communication, Project Management, Problem- Solving and Critical Thinking, Team Collaboration, Industry Awareness, Ethical and Professional Responsibility, Career Preparation.	

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Explain core content marketing strategies and their role in customer acquisition and retention.	1,2,3,5,6,7,8						
2	Develop a comprehensive content marketing strategy tailored to specific business goals.	1,2,3,5,6,7,8						
3	Organize and implement content marketing plans effectively.	1,2,3,5,6,7,8						
4	Analyze content marketing performance using appropriate metrics and tools.	1,2,3,5,6,7,8						
5	Develop a distribution plan for content across various channels	1,2,3,4						

SEMESTER – IV											
Course Title	BASIC ACCLIMATIZING SKILLS (BAS)										
Course code	22UULS201R	Total credits: 1		L	T	P	S	R	O/F	С	
		Total hours: 30	P	0	0	2	0	0	0	1	
Pre-requisite	Nil Co-requisite							Nil			
Programme	All the Under Graduate Programmes										
Semester		Fall/I or Winter/II Semester of Second Year of the Programme									
Course	_	owledge of the fur	ndam	ental	s of l	Hospit	ality	indus	try and i	ts	
Objectives	applications.										
	2. Students will be able to familiarize with the cooking equipment & Utensils.										
901		be able to handle					eserva	ations	•		
CO1	Students will have	basic knowledge	of co	okin	g me	thods.					
GOA	G. 1 '11 '				0 4	~1 .					
CO2	Students will gain							Roor	ns.		
CO3	Students will be ab						_	1	111		
CO4	Students will be a	ble to acquire the	e kno	owled	ige o	of basi	c ho	useho	ids' ame	enities for	
COF	day- to-day use.	nortones of time	morr	oro res	ant a	ad a==	ori-	tion:	n 0001!	oticina ta	
CO5	Understand the imnew academic dem	•	шапа	igeme	zm al	iu org	amze	เนยก 1	ii acciim	atizilig to	
Unit-No.			- 1	Cont	00	Loo	rnina	· Out	come	KL	
UIIII-NO.	No. Content					Lea	CIIIII	z Out	come	KL	
I	Introduction to	Accommodati		t Ho		escrib	e i	lustra	ite, and	1,2	
1		Telephone handli		,					nization	1,2	
	_	nizing of Room	-			ınd		_	inctions,		
		cleaning equipme				nicros	copy		and		
	and uses, Bed ma					tructu			ices.		
II	Fundamentals	of Cookii	ng:	10	D	escrib	e, il	lustra	ite, and	1,2	
	Definition of	cookery –Aim	&		ϵ	xplair	ì	m	embrane		
	Objectives of co	oking, Use of ba	sic		S	tructu	re, f	uncti	on; cell		
		pment, Person			C	organiz	zatioi	ı, a	nd the		
		fety, Use of Fire	&		_	rotein		involv	ed in		
	Fuels					ranspo					
III		Cooking: Differe	ent	10					ite, and	1,2	
	Cuts.	1 C-:				xplair			nosomal		
	Use of Herbs and Basic Food	•			S	tructu	re an	a type	es.		
	Preparation.	and Bevera	ige								
	Regional food H	ahite									
IV	Forms & Forma			8	D	escrih	e i	lustra	ite, and	1,2	
1,	Reservation form			U					anism of		
	Registration form					ell-to-			01		
	Passport Applica					ommı		tion			
	Legal Rent Agreement										
Practical	. Staining ar		pic	30	D	escrib	e, i	llustra	ate and	1,2,3,4	
	observation of	various stages	of		ϵ	xplair	ì	and	apply		
	Mitosis of given	sample(s).			S	tainin	g te	chniq	ues and		
	. Staining ar	d microsco	pic		C	arry	out	mic	roscopic		

observation of various stages in	examination.	
Meiosis of given sample(s).		

- 1. Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt ltd-New Delhi.
- 2. Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restauranteur, Guides.
- 3. Mohammed Zulfikar (2010) Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.
- 4. Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013.

REFERENCE BOOKS:

- 1. Cooper GM. The Cell: A Molecular Approach. 2nd edition. Sunderland (MA): Sinauer Associates; 2000.
- 2. Ambrose and Dorothy. Cell Biology. 2nd Edition. MEasty, ELBS Publications; 1970.
- 3. Sharp, Lester W. Fundamentals of Cytology. 1st edition. Mc Graw Hill Company; 1943.

OTHER LEARNING RESOURCES:

1. https://www.ncbi.nlm.nih.gov/books/NBK9839/?term=cell%20Biolpgy

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
	Able to explain the fundamentals and advances of cytology							
1	including structure and functions of cell and cell	1,3 & 4						
	organelles.							
2	Able to explain the cell cycle and cell division.	1,2						
3	Learn and develop skills for operating microscope,	7.9,10						
3	preparing slides by various staining techniques	7.9,10						
4	Apply knowledge of cellular processes to explain how	5.7						
4	cells operate and interact within living organisms.	5,7						
5	Demonstrate a comprehensive understanding of cell	5,8						
3	structure and function.	3,8						

MAPPING TABLE

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO221R	DESIGN AND ANALYSIS OF ALGORITHM	2	2.66	2.33					1.66
22BCAO222R	BASICS OF PYTHON PROGRAMMING	1.6	1	1					1.6
22BCAO223R	COMPUTER NETWORKS	2.6	2	2					1
22BCAO224R	TECHNO PROFESSIONAL SKILLS III	1.8	2	2.2	1				
22UBPD222R	(ENGLISH FOR EMPLOYABILITY			2					
22UBCC221	CO-CURRICULAR				2	1	2.6	2.4	2.4
22UBEC221	EXTRA- CURRICULAR		1.2	2.2	1.75	2.2	2.6	1.6	2.33
22BCAO311R	BASIC ACCLIMATIZING SKILLS	2.5	2.5	2	1	1.66		2.66	1
22MOSY222R	MOOC III (INTERMEDIATE POSTGRESQL)	1	2	2.8				1	1
22BCAO225R	GENERIC ELECTIVE II (THE STRATEGY OF CONTENT MARKETING)	1	1.5	2		1.75	2.5	1.5	1

SEMESTER – V										
Course Title	PROGRAMMING IN JAVA									
Course code	22BCAO311R	Total credits: 4	L	Т	P	S	R	O/F	С	
		Total hours:	3	0	2	0	0	0	4	
		40L+30P								
Pre-requisite	Nil	Co-requisite					Nil			
Programme	Bachelor of Computer Application									
Semester	Fall/ V semester of the third year of the program									
Course	1. To enable students to understand the basic object-oriented programming									
Objectives	concepts a	nd apply them in pr	oblem s	olvin	g.					
	2. To illustra	ate among studen	ts the	inher	itance	cor	cepts	for rec	ising the	
	program.									
		students to develo	p GUI-	based	appl	icatio	ons us	sing AW	T, Swing	
	and Event	handling.								
CO1	Explain the object-	oriented programm	ing con	cepts	and ii	npler	nent i	n java.		
CO2		building blocks o					eritai	nce, pacl	kage and	
CO2	interfaces, and ana	lyse real-world prob	olems in	term	s of tl	nese.				
CO3	* * *	n handling methods	-	_	_					
CO4		e as well as GUI-ba								
		t of package, interfa								
Unit-No.	Con	tent	Contact Learning Outcome						KL	
			Hour							
I	Java Overview:		8		Describe and				1,2	
	Java Introduc	*			demonstrate Java's basic concepts like platform					
	•	VM & JDK, Data			_	platform data				
	• • •	If, else statement,			ndepe					
		while, do-while, and continue			ructu	-	and	control standard		
	statement;	and continue			brary					
	•	g: Single Array &			•			ys and		
	=	Array, Library			trings		urre	ijo una		
		String Buffer &				•				
		Command line								
		Various String								
	Operations.									
II	Classes, Objects	and Methods:	8	U	Inders	stand	the	structure	2, 3	
	Class and	Object, Object		a	nd u	ısage	of	classes,		
	reference,	Constructor:		o	bjects	, and	meth	ods, and		
	Constructor Overloading, Method:			a	pply s	skills	to in	plement		
	Method Overloading, Recursion,				onstrı		-	method		
	Passing and Retu			verlo	_		ecursion,			
	-	perator, this and			nd	man	-	access		
	-	inalize() method,		W	ithin	Java	progr	ams.		
	_	t, Static import,								
		lested class, Inner								
	class, Anonymou	s inner class.								

III	Inheritance and Interfaces in	8	Comprehend the	2, 3
	Java:		principles of inheritance	
	Overview of Inheritance,		including multilevel	
	inheritance in constructor,		inheritance, method	
	Inheriting Data members and		overriding, and	
	Methods, Multilevel Inheritance –		constructor behaviours,	
	method overriding Handle		and apply these concepts	
	multilevel constructors super		along with interface	
	keyword, Stop Inheritance, final		implementation, abstract	
	keyword.		classes, and dynamic	
	Creation and Implementation of an		method dispatch in Java	
	interface, Interface reference,		programming.	
	instance of operator, Interface			
	inheritance, Dynamic method			
	dispatch, Abstract class,			
	Comparison between Abstract			
	Class and interface, inside of			
	System.out.println – statements.			
IV	Exception Handling in Java:	8	Apply techniques to	3, 4
	Exception and Error, Use of try,		manage exceptions using	
	catch, throw, throws and finally,		try, catch, throw, throws,	
	Built in Exception, Custom		and finally, and create	
	exception, Throwable Class.		custom exceptions;	
	JAVA File Handling:		analyze and implement	
	Overview of Different Stream		file operations using	
	(Byte Stream, Character stream),		various stream classes,	
	Readers and Writers class, File		including file streams,	
	Class, File Input Stream, File		buffered readers, and	
	Output Stream, Input Stream		writers to handle input	
	Reader and Output Stream Writer		and output in Java.	
	class, File reader and writer class,			
	File Writer, Buffered Reader class.			
V	Applet, AWT and Swing:	8	Apply the fundamentals	3, 4, 5
	Applet: Applet Fundamental,		of Java applets, including	
	Applet Architecture, Applet		architecture and event	
	Skeleton, Requesting Repainting,		handling mechanisms;	
	Event Handling: various event		analyze and implement	
	handling mechanisms, various		graphical user interfaces	
	classes related to event sources and		using AWT and Swing,	
	event listeners, AWT: window		focusing on window	
	fundamentals, creating frames,		fundamentals, frames,	
	Adding removing various controls,		control management, and	
	Layout managers, Introduction to		layout arrangements.	
	Swing.			
	Practic	cal		
Practical	Content	Contact	Learning Outcome	BL
Tractical	Content		Learning Outcome	DL

		Hour		
Practical 1	Program to print all even numbers between 1 and 50 using for loop.	2	Demonstrate the understanding of for loops and conditional statements	2
Practical 2	Program to calculate and print factorial of a number 'n' using for loop	2	Apply the knowledge of for loops and mathematical concepts	3
Practical 3	rogram to check two arrays are equal or not.	2	Analyze and compare two arrays to determine if they are equal by writing a program that iterates through the arrays and checks for element-wise equality	4
Practical 4	Program to add two matrices.	2	Apply the understanding of matrix operations	3
Practical 5	Program to display marks, percentage, grade based on attendance.	2	Explain how attendance data impacts marks, percentage, and grades	2
Practical 6	Program to check if a number is odd or even.	2	Determine and explain whether a number is odd or even by writing a program that uses conditional statements	2
Practical 7	Program to check if a number is prime or not.	2	Determine and explain whether a number is prime by writing a program that tests the number's divisibility by integers other than 1 and itself	2
Practical 8	Program to use switch case to print seasons.	2	Apply the knowledge of switch case statements by writing a program that prints the appropriate season based on a given input	3
Practical 9	Program to print Volume of box using Constructor overloading.	2	Analyze and differentiate between various constructor implementations by writing a program that uses constructor overloading	4
Practical 10	Program to show function overloading.	2	Apply the understanding of function overloading	3
Practical 11	Program to show return by object.	2	Apply object-oriented programming concepts by writing a program that returns an object from a function to demonstrate encapsulation and data handling	3

the concept of pass by value by writing a program that shows how passing arguments by value affects the function's behaviour the concept of pass by reference. Practical 13 Program to show pass by reference by writing a program that shows how passing arguments by reference by writing a program that shows how passing arguments by reference by writing a program that shows how passing arguments by reference affects the function's behavior Apply the understanding of recursion by writing a program that calculates the factorial of a number using a recursive function Practical 15 Program to find Month- season using switch case. Practical 16 Program to print data of employee. Practical 16 Program to print data of employee. Practical 17 Program to print student data. Practical 18 Write a Java program to create a new Box class in Java. Practical 18 Write a Java program to create a new Box class in Java.	Practical 12	Program to show pass by value.	2	Understand and explain	2
Practical 13 Program to show pass by reference. Practical 14 Practical 15 Practical 15 Practical 15 Practical 16 Practical 16 Practical 17 Practical 17 Practical 18 Write a Java program to create a new Box class in Java. Practical 18 Program to show pass by reference by writing a program that shows how passing arguments by reference affects the function's behavior 2 Understand and explain the concept of pass by reference by writing a program that shows how passing arguments by reference affects the function's behavior 2 Apply the understanding of recursion by writing a program that calculates the factorial of a number using a recursive function 2 Apply the knowledge of switch case statements by writing a program that determines and prints the season based on the input month 2 Demonstrate their understanding of data structures and object-oriented programming by designing and implementing a new class	Practical 12	Program to snow pass by value.	4		2
Practical 13 Program to show pass by reference. Practical 14 Program to find Factorial using recursive function. Practical 15 Program to find Month- season using switch case. Practical 16 Program to print data of employee. Practical 17 Program to print student data. Practical 18 Write a Java program to create a new Box class in Java. Practical 18 Program to show pass by reference a ffects the function's behavior Apply the understanding of recursion by writing a program that calculates the factorial of a number using a recursive function Apply the knowledge of switch case statements by writing a program that determines and prints the season based on the input month Practical 16 Program to print student data. 2 Apply object-oriented programming principles Practical 18 Write a Java program to create a new Box class in Java.					
Practical 13 Program to show pass by reference by writing a program that shows how passing arguments by reference affects the function's behavior Practical 14 Program to find Factorial using recursive function. Practical 15 Program to find Month- season using switch case. Practical 16 Program to print data of employee. Practical 17 Program to print student data. Practical 18 Write a Java program to create a new Box class in Java. Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Program to print data of employee. Practical 19 Practical 19 Practical 19 Practical 19 Practical 19 Program to print student data. Program to find Month- season the concept of switch case statements by writing a program to a number using a recursive function. Program that calculate				, <u> </u>	
Practical 13 Program to show pass by reference. Practical 14 Program to find Factorial using recursive function. Practical 15 Program to find Month- season using switch case. Practical 16 Program to print data of employee. Practical 17 Program to print student data. Practical 18 Write a Java program to create a new Box class in Java. Practical 19 Program to show pass by reference by writing a program that calculates the factorial of a number using a recursive function. Apply the understanding of recursion by writing a program that calculates the factorial of a number using a recursive function. Demonstrate their understanding of data structures and object-oriented programming Practical 17 Program to print student data. 2 Apply object-oriented programming principles Practical 18 Write a Java program to create a new Box class in Java.					
Practical 13 Program to show pass by reference. Practical 14 Program to find Factorial using recursive function. Practical 15 Program to find Month- season using switch case. Practical 16 Program to print data of employee. Practical 17 Program to print student data. Practical 18 Write a Java program to create a new Box class in Java. Function's behaviour Understand and explain the concept of pass by reference by writing a program that shows how passing arguments by reference affects the function's behavior Apply the understanding of recursion by writing a program that calculates the factorial of a number using a recursive function Apply the knowledge of switch case statements by writing a program that determines and prints the season based on the input month Practical 16 Program to print data of employee. 2 Demonstrate their understanding of data structures and object-oriented programming Practical 17 Program to print student data. 2 Apply object-oriented programming principles Practical 18 Write a Java program to create a new Box class in Java.					
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Practical 18 Write a Java program to create a new Box class in Java. Synthesize the knowledge of object-oriented programming by designing and implementing a new class				11 0	
new Box class in Java. knowledge of object- oriented programming by designing and implementing a new class	Practical 18	Write a Java program to create a	2		6
oriented programming by designing and implementing a new class		1 0		knowledge of object-	
designing and implementing a new class				oriented programming by	
implementing a new class				designing and	
in Java				in Java	

- 1. Herbert Schildt and Dale Skrien, "Java Fundamentals A comprehensive Introduction", McGraw Hill.
- 2. Herbert Schildt, "Java the complete reference", McGraw Hill, Osborne.
- 3. T. Budd, "Understanding Object- Oriented Programming with Java", Pearson Education.

REFERENCE BOOKS:

- 1. P.J.Dietel and H.M.Dietel, "Java How to program", Prentice Hall.
- 2. P.Radha Krishna, "Object Oriented programming through Java", CRC Press.
- 3. S.Malhotra and S. Choudhary, "Programming in Java", Oxford University Press.

OTHER LEARNING RESOURCES:

- 1. http://java.sun.com
- 2. http://www.oracle.com/technetwork/java/index.html

- 3. http://java.sun.com/javase
- 4. http://www.oracle.com/technetwork/java/javase/overview/index.html
- 5. http://download.oracle.com/javase/7/docs/api/index.html

E-Text Books:

- 1. http://docs.oracle.com/javase/tutorial/
- 2. https://iiti.ac.in/people/~tanimad/JavaTheCompleteReference.pdf
- 3. https://www.codejava.net/books/4-best-free-java-e-books-for-beginners

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Explain the object-oriented programming concepts and implement in java.	1, 2, 5, 8
2	Demonstrate the building blocks of OOPs language, inheritance, package and interfaces, and analyse real-world problems in terms of these.	2, 3, 4, 5, 7, 8
3	Apply the exception handling methods on programming	7
4	Develop interactive as well as GUI-based java applications in project-based learning.	2, 3, 4, 5, 7, 8
5	Outline the concept of package, interface, multi-threading and File handling in java.	1, 2, 3

	SEMESTER – V								
Course Title	CLOUD COMPUTING								
Course code	22BCAO312R	Total credits: 3	L	T	P	S	R	O/F	C
-	2742	Total hours: 40I	. 3	0	0	0	0	0	3
Pre-requisite	Nil	1							
Programme		Bachelor of Computer Application							
Semester		Fall/ V semester of the third year of the program							
Course Objectives		1. To elucidate both theoretical and practical aspects of cloud computing.							
Objectives		students with the							
	1	solutions effective	•	•		•			Ū
	_	proficiency in evalu	_		based	syste	ms ar	d optim	izing them
	for enhanc	ed performance and	d securit	y.					
CO1	Understand cloud	d computing's fu	ndamen	tal c	concep	ots,	inclu	ding its	history,
		ey advantages and							
CO2		e of different cloud	service	and o	leploy	ment	mod	els, asses	ssing their
~~*	impact on security								
CO3	_	alization technique	s and th	neir p	ractic	al ap	plicat	ions wit	hin cloud
CO4	infrastructures.	onship between Io	Т1	010	1 ~~:		.~ :	- الله والم	omersi:
CO4	technologies like f	•	or and	ciouc	ı con	iputii	ig, in	cluding	emerging
CO5		als of cloud securit	v focus	ing o	n rick	man	agem	ent and	protective
	measures for cloud		y, 10cus	ing o	11 1131	inan	agem	ciit aiia	protective
Unit-No.		tent	Conta	ct	Lea	rning	o Out	come	KL
			Hour		200		5 0 440	COLLIC	
I	Cloud Comp	uting - An	8		Inders	stand	and	describe	1,2
		Introduction to		tl	ne fo	undat	ional	aspects	
	Cloud Computi	ng, History of				loud	COI	nputing,	
		outing, Cloud			ncludi		its	history,	
		oud Storage, Why			rchite			storage	
	Cloud Comp							overall	
		Cloud Computing,			_			well as	
	Disadvantages	of Cloud					ntage		
	Computing, Cloud	u services.			loud s			f using	
II	Cloud Donlovm	ent Models and	8		Inders		cs.	and	2, 4
11		ecture: Cloud	0		iffere			various	
		l, Platform as						t models	
		e as a service,			nd	acpio		tectures,	
	1	service, Cloud				ng p		private,	
		els, public clouds,						hybrid	
	Private clouds, C	Community cloud,				-		th cloud	
	Hybrid clouds, s	ecurity, trust and			ervice		nodel	s like	
	privacy				latfor			Service	
					,	•		e as a	
				ervice		(SaaS)			
				nfrastı			as a		
							Evaluate		
					neir	_			
		security, trust, and privacy.							
III	Cloud	Virtualization	8				and	explain	2, 3
	Technology:	Overview of	0		arious			alization	
		hniques, Types of			echnic		and	types,	
L	, intamization tee	iniques, Types of		- 1		1400	unu	types,	1

	Virtualizations, Implementation Levels of Virtualization Structures, Virtualization benefits, Server virtualization, Hypervisor management software, Virtual infrastructure requirements		assess the benefits and levels of virtualization structures, and apply knowledge of server virtualization and hypervisor management to meet specific virtual infrastructure requirements.	
IV	IoT and the Cloud Computing Introduction to IoT, Difference between Cloud Computing and IoT, Fog Computing: The Next Evolution of Cloud Computing, Role of Cloud Computing in IoT, Living on the Edge, An Abstract Edge Architecture Model, Connecting devices at the edge and to the cloud	8	Understand the fundamentals of IoT and its distinction from cloud computing, analyze the integration and role of cloud computing within IoT ecosystems, and apply concepts of fog computing and edge architectures to enhance connectivity and functionality between devices and the cloud.	2, 3, 4
V	Cloud security: Introduction to Security, Cloud Security challenges and Risks, Software-as-a-Service Security, Security Monitoring, Security Architecture Design, Data Security, Application Security, Virtual Machine Security, Identity Management and Access Control	8	Understand cloud security fundamentals and challenges; design and apply security measures for data, applications, and identity management; and evaluate the efficacy of these security solutions in cloud environments.	3, 4, 5

1. Michael Miller, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Que Publishing, August 2008

REFERENCE BOOKS:

- 1. K.Chandra Sekaran, "Essentials of Cloud Computing", 1st Edition, 2015, CRC Press, Taylor & Francis Group.
- 2. A.Srinivasan and J.Suresh, "Cloud Computing, A practical approach for learning and implementation", Pearson, 2014.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand cloud computing's fundamental concepts, including its history, architecture, and key advantages and	3, 4						

	disadvantages.	
2	Acquire knowledge of different cloud service and deployment models, assessing their impact on security and privacy.	2, 3
3	Comprehend virtualization techniques and their practical applications within cloud infrastructures.	3
4	Explore the relationship between IoT and cloud computing, including emerging technologies like fog computing.	3, 4
5	Master the essentials of cloud security, focusing on risk management and protective measures for cloud-based systems.	2, 5, 7

		SEMESTE	R - V						
Course Title	PROJECT-I								
Course code	22BCAO313R	Total credits: 6	L	T	P	S	R	O/F	С
		Total hours:60P	0	0	4	12	6	0	6
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of C							
Semester		all/ V semester of t		_					
Course	1	p the knowledge, si	kills an	d atti	itudes	of a	prof	essional	Compute
Objectives	^ ^	n professional.							
		e confident in desig	_		are so	olutio	ns to	complex	software
	•	itilising a systems ap					1.	.• .	1
	_	a deep understand	_		_	_	_		ennance
CO1	-	al knowledge, skills, and technical knowle							
							ojeci	topic.	
CO2	•	identification, form					4 -	1	
CO3		olutions to complex	•					approach	•
CO4		the community at la						A1: a a 4:	IT
CO5	professional.	nowledge, skills ar	ia attitu	ides (or a C	comp	uter	Applicati	on or 11
Unit-No.	Con	tont	Contac	4	Lan	rning	Out	come	KL
Cint-140.	Con	tent	Hour		Lea	ב ווווון	, Out	come	KL
I	This course wi	1 be conducted	Hour	A	nalyz	e		current	
_	largely as an inc				nowle		thro		
		nder the direct				-		iterature	
		a member of			eview			chosen	
	academic staff.	The specific		te	echnic	al :	field,	apply	
	project topic	undertaken will		a	dvanc	ed r	netho	ds like	
	reflect the comm			tł	neoret	ical		studies,	
	expertise of the			C	ompu	ter	sim	ulations,	
	supervisor. Stu-	dents will be						ardware	
	required to:						-	nthesize	
		erature search to			_			progress	
		at knowledge and			_		_	essional	
	technical area	in the chosen	90		ournal recent			te and dings in	3, 4, 5
		etailed technical		_	emina		e IIII	and	
		chosen area using			emons		,	practical	
	one or more of	-						h poster	
	3. theoretical				resent		_	and	
	4. computer s				perati				
	_	onstruction;			emons		ons.		
	6. Produce pro	gress reports or							
	maintain a pr	ofessional journal							
	to establish	work completed,							
	and to sch	edule additional							
		the time frame							
	specified for t	he project;							

	7. Deliver a seminar on the
	general area of work being
	undertaken and specific
	contributions to that field;
	8. Prepare a formal report
	describing the work
	undertaken and results
	obtained so far; and
	Present the work in a forum
	involving poster presentations and
	demonstrations of operational
	hardware and software.

OTHER LEARNING RESOURCES:

As given by Project supervisor.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Students will be able to demonstrate a sound technical knowledge of their selected project topic.	1, 2, 4					
2	Students will be able to undertake problem identification, formulation, and solution.	1, 3					
3	Students will be able to design Software solutions to complex problems utilising a systems approach.	2, 3, 5, 7					
4	Students will be able to communicate with the community at large in written an oral form.	2, 3, 5, 6, 7					
5	Demonstrate the knowledge, skills and attitudes of a Computer Application or IT professional.	1, 2, 3, 7					

		SEMESTE	R - V						
Course Title		TECHNO PROFESSIONAL SKILLS IV							
Course code	22BCAO314R	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 40	0	0	2	0	0	0	1
Pre-requisite	Nil	Co-requisite				l	Nil		
Programme		Bachelor of (Comput	er A	pplica	ation			
Semester		all/ II semester of t							
Course	_	1. To thoroughly revise and consolidate foundational concepts of Computer							
Objectives		Science & Information Technology learned previously.							
		fidence in applying	_		cience	e & I	nforn	nation Te	chnology
	•	ddress real-world ch	•						
	_	practical skills in an					_	ementing	software
601		unded in theoretical			_	_			
CO1		mental and advance	ced we	b teo	chnolo	ogies	to a	address re	eal-world
	problems.	1	1		•	4 - 1	•		
CO2	-	dge of advanced Pyt					iques	S	
CO3		essential concepts of	•		•				
		hensive understandi							
CO5		critical analysis and	i evaiua	tion	oi soi	tware	ana	naraware	systems
Unit-No.	to improve technol	tent	Contac	.4	Loo	mnina	· O vit	taama	KL
UIIII-NO.	Con	itent	Hour		Lea	rinng	, Out	tcome	KL
I	Web Technology	Advanced: SPA	8)esign	ano	1 in	nplement	6
_		l Express.js for	J		omple			web	
	Book Manager				pplica				
		with Node.js and			• •				
		mmerce Platform							
	Development w	ith React and							
	Node.js, PWA D	Development with							
	React.								
II	Python advance	d: Data Pipeline	8	Γ	D evelo	p a	and	deploy	6
	with Apache Airf	low for API Data			ophist			Python-	
	Extraction and	0 ,		b	ased s	solutio	ons		
		arning Model							
	Deployment	with Flask,							
	I	Veb Scraper with							
	Python's asynci	-							
		ata Analysis with							
		Pandas and Visualization using							
111	_	Matplotlib.				to -	nd	ontimi	5
III	Operating Syst	tems: Producer- em with POSIX	8		evalua perati		nd	optimize	5
	Threads and	Synchronization,	1 5						
		Virtual Memory			ompo 1 hand				
	Management Management	System,		11	ıııanı	io-OII	hrole	~ to	
	171unugement	Tanagement System,							

	Development of a Simple File			
	System using C, Implementation			
	of a Simple Unix-like Shell in C.			
IV	Computer Networks: Configuring VLANs and Inter- VLAN Routing with Cisco	8	Analyze network configurations and protocols	4
	Switches and Routers, Implementation and Verification of OSPF Routing Protocol in a Multi-Router Network, Setting Up Site-to-Site VPN between Remote Locations Using Cisco Routers, Implementing QoS on Cisco Router for VoIP Traffic 6Prioritization.			
V	System Architecture and Performance Evaluation: Performance Analysis and Optimization of CPU using Benchmarking Tools, Evaluation of Memory Hierarchy Performance (Cache, RAM, Disk), Performance Impact of Multithreading and Parallel Processing on Multi-core Systems, Performance Evaluation of Network Communication in Distributed Systems.	8	Analyze and optimize system architecture components by utilizing performance evaluation techniques.	4
	Practic	cal		
Practical	Content	Contact Hour	Learning Outcome	KL
Practical 1				
	Develop a single-page application (SPA) using React for the frontend and Express.js for the backend. The application should allow users to perform CRUD operations on a collection of books.	2	Create a full-stack application by developing a Single Page Application (SPA) using React for the frontend and Express.js for the backend	6
Practical 2	(SPA) using React for the frontend and Express.js for the backend. The application should allow users to perform CRUD operations on a	2	application by developing a Single Page Application (SPA) using React for the frontend and Express.js for the	6
Practical 2 Practical 3	(SPA) using React for the frontend and Express.js for the backend. The application should allow users to perform CRUD operations on a collection of books. Create a real-time chat application		application by developing a Single Page Application (SPA) using React for the frontend and Express.js for the backend Develop a real-time chat application by utilizing Node.js and Socket.IO to enable instantaneous communication between	

	Node.js backend.		commerce platform by	
	rvode.js backend.		integrating a React	
			frontend with a Node.js	
			backend	
Practical 4	Develop a Progressive Web App	2	Design and develop a	6
	(PWA) using React.		Progressive Web App	
			(PWA) using React,	
			implementing features	
			such as offline access,	
			*	
			push notifications, and a	
			responsive user interface	
Practical 5	Create a data pipeline to extract	2	Evaluate and optimize a	5
	data from an API, process it, and		data pipeline by using	
	load it into a PostgreSQL database		Apache Airflow to	
	using Apache Airflow.		extract data from an API,	
	using repactic ratifiow.		, i	
			process it, and load it into	
			a PostgreSQL database	_
Practical 6	Develop and deploy a machine	2	Evaluate and refine the	5
	learning model using Flask.		deployment of a machine	
			learning model by using	
			Flask, ensuring the	
			model's functionality,	
			scalability, and	
			•	
			accessibility	
Practical 7	Implement an asynchronous web	2	Create an efficient and	6
	scraper using Python's asyncio and		scalable asynchronous	
	aiohttp.		web scraper using	
			Python's asyncio and	
			aiohttp, enabling	
			concurrent data	
			extraction from multiple	
			web sources	
D 41 10				4
Practical 8	Analyze stock market data using	2	Analyze stock market	4
	Pandas and visualize the results		data by utilizing Pandas	
	with Matplotlib.		for data manipulation and	
			Matplotlib for visualizing	
			the results, gaining	
			insights into market	
			trends and patterns	
Practical 9	Implement a producer-consumer	2	Analyze and implement a	4
1 Tactical 9	problem using POSIX threads and	_	solution to the producer-	7
	_		_	
	synchronization primitives.		consumer problem using	
			POSIX threads and	
			synchronization	
			primitives, ensuring	
			proper coordination and	
			resource sharing between	
			resource sharing between	

			threads.	
Practical 10	Create a simulation of a virtual memory management system.	2	Create a simulation of a virtual memory management system, demonstrating their understanding of memory allocation, paging, and address translation	6
Practical 11	Develop a simple file system using C.	2	Analyze and implement a simple file system using C, demonstrating their understanding of file organization, storage management, and basic file operations	4
Practical 12	Implement a simple Unix-like shell in C.	2	Analyze and implement a simple Unix-like shell in C, demonstrating their understanding of command parsing, process control, and basic shell functionalities	4
Practical 13	Configure multiple VLANs on a Cisco switch and ensure proper inter-VLAN routing using a Cisco router.	2	Evaluate the configuration of multiple VLANs on a Cisco switch and ensure proper inter-VLAN routing using a Cisco router	5
Practical 14	Implement and verify the OSPF routing protocol in a multi-router network.	2	Implement and verify the OSPF routing protocol in a multi-router network, ensuring efficient and accurate routing	3
Practical 15	Set up a site-to-site VPN between two remote locations using Cisco routers.	2	Create a secure site-to- site VPN between two remote locations using Cisco routers, facilitating protected and reliable communication	6
Practical 16	Implement QoS on a Cisco router to prioritize VoIP traffic over regular data traffic.	2	Analyze and implement QoS on a Cisco router to prioritize VoIP traffic over regular data traffic, improving call quality and network performance.	4
Practical 17	Analyze the performance of a CPU	2	Analyze CPU	4

	using benchmarking tools and optimize its performance by adjusting system parameters and configurations.		performance using benchmarking tools and optimize its performance by adjusting system parameters and configurations	
Practical 18	Evaluate the performance of different levels of the memory hierarchy (cache, RAM, and disk) and their impact on overall system performance.	2	Evaluate the performance of different levels of the memory hierarchy (cache, RAM, and disk) and understand their impact on overall system performance.	5
Practical 19	Assess the performance impact of multithreading and parallel processing on a multi-core system.	2	Analyze the performance impact of multithreading and parallel processing on a multi-core system, identifying how these techniques affect computational efficiency	4
Practical 20	Evaluate the performance of network communication in a distributed system and identify bottlenecks.	2	Evaluate the performance of network communication in a distributed system, identifying bottlenecks and proposing solutions to enhance data transfer rates and overall network efficiency.	5

- 1. "Learning React: Modern Patterns for Developing React Apps", Alex Banks and Eve Porcello.
- 2. "Fluent Python: Clear, Concise, and Effective Programming", Luciano Ramalho.
- 3. "Operating Systems: Three Easy Pieces", Remzi H. Arpaci-Dusseau and Andrea C. Arpaci-Dusseau.
- 4. "CCNA 200-301 Official Cert Guide Library", Wendell Odom.
- 5. "Cisco Networking All-in-One for Dummies", Edward Tetz.
- 6. "Computer Architecture: A Quantitative Approach", John L. Hennessy and David A. Patterson

- 1. "Node.js Design Patterns", Mario Casciaro and Luciano Mammino
- 2. "Data Science from Scratch: First Principles with Python", Joel Grus
- 3. "UNIX Systems Programming: Communication, Concurrency, and Threads", Kay A. Robbins and Steven Robbins.

- "Routing TCP/IP, Volume 1", Jeff Doyle and Jennifer DeHaven Carroll.
 "Computer Systems: A Programmer's Perspective", Randal E. Bryant and David R. O'Hallaron

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand fundamental and advanced web technologies to address real-world problems.	2, 3, 4, 6, 8					
2	Gain deep knowledge of advanced Python programming techniques.	2, 3, 8					
3	Explore and apply essential concepts of operating systems.	1, 2, 3, 4, 7, 8					
4	Develop a comprehensive understanding of computer network systems.	1, 2, 3, 4, 6, 7, 8					
5	Cultivate skills in critical analysis and evaluation of software and hardware systems to improve technological solutions.	2, 3, 4, 5, 7					

		SEMESTE	$\mathbf{R} - \mathbf{V}$						1
Course Title	INTERNSHIP								
Course code	22BCAO315R	Total credits: 1	L	Т	P	С			
		Total hours: 40	0	0	0	0	0	8	1
Pre-requisite	Nil	Co-requisite				,	Nil		
Programme		Bachelor of	Comput	ter A	pplica	ation			
Semester		all/V semester of							
Course	11 2	emic knowledge	and de	evelop	o inc	lustry	-spec	ific ski	lls in a
Objectives	professional s	C	_						
	2. Gain insigh			ys a	and	enha	nce	problen	n-solving,
		on, and teamwork s			1	1	1	.•	
CO1		ssional network and							2021
COI	Demonstrate the ap	oplication of theore	ucai kno	owied	ge in	a pra	cucai	environn	ient.
CO2	Identify and develo	op key professional	skills re	levan	t to th	ne fiel	d of	study.	
CO3	, , , , , , , , , , , , , , , , , , ,	l and professional g							
CO4	•	nal documents, such						_).
CO5		hip experience and							
Unit-No.		tent	Contac					come	KL
			Hour	•		·			
I		d Preparation:	8		emor			the	1, 2
	Introduction to	the internship,						eoretical	
	setting goals,	understanding				_		practical	
		pectations, and		e	nviro	nmen	t.		
	professional beha	viour.							
II	Skills Developm	ent: Developing	8	Id	dentif	y and	dev	elop key	2, 3
	industry-specific	skills, working		professional				skills	
		ects, and regular				nt to	the	field of	
	feedback sessions				tudy.				
III	Professional	Growth:	8					personal	2, 3
	Understanding	workplace						growth	
		ng a professional		tr	irougi	hout t	he in	ternship.	
	network, and mentors and colle	learning from							
IV	Professional	Documentation :	8	P	roduc	·e	pro	fessional	3, 4
		ning professional	O		ocum		-	n as a	
		as resumes, cover							
		documents such as resumes, cover letter, and letters, and portfolios.							
V		nd Reflection:							3, 4, 5
	Presenting tl	ne internship						learning	
	_	cussing learning		0	utcon	nes ef	fectiv	ely.	
	outcomes, and	reflecting on							
	1	and future career							
	plans.								

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate the application of theoretical knowledge in a practical environment.	1, 2				
2	Identify and develop key professional skills relevant to their field of study.	2, 3, 7				
3	Reflect on their personal and professional growth throughout the internship.	8				
4	Produce professional documents, such as a resume, cover letter, and portfolio.	6				
5	Present their internship experience and learning outcomes effectively.	6				

		SEMEST	ER – V						
Course Title	PE I: FUNDAMENTALS OF AI /ML								
Course code	22BCAO316R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 45	L 3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite		1		1	Vil		
Programme		Bachelor of	Compu	ter A	pplica	tion			
Semester	F	all/ V semester of	the thir	d yea	r of tl	he pr	ogra	m	
Course									
Objectives	1. Learn the b	asic principles of	machine	learn	ing ar	nd ho	w the	ey can	
	be applied to	o different scenario	os.						
	2. Understand	the differences b	etween	super	vised	and	unsu	pervised	learning
	algorithms.								
		the fundamenta	al conc	epts	and	termi	nolog	gy of A	Artificial
	Intelligence								
CO1	Explain machine	learning concep	ts, appl	licatio	ns, c	halle	nges,	and ba	sic data
	descriptions						_		
CO2	Apply and evaluate		_						
CO3	Differentiate pred	diction and clas	ssificatio	on, a	pply	algo	rithm	s, and	evaluate
~~.	performance.		_						
	Implement and cor	•							
CO5	Use logic and prob								
Unit-No.	Con	tent	Conta		Lea	rning	Out	come	KL
I	Introduction	to Machine	Hour 8)ofino	mook	ino 1	aarnina	1 2 4
ı.	Learning: What		0			its		earning,	1, 2, 4
		tions of machine						ications, issues,	
		and challenges			•			en types	
	~	learning, types of		o	_	data		tributes,	
		nominal, binary,						tatistical	
	ordinal, num	•			ata				
	· ·	basic statistical						ta pre-	
	•	of data –			rocess	•		1	
	measures of centr	al tendency and							
	dispersion, major	tasks in data pre-							
	processing								
II	_	earning - Data	8	Г	Define			analysis,	1, 2, 3,
		hat is cluster			xplain			ecessity,	4
	<u> </u>	cluster analysis,			escrib		data		
		similarity matrix,			issimi	•		natrices,	
	proximity and	~			discuss proximity and				
	measures for	different data			issimi	•		easures,	
		partitioning based			ompai		_	itioning,	
	clustering met	· · · · · · · · · · · · · · · · · · ·			ensity			and	
		g methods and			ierarc			lustering evaluate	
		stering methods,						evaluate	
	measuring cluster	quanty		C	luster	quan	ıy.		

III	Supervised Learning – Prediction: What is prediction, application areas of prediction, Simple linear regression, Multiple linear regression, Predictor Error measures Classification: What is	8	Define prediction and classification, identify their applications, explain the differences between them, describe linear regression models and prediction error	1, 2, 3, 4
	classification, differences between classification and prediction, applications of classification, Some classification algorithms, Confusion matrix and metrics for evaluating classifier performance		measures, list classification algorithms, and evaluate classifier performance using confusion matrices and metrics.	
IV	Introduction to Search: Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha – Beta pruning.	8	Understand various search strategies, including uninformed and informed methods, explore local search algorithms and adversarial search techniques, and apply alpha-beta pruning in game search scenarios.	2, 3, 4
V	Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	8	Master propositional and first-order logic, implement inference mechanisms like forward and backward chaining and resolution, understand probabilistic reasoning including Hidden Markov Models and Bayesian Networks, and apply concepts of utility theory.	3, 4, 5

- 1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann, India
- 2. Russell, S., &Norvig, P. Artificial intelligence: a modern approach. Third Edition. Pearson new international edition. 2014

- 1. Han, Manilla and Smyth, Principles of Data Mining, PHI, India
- 2. Tan, Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Education Inc. Rich and K. Knight, Artificial Intelligence, Tata McGrawHill.
- 3. N. J. Nilsson, Principles of Artificial Intelligence, Narosa

4. D. W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Prentice Hall of India.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Explain machine learning concepts, applications, challenges, and basic data descriptions	1, 2, 3				
2	Apply and evaluate clustering techniques using various methods.	2, 3, 4				
3	Differentiate prediction and classification, apply algorithms, and evaluate performance.	2, 3, 6				
4	Implement and compare various search strategies and algorithms.	2, 3, 7				
5	Use logic and probabilistic models for knowledge representation and reasoning.	3, 4, 5				

		SEMESTE	R - V						
Course Title		PE I: BUSIN	ESS IN	TEL	LIGI	ENC	E		
Course code	22BCAO318R	TOTAL	L	T	P	S	R	O/F	C
		CREDITS: 3	3	0	0	0	0	0	3
		TOTAL HOURS:							
		40							
Pre-requisite	Nil	Co-requisite					Nil		
Programme		Bachelor of							
Semester		Fall/ V semester of							
Course		managers utilise b			•		reate,	address,	and assist
Objectives	_	decision-making for	_			-			
		ccustomed to the pro	ocedures	s requ	ured	to cre	eate, p	oresent, ai	nd analyse
	business data		1 1.	. 1	1				11
CO1		e on how to use Exc sic concepts of Bus							
CO1		he value proposition		•			_		
	enhance decision-		on or n	inegra	atting	busii	11055	with tech	nology to
CO2		bility to organize a	nd sour	ce da	ıta ad	ldress	data	quality i	ceries and
CO2		rively to organize an							ssucs, and
CO3	•	et a variety of data							nie charts
	_	maps) and utilize the							
	_	gful analytics insight		·			311004	ras ana si	or y cour us
CO4		analytics techniques		s line	ear ar	nd mi	ılti-li	near regre	ession and
		ting, alongside utiliz						_	
CO5	Synthesize knowle	edge gained from ir	ndustry	expe	rts or	eme	erging	trends in	business
	analytics and intell	ligence through prac	tical de	mons	stratio	ns.			
Unit-No.	Con	itent	Contac	et	Lea	arnin	g Ou	tcome	KL
			Hour						
I		siness Analytics:	8					rstand the	*
	Introduction to	•						business	
	_	Decision Making,			nalyti	-		decision-	
		Intelligence, The				-	nallen	-	
		lligence Value			oncep		nd v		
	_	Combination of				ss in	_	ence, and	
	Business and Tec	hnology			he 1 .:	1 .		ynergistic	
					elatio	_		between	
II	Introduction to	Data	8					nology.	2, 3
11	Visualization:	Data	o		ata	une	_	ciples of alization,	
	Visualization/	Data Issues,			ata ncludi	inσ	VISC	data	
	Organization/sou	*			rgani	_	1.	the	
	Importance of	data quality,			ignifi			of data	
	Dealing with	missing or			uality		strateg		
	incomplete	data, Data					_	data, and	
i	T .	,		1		_	clas		1

techniques	3.
III Descriptive Analytics: Data 8 Create and	•
Visualization and Analytics- diverse ch	
	ons such as bar,
	catter, map,
	ox & whisker,
	heat map, and
	s, and develop
comprehe	
	s, dashboards,
and storyb	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	near and multi- 3, 4
	gression models
	eries forecasting
	ctive analytics,
	ze optimization
optimization, Integer optimization, lechniques Non-linear programming,	
Optimization of Network models	
and Monte Carlo Simulation	
V Applications: Practical 8 Demonstra	ate proficiency 3, 5, 6
Tr	software tools
	thon, or SPSS to
Emerging trends in business implement	
analytics and intelligence analytics t	

- 1. Sharda R, Delen D, Turban E, Aronson J, Liang T. P, (2014), Business Intelligence and Analytics: Systems for Decision Support, 10th edition, Pearson Education.
- 2. Powell S. G, Barker K. R, (2014), Management Science: The Art of Modeling With Spreadsheets, (W/Cd), 4th edition, John Wiley & Sons.

- 1. Linoff G. S, Berry M. J, (2011), Data mining techniques: for marketing, sales, and customer relationship management, 3rd edition, John Wiley & Sons.
- 2. Frank B, Green B, Harris T, Van De Vanter K, (2010), Business Intelligence Strategy: A Practical Guide for Achieving BI Excellence, MC Press.
- 3. Hair, J. F, Black W. C, Babin B. J, Anderson R. E, Tatham R. L, (2009), Multivariate data analysis, 7th edition, Pearson education.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the basic concepts of Business Analytics, including the roles of Business Intelligence and the value proposition of integrating business with technology to enhance decision-making.	2, 3, 4
2	Demonstrate the ability to organize and source data, address data quality issues, and classify data effectively to prepare for advanced visualization techniques.	2, 3
3	Create and interpret a variety of data visualizations (such as bar charts, pie charts, scatter plots, heat maps) and utilize these visualizations in dashboards and storyboards to convey meaningful analytics insights.	2, 3, 6
4	Apply predictive analytics techniques such as linear and multi-linear regression and time series forecasting, alongside utilizing prescriptive analytics methods	2, 3, 7
5	Synthesize knowledge gained from industry experts on emerging trends in business analytics and intelligence through practical demonstrations.	2, 3, 7, 8

		SEMESTE	R - V						
Course Title		PE II: DATA ANA	LYTI	CS US	SING	PYT	HON	1	
Course code	22BCAO317R	TOTAL	L	T	P	S	R	O/F	C
		CREDITS: 3	3	0	0	0	0	0	3
		TOTAL HOURS:							
		45L							
Pre-requisite	Nil	Co-requisite					Nil		
Programme	_	Bachelor of C							
Semester		Fall/ V semester of t		•					
Course	^ ^	nts with essential to data science.	SK1IIS	ın	aigeb	ra a	na s	tatistical	analysis
Objectives			inulata	doto	ucina	Druth	on lih	rorios lilz	o Numbu
		ts to effectively man nd create comprehen	_		_	-	on no	oraries iik	e Numpy
		nts to implement un					ethode	s and end	rage with
		ta science advancen	_			-		_	
	studies.	ou poronio ud anto in			, p		- upp	1104010115	
CO1		pply concepts of fun	nctions,	expo	nenti	als, lo	ogarit	hms, pol	ynomials,
	1	te systems, and statis		_					
CO2	Demonstrate profi	ciency in using Nu	mPy fo	r var	ious	opera	tions	and broa	dcasting,
	and manipulate da	ta frames in Pandas,	includi	ng lo	ading	data	in dif	ferent for	mats
CO3	Create and interp	ret various types of	f data '	visual	izatio	ns su	ıch a	s histogr	ams, box
		e charts, and line cha							
CO4	_	aluate unsupervised		-	_				_
		hierarchical clusterir			_				
CO5	1	improvements and a						_	se studies
Unit-No.		nta analysis (EDA) in							171
Unit-No.	Col	item	Contac Hour		Lea	riiiiį	g Out	come	KL
I	Introduction:	Intermediate	8		emor	nstrat	<u>е</u>		1,2
_		near Algebra:	Ü		nders			and	1,2
	_	ponentials and			pplica		υ	of	
	Logarithm's,	Polynomial's,					e alge	ebra and	
	Alternate Coor	dinate systems,		li	near a	algeb	ra cor	ncepts	
	Binomial Distr	ibution, Poisson							
	distribution	and Normal							
		its properties,							
	_	NOVA, Measures							
	of Central Tender	· ·							
II		about NumPy:	8					NumPy	2, 3
	Different Num	-			_		rming	•	
	Broadcasting	with NumPy, about Pandas,			_			dcasting	
		′				•		Pandas pulation,	
	frame, Pandas	ing data into Data Data Frame			or a ncludi			reading,	
	Manipulations,	Data Loading				_		sforming	
	•	lifferent formats			-	-		frames	
	(CSV, Excel, Jso						us for		
	(SS 1, EACCI, 380.	,		a	-1000	, al 10	35 IOI	111413	<u> </u>

III	Introduction to data	8	Develop the ability to	3, 4
	Visualizations: Principles Behind		create and interpret	
	Data Visualizations, Histograms		various data	
	Visualize, Box Plots-Visualize, the		visualizations, including	
	Distribution of Continuous		histograms, box plots, bar	
	Numerical Variables (Bar Plots Pie		plots, pie charts, line	
	Chart Line Chart). Data		charts, and utilize R for	
	Visualization using R- Line Plots		generating line plots and	
	and Regression.		conducting regression	
			analysis to effectively	
			communicate data	
			insights.	
IV	Unsupervised Learning in	8	Apply unsupervised	3, 4
	Python: K- Means Theory/		learning techniques in	
	Implementation, Quantifying K-		Python, including K-	
	Means Clustering Performance,		Means clustering and	
	Hierarchical Clustering Theory,		hierarchical clustering,	
	Principal Component Analysis		evaluate their	
	(PCA) theory / Implementation.		performance, implement	
	Selection criteria for number of		Principal Component	
	clusters choosing.		Analysis (PCA), and	
			determine the appropriate	
			number of clusters based	
			on selection criteria.	
\mathbf{V}	The improvements and most recent	8	Analyze recent	4, 5
	developments in the course's topics		advancements and	
	as well as their most recent		applications in data	
	applications in the field Data		science, applying	
	Science. Case Study and EDA in		knowledge through case	
	the interdisciplinary research areas		studies and exploratory	
	of Data Science.		data analysis (EDA) in	
			various interdisciplinary	
			research areas to	
			understand current trends	
			and innovations.	

- 1. Think Python, Allen B. Downy, O'reilly
- 2. Python for Everybody: Exploring Data Using Python 3 Book by Charles Severance

REFERENCE BOOKS:

- 1. Python Data Science Handbook, Jakes Vander Plas O' Reilly
- 2. Eric Matthes, Python Crash Course, A Hands on Project Based Introduction to Programming, 2nd Edition, No Starch Press, 2019

OTHER LEARNING RESOURCES:

1. https://www.w3schools.com/python/python_intro.asp

2. https://www.tutorialspoint.com/python/index.htm

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and apply concepts of functions, exponentials, logarithms, polynomials, alternate coordinate systems, and statistical distributions	1, 2, 3
2	Demonstrate proficiency in using NumPy for various operations and broadcasting, and manipulate data frames in Pandas, including loading data in different formats	3, 6, 7
3	Create and interpret various types of data visualizations such as histograms, box plots, bar plots, pie charts, and line charts	3, 6, 8
4	Implement and evaluate unsupervised learning techniques in Python, including K-Means clustering, hierarchical clustering, and Principal Component Analysis (PCA)	2, 3, 7
5	Analyze the latest improvements and applications in data science through case studies and exploratory data analysis (EDA) in interdisciplinary research areas.	3, 7, 8

		SEMESTE	R - V						
Course Title		PE II: KNOWI	EDGE	ENG	SINE	ERI	VG		
Course code	22BCAO319R	TOTAL	L	T	P	S	R	O/F	С
		CREDITS: 3	3	0	0	0	0	0	3
		TOTAL HOURS:	;						
		45L							
Pre-requisite	Nil	Co-requisite					Nil		
Programme	Bachelor of Com	puter Application							
Semester		of the third year of							
Course	1. Understand	the basics of Know	ledge E	ngine	ering				
Objectives	2. Discuss the	knowledge represer	ntation a	and re	asoni	ng m	ethod	s.	
	3. Apply reason	oning and uncertaint	y for in	tellige	ent sy	stems	S		
CO1	Understand the ba	sics of Knowledge F	Enginee	ring					
CO2	Interpret the know	ledge representation	and rea	asonir	ng me	thods	S.		
CO3	Apply reasoning a	nd uncertainty for in	ntelligen	t syst	ems				
CO4	Design and develo	p ontologies							
CO5	Understand learning	ng and rule learning							
Unit-No.	Cor	ntent	Contac		Learning Outcome			KL	
I	Introduction to	Knowledge	8	C	ain	a	four	dational	1,2
	Engineering:			u	nders	tandi	ng c	of data,	
	Introduction Data	a, Information and		ir	nform	ation	,	and	
	Knowledge Skil	ls of Knowledge		k	nowle	edge	dist	inctions;	
	~	owledge based		a	cquire	e sk	ills	essential	
	systems Types	of Knowledge		fo	or a k	nowl	edge e	engineer	
	based systems	Expert Systems							
	Neural Networ	ks Case Based							
	Reasoning Ger	netic Algorithms							
	Intelligent Syster	ns Data Mining							
II	Knowledge Rep	resentation and	8	N	laster	the	proc	esses of	2, 3
	Reasoning:			k	nowle	edge	ac	quisition	
	Knowledge	Acquisition		a	nd	1	epres	entation,	
	Knowledge Re	presentation and		d	evelo	p	skill	s in	
	Reasoning Us	ing Knowledge		re	eason	ing		with	
	Logic, Rules ar	nd Representation		k	nowle	edge	usin	g logic	
	Developing Rul	e based Systems		a	nd ru	les, a	nd ef	fectively	
	Semantic Networ	ks Frames		C	reate		ru	le-based	
				S	ystem	ıs,		while	
				u	nders	tandi	ng	the	
				a	pplica	ations	of s	semantic	
				n	etwor	ks a	nd fr	ames in	
				a	rtifici	al int	ellige	nce.	
III	Reasoning unde	r Uncertainty:	8	U	Inders	stand	and	apply	3, 4
		ductive reasoning		v	ariou	S 1	metho		
	Probabilistic	reasoning		re	eason	ing		under	
	Enumerative	Probabilities		u	ncerta	ainty;	;	develop	

	0.1: (' D ' ' D1' C			
	Subjective Bayesian view Belief		competence in	
	Functions Baconian Probability		integrating these	
	Fuzzy Probability Uncertainty		approaches within	
	methods Evidence-based reasoning		intelligent agents and	
	Intelligent Agent Mixed Initiative		mixed-initiative	
	Reasoning Knowledge		reasoning environments	
	Engineering.		for effective knowledge	
			engineering.	
IV	Ontologies Design and	8	Acquire skills to design	3, 4
	Development:		and develop ontologies,	
	Concepts and Instances		understanding the	
	Generalization Hierarchies Object		structural elements such	
	Features Defining Features		as concepts, instances,	
	Representation Transitivity		generalization	
	Inheritance Concepts as Feature		hierarchies, and object	
	Values Ontology Matching Design		features, and apply	
	and Development Methodologies		methodologies for	
	Steps in Ontology Development		ontology matching and	
			development	
V	Learning and Rule Learning:	8	Master the foundational	3, 4, 5
	Machine Learning Concepts		concepts of machine	
	Generalization and Specialization		learning, focusing on	
	Rules Types of Generalization and		generalization and	
	Specialization Formal definition of		specialization principles;	
	Generalization. Modelling,		understand formal	
	Learning and Problem Solving		definitions and different	
			types of generalization,	
			and apply these concepts	
			in modelling, learning,	
			and problem-solving	
			contexts to develop	
			effective rule-based	
			learning systems	
			rearing systems	

- 1. Ela Kumar, Knowledge Engineering, I K International Publisher House, 2018
- 2. Gheorghe Tecuci, Dorin Marcu, Mihai Boicu, David A. Schum, Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning, Cambridge University Press, First Edition, 2016
- 3. Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann, 2004.
- 4. John F. Sowa: Knowledge Representation Logical, Philosophical, and Computational Foundations, Brooks Cole, Thomson Learning, 2000

- 1. King, Knowledge Management and Organizational Learning, Springer, 2009.
- 2. Jay Liebowitz, Knowledge Management Learning from Knowledge Engineering, 1st Edition, 2001

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the basics of Knowledge Engineering	1, 3
2	Interpret the knowledge representation and reasoning methods.	2, 3, 5
3	Apply reasoning and uncertainty for intelligent systems	2, 3, 7
4	Design and develop ontologies	2, 3, 7
5	Understand learning and rule learning	1, 3, 6

		SEMESTE	R - V						
Course Title	MOOCS IV (MEAN Stack Developer: MongoDB, ExpressJS, AngularJS &					arJS &			
	447.50.0774147		NodeJS					0.75	T ~
Course code	22MOSY311R	Total credits: 6	L	T	P	S	R	O/F	C
D • • •	N T*1	Total hours: 90	0	0	4	12	6	0	6
Pre-requisite	Nil	Co-requisite			1.		Nil		
Programme	10	Bachelor of							
Semester		all/ V semester of							
Course Objectives		proficiency in Most the power of E							
Objectives	development.	s the power of E	Apressi	3 10	suca	11111110	SCIV	ver-side .	avascripi
	_	AngularJS for d	lvnamic	and	resn	onsiv	e fro	nt-end a	nnlication
	design.	7 mgalarsb 101 d	iy nanne	una	resp	OHSIV	CIIC	nit cha a	ppiicutioi
	_	NodeJS for creating	high-ne	erforr	nance	serv	er env	vironment	s.
		seamless integration							
	and efficient devel	_					,	C	
CO1		damentals of NoSQ	L datab	ases.					
			-						
CO2	Gain in-depth knov	vledge of Express.j	s framev	vork	for bu	iildin	g web	applicat	ions.
CO3	Build dynamic and	interactive web ap	plication	ıs usi	ng Ar	ngula	rJS.		
CO4	Grasp the concepts	of event-driven pro	ogrammi	ing a	nd asy	nchr	onous	s I/O in N	ode.js.
CO5	Learn to integrate l	MongoDB, Express	.js, Ang	ularJ	S, and	l Nod	le.js c	omponen	ts to build
	a complete MEAN	stack application.							
Unit-No.	Con	tent	Contac	et	Lea	rnin	g Out	come	KL
			Hour						
I	MongoDB: The	Complete Guide	9	J	Inder	stand	ing th	ne basics	1, 3
	to NoSQL	Database		О		MEA		Stack.	
	Development: Th	_				_		owledge	
	course ensures	to develop a		О	f Moı	ngoD	B.		
		derstanding of							
	MongoDB, coveri								
		and essential							
	operations. Gain								
		DDB, executing							
	CRUD operations								
	its architecture.	0							
	advanced concer								
	schema design,	indexing, and							
	performance	optimization,							
	incorporating adv								
	techniques using	~							
	course further exte								
	MongoDB wit								
		ument creation,							
	RESTful API design								
	^	ally, explore							
	MongoDB's	advanced							

	functionalities, mastering data			
	distribution, fault tolerance, and			
	performance strategies. Will possess			
	a robust skill set for proficient			
	MongoDB development and			
	management by the course's			
	conclusion.			
II	ExpressJS Essentials: Building	6	Understanding the	1, 3, 5
	Modern Web APIs: This		working of APIs and	
	comprehensive module provides a		ExpressJS. Applying	
	deep dive into Express.js, a robust		different APIs and	
	web application framework for		integrating MongoDB	
	Node.js. Participants will master		with ExpressJS.	
	fundamental concepts,		1	
	architecture, and the step-by-step			
	process of setting up Express.js			
	projects. Explore HTTP methods,			
	route definition, and parameter			
	_			
	extraction, gaining practical skills			
	in setting up requests with			
	Thunder Client and Postman tools.			
	Delve into middleware's pivotal			
	role, crafting custom functions and			
	distinguishing built-in from			
	custom middleware. Navigate			
	error handling with proficiency in			
	addressing synchronous errors and			
	transmitting appropriate responses.			
	The course extends to integrating			
	MongoDB with Express.js,			
	covering CRUD operations.			
	Concluding with user			
	authentication, participants acquire			
	skills in generating and managing			
	JWTs for secure authentication			
	practices.			
TTT	*	5	Understanding the besier	1 2 5
III	Angular Fundamentals:	5	Understanding the basics	1, 3, 5
	Building Responsive Web Apps		of responsive web apps	
	with Ease: This comprehensive		with AngularJS. Creating	
	module takes through AngularJS,		responsive Web Apps	
	delving into foundational		with AngularJS.	
	principles, including architecture,			
	data binding, and essential			
	features. Deepen the			
	understanding of AngularJS			
	architecture, empowering to			
	initiate critical application			
	Tr		<u> </u>	

	development. Exploring advanced			
	concepts, interpret adept			
	implementation of routing,			
	navigation, and form controls,			
	showcasing proficiency in data			
	binding. The module guarantees a			
	thorough comprehension of			
	Angular services, user			
	authentication, and the execution			
	of role-based access control.			
	Delving into advanced Angular			
	concepts, construct modular			
	components, implement effective			
	state management, and ensure			
	code reliability through testing and			
	debugging practices. Additionally,			
	the course emphasizes seamless			
	Bootstrap integration into			
	AngularJS and practical			
	application in creating a MEAN			
	stack project, showcasing			
	expertise in web development and			
	design.			
IV	NodeJS Unleashed: Mastering	6	Understanding the	1, 3, 5
_ ,		•	· ·	, - , -
	Backend Development: Embark		backend development.	
	Backend Development: Embark		backend development. Creating a backend with	
	on a comprehensive Node.js		Creating a backend with	
	on a comprehensive Node.js development journey with this		*	
	on a comprehensive Node.js development journey with this module. Starting with the		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration.		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration. Authentication, authorization, and		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration. Authentication, authorization, and email communication with Node		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration. Authentication, authorization, and email communication with Node mailer are explored for secure		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration. Authentication, authorization, and email communication with Node mailer are explored for secure applications. The module		Creating a backend with	
	on a comprehensive Node.js development journey with this module. Starting with the fundamentals, it will establish a solid foundation by mastering Node.js installation and utilizing Visual Studio Code. Later, lets delve into advanced topics, such as asynchronous programming, error handling, CRUD operations, and OS module usage for system information retrieval. The module progresses to web development essentials, covering HTTP request handling, JSON manipulation, and Express.js configuration. Authentication, authorization, and email communication with Node mailer are explored for secure		Creating a backend with	

communication, real-time chat	
application construction using	
Socket.io, and	
scalability/performance	
optimization for responsive	
applications. It will emerge adept	
in foundational and advanced	
Node.js concepts.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the fundamentals of NoSQL databases.	1, 2, 3, 5, 6, and 8
2	Gain in-depth knowledge of Express.js framework for building web applications.	2, 3, 5, 6, 7, and 8
3	Build dynamic and interactive web applications using AngularJS.	2, 3, 5, 6, 7, and 8
4	Grasp the concepts of event-driven programming and asynchronous I/O in Node.js.	1, 2, 3, 5, 6, 7, and 8
5	Learn to integrate MongoDB, Express.js, AngularJS, and Node.js components to build a complete MEAN stack application.	2, 3, 5, 6, 7, and 8

MAPPING TABLE

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO311R	PROGRAMMING IN JAVA	2.5	2.5	2	1	1.67		2.67	1
22BCAO312R	CLOUD COMPUTING	1	2.2	3	2.2	1.4	1	1.6	2
22BCAO313R	PROJECT-I	1.33	2.2	2.67	1	2	2	2.33	2
22BCAO314R	TECHNO PROFESSIONAL SKILLS IV	1.5	3	2.8	1.75	2	2	2.33	2
22BCAO315R	INTERNSHIP	1.33	2	2	1	1	2.33	1.5	1.5
22BCAO316R	PE I (Fundamentals of AI /ML)	1.5	2.6	2.4	1.5	2	2	1.67	1.67
22BCAO317R	PE II (Data Analytics using Python)	1	3	2.8	1	1.2	3	3	2
22BCAO318R	Business	1	2.6	1.6	2	1.25	1	2	1.5

	Intelligence								
22BCAO319R	Knowledge Engineering	2	3	3	1	1.2	2	2	1.5
22MOSY311R	MEAN Stack Developer: MongoDB, ExpressJS, AngularJS & NodeJS	1	2	3		2	1	1	1

		SEMESTE	R – VI						
Course Title		COMPUTER V	ISION						
Course code	22BCAO321R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 30L	2	1	0	0	0	0	3
Pre-requisite	Basic	Co-requisite	NIL						•
	Programming								
	Skills,								
	Mathematics								
Programme 1	Bachelor of Comp	puter Application							
Semester	Fall/ II semester o	of the third year of	f the pro	ogra	m				
Course 1	. Introduce the fur	ndamentals of comp	outer vis	ion a	and its	s app	licatio	ons.	
Objectives 2	. Equip students v	vith the skills to ac	quire, p	re-pr	ocess	, and	analy	yse image	and video
d	lata.								
3	. Explore various	techniques for ima	age feati	ure e	extrac	tion,	segm	entation, a	and object
	ecognition.								
		orinciples of motion	•			_			
		perience through p							
	•	ntial concepts of	•						olications,
		itations, drawing co							
		nt image feature ex			_		-		
		analysis, shape de	scriptors	s) to	extr	act re	elevar	nt informa	tion from
	mages.			_					
	•	mage segmentation	•				_	•	_
		cal) to partition ima					_		
	• •	and unsupervised le	•						networks,
		object recognition							1
		se applications of o	-						•
		maging, robotics,	and sect	urity	syste	ems,	mgmi	ignuing its	potentiai
Unit-No.	mpact. Con	tont	Contac	a t	Το	ownir	·α Ου	ıtcome	KL
Omt-No.	Con	Hour		Le	ai IIII	ig Ou	itcome	KL	
I	Introduction	to Computer	6						1, 2
	Vision: Definition	_	U						1, 2
	applications of o								
	the human visi	•				iho	and	1 .	
		Journ Djourn			Descr	11110	and	explain	
					Descr Comp			explain and	
	computer vision	Spatial Domain:		(Comp	uter	visi	ion and	
	computer vision Images in the	_		9	Comp Spatia	uter ıl		ion and	
	computer vision Images in the Pixels and Windo	ws	8	(5	Comp Spatia Image	outer al es	visi Dom	ion and ain of	1.2.4
II	computer vision Images in the Pixels and Windo Image Form	_	8]	Comp Spatia Image Descr	outer al es ibe, I	visi Dom llustra	ion and ain of	1,2,4
п	computer vision Images in the Pixels and Windo Image Forr transformations,	ws anation: 2D 3D	8		Comp Spatia Image Descr Analy	outer al es ibe, I vse th	visi Dom	ion and ain of ate and ge	1,2,4
П	computer vision Images in the Pixels and Windo Image Forr transformations, transformations,	mation: 2D 3D 3D rotations, 3D	8		Comp Spatia Image Descr Analy	outer al es ibe, I ase thation	visi Dom llustra e Ima and tl	ion and ain of ate and ge	1,2,4
II	computer vision Images in the Pixels and Windo Image Forr transformations, transformations, to 2D projection	mation: 2D 3D 3D rotations, 3D ons, Photometric	8		Comp Spatia Image Descr Analy Forma	outer al es ibe, I ase thation	visi Dom llustra e Ima and tl	ion and ain of ate and ge	1,2,4
п	computer vision Images in the Pixels and Windo Image Forr transformations, transformations, to 2D projection image formation	mation: 2D 3D 3D 3D rotations, 3D ons, Photometric n, The digital	8		Comp Spatia Image Descr Analy Forma	outer al es ibe, I ase thation	visi Dom llustra e Ima and tl	ion and ain of ate and ge	1,2,4
П	computer vision Images in the Pixels and Windo Image Forr transformations, transformations, to 2D projection image formation camera, Samplin	mation: 2D 3D 3D 3D rotations, 3D ons, Photometric n, The digital	8		Comp Spatia Image Descr Analy Forma	outer al es ibe, I ase thation	visi Dom llustra e Ima and tl	ion and ain of ate and ge	1,2,4
II	computer vision Images in the Pixels and Windo Image Forr transformations, transformations, to 2D projection image formation	mation: 2D 3D 3D BD rotations, 3D ons, Photometric n, The digital g and aliasing,	8		Comp Spatia Image Descr Analy Forma	outer al es ibe, I vse the ation ent fo	visi Dom llustra e Ima and th	ion and ain of ate and ge	1,2,4

	transforms, Pyramids and		Fourier transforms,	
	wavelets, Parametric transformations, Mesh-based warping,		Parametric transform etc	
	Application: Feature-based morphing			
IV	Feature detection and matching: Points and patches, Performance- driven animation, Edge detection, Edge linking, Vanishing points Image Segmentation, Snakes Image classification, Application: Visual similarity search	8	Describe and Applying Feature detection and matching in different images	2, 3
V	Applications of Computer Vision: Image and video retrieval: searching for specific images or videos in a database, medical imaging: diagnosis and analysis of medical images, Surveillance and security: object tracking and anomaly detection	6	Describe and Applying Various Computer Vision techniques like Searching, Medical images diagnosis, etc	2,3
Practical 1	Image Loading and Display: Learn how to read and display images using OpenCV.	4	Illustrate and implement different imaging techniques and carry out practical experiments in the lab.	1,2,3,4
Practical 2	Image Grayscale Conversion: Understand the process of converting colour images to grayscale.	4	Understanding and implementing Image Grayscale Conversion in colour images.	3,4,5,6
Practical 3	Image Thresholding: Explore thresholding techniques for image binarization.	4	Understanding and implementing threshold technique for image binarization.	3,4,5,6
Practical 4	Image Smoothing and Blurring: Implement various filters for smoothing and blurring images.	4	Understanding and implementing Image Smoothing and Blurring using various filters.	3,4,5,6
Practical 5	Edge Detection: Detects edges in images using Canny edge detection and other methods.	4	Understanding and implementing Image edge detection using Canny and other methods.	3,4,5,6
Practical 6	Image Morphological Operations: Apply morphological operations like erosion and dilation for image processing.	4	Understanding and implementing Image Morphological Operations and dilation	3,4,5,6

			process.	
Practical 7	Image Geometric Transformations: Perform scaling, rotation, and other geometric transformations on images.	4	Understanding and implementing different transformations in images.	3,4,5,6
Practical 8	Contour Detection and Object Recognition: Find contours in images and use them for object recognition.	4	Understanding and implementing Contour Detection and Object Recognition.	3,4,5,6
Practical 9	Histogram Analysis and Equalization: Analyze image histograms and perform histogram equalization for image enhancement.	4	Understanding and implementing histogram equalization for image enhancement	3,4,5,6
Practical 10	Template Matching: Find occurrences of a template image within a larger image.	4	Understanding and implementing a template image within a larger image.	3,4,5,6
Practical 11	Feature Detection and Keypoints: Detect keypoints like corners and Harris corners in images.	4	Understanding and implementing Feature Detection and Keypoints.	3,4,5,6
Practical 12	Feature Matching and Homography: Match features between images and estimate homography for image registration.	4	Understanding and implementing Feature Matching and Homography.	3,4,5,6
Practical 13	Image Pixel Manipulation and Display with OpenCV.	4	Understanding and implementing Pixel Manipulation and Display.	3,4,5,6
Practical 14	Python program to draw various shapes.	4	Understanding and implementing various shape.	3,4,5,6
Practical 15	Python program to draw a simple bullseye with the cv2.circle function	4	Understanding and implementing bullseye with the cv2.circle function	3,4,5,6
Practical 16	Program to perform various transformations in an image.	4	Understanding and implementing transformations in an image.	3,4,5,6
Practical 17	Python program that finds and draws contours of objects in an image.	4	Understanding and implementing Contour Detection and Object.	3,4,5,6
Practical 18	Detecting Blue Objects.	4	Understand the implementation of the Blue Objects detection.	3,4,5,6

Practical 19	Program for detecting faces.	4	Understand and	3,4,5,6
			implement of face	
			detection	
Practical 20	Program for Face and Smile	4	Understand and	3,4,5,6
	Detection.		implement face and smile	
			detection using different	
			technique	
Practical 21	Image segmentation based on color	4	Understand and	3,4,5,6
			implement color based	
			image segmentation	
			using different algorithm	
Practical 22	Image Color Conversion: Convert	4	Understand and	3,4,5,6
	the color space of the image (e.g.,		implementation different	
	RGB to grayscale, HSV, LAB,		color space image dataset	
	etc.) and analyze the channels			
	separately.			

- 1. Szeliski, Richard. Computer Vision: Algorithms and Applications. Springer Nature, 2022.
- 2. Davies, E. Roy. Computer and Machine Vision: Theory, Algorithms, Practicalities. Academic Press, 2012.
- 3. Gonzalez, Rafael C. Digital Image Processing. Pearson Education India, 2009.

REFERENCE BOOKS:

- 1. Forsyth, David A., and Jean Ponce. Computer Vision: A Modern Approach. Prentice Hall Professional Technical Reference, 2002.
- 2. Brownlee, Jason. Data Preparation for Machine Learning: Data Cleaning, Feature Selection, And Data Transforms In Python. Machine Learning Mastery, 2020.

ADDITIONAL RESOURCES:

- OpenCV Tutorials and Documentation: https://opencv.org/
- Python libraries for computer vision: Scikit-image, TensorFlow, PyTorch
- https://nptel.ac.in/courses/117105079
- https://nptel.ac.in/courses/106105216/

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Explain the essential concepts of computer vision, including its applications, challenges, and limitations, drawing comparisons with human vision.	1, 2, 7 and 8						
2	Classify the different image feature extraction techniques (edge detection, corner/blob detection, texture analysis,	1, 2, 7 and 8						

	shape descriptors) to extract relevant information from	
	images.	
	Develop various image segmentation algorithms	
3	(thresholding, region-based, edge-based, morphological) to	1, 2, 7 and 8
	partition images into meaningful regions for further analysis.	
	Justify supervised and unsupervised learning methods (k-	
4	NN, SVM, neural networks, K-means, PCA) for object	1, 2, 7 and 8
	recognition and classification tasks in images.	
	Examine the diverse applications of computer vision in	
5	various domains like image retrieval, medical imaging,	1 2 7 and 8
5	robotics, and security systems, highlighting its potential	1, 2, 7 and 8
	impact.	

SEMESTER – VI										
Course Title		$A_{ m l}$	pplied A	I/ML						
Course code	22BCAO32	Total credits: 3	L	T	P	S	R	O/F		C
	3R	Total hours:	3	0 0 0 0					3	
		45L								ı
Pre-requisite	Basics of	Co-requisite	NIL							
	AI									
Programme		Computer Applic								
Semester		ster of the third y								
Course		e the applications of			_) in va	arious do	ma	ins.
Objectives		w to apply AI to so	_	_	oblei	ns.				
		nd the real-world a								
CO1		sic concepts of ma								
CO2	•	us AI and ML tec	hniques	in expe	rt sy	stems a	and otl	her mach	nine	learning
	models.									
		d application of su			_		nt don	nains.		
CO4		f un-supervised lea			-					
CO5	•	on of advanced co	ncepts o	of AI an	d M	L in en	nergin	g field l	ike	Medical
	and Agricultu	ral sciences.			ı					
Unit-No.		Content		Conta		Learning Outco		Outcome	•	KL
I	AI in health	00,000		Hour 10	r	Explain	n	AI	in	1 2 2
1		in enhancing o	aliniaal	10		healtho		AI	111	1, 2, 3
		ting process, class				Unders				i
		ing process, clas						ig ai ferent M	nd rr	ı
	_	ugment diagnosis					-	e datasets		
	_	nodels using di				III I I Ca	illicarc	ualaseis	•	
	Algorithms:	Supervised	and							
	_	l, Naïve Bayes, D								
	•	tic Regression,								
	_	Medical data: ii								
	such as	X-ray, CT,	MRI,							
		hy, Pathology.	Build							
		my, ramology. I models for di								
		arios that involve								
	images.		موں رمد							
II	AI in Agricu	lture:		10		Descri	hing A	I is usef	iu1	1, 2, 3
	_		arming,	10		in	_	gricultur		1, 2, 3
		of Smart and Pr	_			Unders		differe		
			t/Precision Analysis							
	_	redictive Analyti				Agricu			in nd	
		tonomous Farming				-				
	_	ML. Example:								
		Disease Detection,					-			
			Species							
	Recognition,		Velfare,							
	Livestock	Production,	Water							
				<u> </u>						

	Management, Soil Management			
III	AI for Language Processing Introduction to NLP - Various stages of NLP -The Ambiguity of Language: Why NLP Is Difficult. Parts of Speech. Components of NLP: Natural Language Understanding (NLU), Natural Language Generation (NLG). Difficulties in NLU, NLP Terminology, Steps in NLP. Implementation Aspects of Syntactic Analysis: Context-Free Grammar, Top-Down Parser.	8	Understanding NLP and Applying in day-to-day life. Analysis with different real-world examples.	2, 3, 4
IV	Al for Image Processing Digital Image Formation: point spread functions -sampling and quantization. Spatial Transforms: convolution concept - low and high pass filtering. Image corrections: Atmospheric Correction, Image enhancement and filtering, Image classification (Unsupervised, Supervised) and Accuracy assessment. Remote Sensing Concepts: spatial and radiometric characteristics — spectral and temporal characteristics. Data reception, Data processing & Data generation: Ground station, Data generation, Data processing & correction. Radiometric and Geometric corrections: Radiometric corrections Random noise correction, Atmospheric correction, Geometric errors and corrections.	10	Explain different images Processing techniques. Understanding with examples and applying with different images.	1, 2, 3

- 1. Handbook of Artificial Intelligence in Healthcare Vol 2: Practicalities and Prospects CP Lim Vol 2, Springer
- 2. Artificial Intelligence in Agriculture Rajesh Singh, Anita Gehlot, Mahesh Kumar Prajapat, Bhupendra Singh 1st Edition
- 3. Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition Daniel Jurafsky and James H.Marti Prentice Hall Series in Artificial Intelligence, 2020
- 4. Digital Image Processing R. C. Gonzalez and R. E. Woods Pearson, India, third

- edition, 2017.
- 5. Remote sensing and Image interpretation Lilles and and Keifer John Wiley and Sons, $2000\,$

REFERENCE BOOKS:

- 1. Natural Language Processing: A Quick Introduction to NLP with Python and NLTK Samuel Burns 2019
- 2. Introductory digital image processing A Remote Sensing perspective John R. Jenson Prentice Hall, 1986

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Outline the basic concepts of machine learning and Artificial intelligence.	1, 2, 3 and 8						
2	Analyse various AI and ML techniques in expert systems and other machine learning models.	1, 2 and 3						
3	Illustration and application of supervised learning in different domains.	1, 2, 3 and 8						
4	Application of un-supervised learning in expert systems.	1, 2, 3 and 8						
5	Implementation of advanced concepts of AI and ML in emerging field like Medical and Agricultural sciences.	1, 2, 3 and 8						

			SEMES	STEI	R – V	T				
Course		R	ecomme	nder	Syst	em				
Title	22D C 4 O 22 C D	7D 4 1	114 2	T .			- C	T.D.	0/5	
Course code	22BCAO326R	Total cre	hours:	L	T 0	P 0	S 0	R 0	0/F 0	3
couc		45L	nours.	3	U	U	ľ	U	ľ	
Pre-	Fundamental	Co-requi	isite	NIL	,			•		•
requisite	of AI/ML									
Program	Bachelor of Cor	nputer A _l	pplication	n (B	CA)					
me Semester	Fall/ II semester	r of the th	ird voor	of th	e nre	าสาวาท				
Course			•				andar	gristom		
Objectives		stand the fabout cont						•		
									mining alg	orithms for
		ender syst								
CO1	Understand the b			omn	ende	r syste	ms			
GOA	G : 5" :		. D. 1D			1	G .			
CO2	Gain proficiency						Syste	ms		
CO3	Learn about Colla							1 .	.1 1.11.	. 1 .
CO4	Understand secur attack-resistant re				nend	er syst	ems a	nd gain	the ability	to design
CO5	Learn about evalu				mme	ender s	vstems	<u> </u>		
						ontact			04	1/1
Unit-No.		Content				Hour			Outcome	KL
I	Introduction					9	_	olain	and	1, 2, 3
	Introduction ar	nd basic	taxonom	V O	f			erstand	the	
	recommender s			•					ta mining	
	non-personalize	-	Recomm				SV	hods. D in	Applying different	
	Systems, Over			ining	3			asets.	different	
	methods for		•							
	similarity mea			-						
	reduction	Singular	•	Value	2					
	Decomposition	(SVD)								
II	Content-Based	Rec	ommend	ation	ı	9	Uno	derstand	ing	2, 3
	Systems							erent	Content	
	High-level arch	itecture of	content-l	hased	1		Bas		chitecture	
	systems - Item								different	
	item profiles, M	_	_	-				ieval ssificatio	and	
	profiles, Simila		_					orithms.	OII	
	Classification al	gorithms.					aigo	mumis.		
III	Collaborative I	iltering				9	Uno	derstand	ing	2, 3
		J	1 37					laborati	•	
	A systematic			arest				ering	and	
	neighbor collab user-based an		iltering i-based	(CF) CF			App	olying in	n different	
	components of						way	/S.		
	(rating normalize	-								
	computation,	and	neighboi	-						
	selection.	- -	8-232	•						

IV	Attack-Resistant Recommender Systems Types of Attacks, Detecting attacks on recommender systems Individual attack and Group Attack Strategies for robust recommender design, Robust recommendation algorithms.	9	Understanding different attract Resistant system and applying different recommendation Algorithms.	2, 3
V	Evaluating Recommender Systems Evaluating Paradigms, Online and Offline Evaluation Goals of evaluation design, Design Issues, Accuracy metrics, Limitations of Evaluation measures	9	Understanding and Applying Evaluation Recommender Systems and Analyses it with different metrics.	2, 3, 4

- 1. Recommender Systems: The Textbook Charu C. Aggarwal Springer, 2016.
- 2. Recommended Systems: An Introduction Dietmar Jannach, Markus Zanker, Alexander Fleering and Gerhard Friedrich Cambridge University Press (2011), 1st ed.

REFERENCE BOOKS:

- 1. Recommender Systems Handbook Francesco Ricci, Lior Roach, Bracha Shapira 1st ed, Springer (2011)
- 2. Mining of massive datasets Jure Leskovec, Anand Rajaraman, Jeffrey David Ullman Cambridge University Press, 2020

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the basic concepts of recommender systems	1,2,3,7, and 8						
2	Gain proficiency in Content-Based Recommendation Systems	1,2,3,7, and 8						
3	Learn about Collaborative Filtering Techniques	1,2,3,7, and 8						
4	Understand security concerns in recommender systems and gain the ability to design attack-resistant recommender systems	1,2,3,7, and 8						
5	Learn about evaluating paradigms of recommender systems	1,2,3,7, and 8						

		SEMI	ESTE	R – VI								
Course		Exp	lorato	ry Dat	a Ana	lysis						
Title Course	22BCAO324R	2BCAO324R Total credits: 3 L T P S R O/F										
code	225CA0324K	Total hours: 45L	3	0	0	0	0	0	3			
Pre-	Probability	Co-requisite	NIL									
requisite	and Statistics	Doobolow of	Come	nuton A	nnlia	tion ((DCA)					
Programm e		Bachelor of	Comj	puter A	ppnca	นเบบ	(BCA)					
Semester		Fall/ II semeste	r of th	ne third	l year	of the	progran	n				
Course	1.To gain insight	s and understanding			aset th	rough	visual an	d quantita	tive			
Objectives	0.75 : 1 ::6	1 1		hods.	1.	1	1					
	2.To identify p	atterns, relationsh further anal					data, this	can infori	n			
	3.To extract me	aningful informati					nicate it e	effectively	to			
				nolders.								
		importance of ex	plorate	ory dat	a anal	ysis ir	data ana	alysis and	decision-			
	making.											
CO2	Develop skills in	data visualization	using	variou	s tools	and to	echniques	S.				
CO3	Learn how to effe	ectively communic	cate in	sights a	and fin	dings	from data	a analysis.				
CO4		niques to real-wor										
		hinking skills to i	dentify									
Unit-No.	C	ontent		Cont Hou		Lea	arning O	utcome	KL			
I	Introduction	to Explorato	ory	6		Exp	olain EI	OA and	1, 2, 3			
	Data Analysis					und	erstand	and				
		tion, what is ED				App						
		ssical & Bayesia					erent	datasets				
		mary, EDA Goa of Graphics,	us, An			WIU	h Exampl	es.				
		Example, Gene										
	Problem Categ	•	141									
II	Underlying	Assumptio	ns	6		Uno	derstand	and	2, 3, 4			
	Importance,		for			App	olying I	Different				
	Testing	Assumption					ting					
	Interpretation	of 4-Pl	ot,				umptions					
	Consequences.						alysis	with				
III	EDA Techniq	1100	+	8		Gra	ıpn. derstandii	ng and	2, 3, 4			
1111	_	ues Analysis Questic	ons	ø				different	4, 3, 4			
	Graphical	Technique					asets	and				
	Alphabetical,	Graph				ana	lyses wit					
		y Problem Catego				Qua	antitative	ly.				
	Quantitative	Techniqu	-									
	Probability Dis	•										
IV	EDA Case Stu			10)	Uno	derstandi	ng	2, 3, 4			
	Case Studies	Introduction, Ca	ise				erent cas	-				
	Studies: Norm	al random numbe	rs,				applyir	-				
	Uniform ra	andom numbe	rs,					example.				
						Ana	alyze with	n graphs				

SEMESTER-VI

	Random Walk, Josephson Junction Cryo thermometry, Beam Deflections, Filter Transmittance, Standard Resistor, Heat Flow Meter 1, Airplane Glass Failure Time, Ceramic Strength.			
V	Data Visualization Design principles for charts and graphs, ggplot2 and Tableau tools for creating data visualizations, the process creating visualizations and selecting the appropriate visual display, designing effective digital presentations, Visualization as exploration, visualizing categorical data, Visualizing time series data, Visualizing multiple variables, Visualizing geospatial data, Dashboard design, Webbased visualizations, Interactive visualizations and motion.	6	Understanding the different charts, graphs and their interpretations. And Analyses with different datasets.	2, 3, 4

TEXT BOOKS:

1. Exploratory Data Analysis John Tukey Pearson;1st edition

REFERENCE BOOKS:

- 1. Engineering Statistics Handbook http://www.itl.nist.gov/div898/handbook/nist.gov
- 2. Hands-On Exploratory Data Analysis with Python: Perform EDA techniques to understand, summarize and investigate your data PaperbackSuresh Kumar Mukhiya, Usman Ahmed Packet Publishing Limited

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Demonstrate the importance of exploratory data analysis in	1, 2 and 3						
1	data analysis and decision-making.	1, 2 and 3						
2	Develop skills in data visualization using various tools and	1, 2, 3, 5 and 8						
	techniques.	1, 2, 3, 5 and 6						
3	Learn how to effectively communicate insights and findings	1, 2, and 3						
3	from data analysis.	1, 2, and 3						
4	Apply EDA techniques to real-world data analysis problems.	1, 2, 3, 5 and 7						
5	Enhance critical thinking skills to identify patterns, trends,	1, 2, 3, 5, 7 and 8						
	and outliers in data.	1, 2, 3, 3, 7 and 8						

Course Title		Patt	tern l	Recog	nition					
Course code	22BCAO327R	Total credits: 3	L	T	P	S	R	O/F	C	
		Total hours: 45L	3	0	0	0	0	0	3	
Pre-requisite	Fundamentals of	Co-requisite	NII			•				
	probability, linear									
	algebra and									
	Digital Image									
	Processing									
Programme	Bachelor of Compu									
Semester	Fall/ II semester of									
Course	1.Pattern recognition			•	• •		s on	classica	1 comp	uter
Objectives	engineering problem									
	2.The emphasis of th	•		•		•				
	3.The representation	_	sses a	and the	e proxi	imity m	easur	es are a	n impoi	tant
	aspect of pattern reco	<u> </u>								
CO1	Summarize the vario	us techniques involv	ved ir	n patte	rn reco	gnition	•			
CO2	Categorize the variou	is pattern recognition	n tec	hnique	es into	supervi	sed a	nd unsuj	pervised	1
CO3	Understand feature s	election and extract	ion te	echniq	ues.					
CO4	Illustrate the artificia	l neural network-ba	sed p	attern	recogn	nition				
CO5	Discuss the applicati	ons of pattern recog	gnitio	n in va	arious	real-wo	rld ap	plication	ns	
Unit-No.	Content			Cont	act			utcome		KL
				Hour						
I		nd Mathemati		9)	Explai			Pattern	1, 2,
		Pattern Recogniti				Recogn				4
	Definition, Applica	_				Unders		•	fferent	
	Clustering Vs Clas	_				Cluster	_		niques	
	Vs Unsupervised,							eory. Ap		
	Algebra, Vector	-	of			in real	world	d scenari	10.	
	Probability, Basics		-							
	Decision Boundarie	es, Decision Region	ons,							
	Metric Spaces									
II	Classification: Ba	•		9)	Explai	_		fferent	1, 2,
	Error Probability,	-						on tech	•	4
	,	inear Discrimin						standing		
	′	-Linear Decis	-			_		n by ap		
	Boundaries, Mahala					in diffe	erent	datasets.		
	Classifier, Single		-							
	Perceptron, Train		Set,							
	Standardization and									
III	Clustering:	Basics,		9)	Explai	_		fferent	1, 2,
	Similarity/Dissimila	· ·					-	echniqu		4
	Clustering Criteria,					unders		•	their	
1	I functions and sir	nilarity measures,				interpr	etatio	n by ap	plying	
		*				_				
	within cluster dist	ance criterion, K-				_		datasets.		
		ance criterion, K- Single linkage and				_				

	medoids, DBSCAN, Data sets: Visualization, Unique Clustering			
IV	Feature Selection and Extraction: Problem statement and Uses, Branch and Bound Algorithm, Sequential Forward / Backward Selection Algorithms, (l,r) algorithm, Probabilistic separability based criterion functions, interclass distance based criterion functions, Feature Extraction, PCA + Kernel PCA	8	Explaining different Feature Selection and Extraction technique and understanding their role in enhancing models.	1, 2, 3, 4
V	Recent Advances in Pattern Recognition: Structural PR, SVMs, FCM, Soft-Computing and Neuro-Fuzzy Techniques, Real-Life Examples	8	Understanding Recent Advance Pattern Recognition Technique with Real life Examples	1, 2, 3, 4

- 1. J.I. Tou & R.C. Gonzalez, Pattern Recognition Principles, Addition-Wesley.
- 2. MR. Schalkoff, Pattern Recognition Statistical, Structural and Neural Approaches, John Wiley, 1992.

REFERENCE BOOKS:

- 1. P.A. Devijer & J. Kittler, Pattern Recognition A Statistical Approach, Prentice-Hall.
- 2. Christopher. M. Bishop, 'Pattern recognition and machine learning, Springer, 2006.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Summarize the various techniques involved in pattern recognition.	1,2,3,7, and 8
2	Categorize the various pattern recognition techniques into supervised and unsupervised	1,2,3,7, and 8
3	Understand feature selection and extraction techniques.	1,2,3,7, and 8
4	Illustrate the artificial neural network-based pattern recognition	1,2,3,7, and 8
5	Discuss the applications of pattern recognition in various real-world applications	1,2,3,5,7, and 8

		S	EME	STE	R – V	'I						
Course		Applied Ar	alyti	cs in	NLP							
Title												
Course	22BCAO325	Total credits: 3	L	T	P	S	R	O	/F			C
code	R	Total hours:	3	0	0	0	0	0			3	3
		45L										
Pre-	NIL	Co-requisite	NIL									
requisite												
Programme		Computer Applica			•							
Semester		ter of the third ye										
Course		ize the concepts a			lues	of N	atura	Langu	age Pr	ocessing 1	for a	analysing
Objectives		Morphology and						.1	1		c	
		e the fundamentals			_		-		_	_		
		he Statistical lear	nıng	meth	ods	and	cuttii	ig-edge	resear	ch model	s fr	rom deep
CO1	learning.	' ' 1 1 D		CII		т .		1		1' 1 1	.1	т 1'
CO1	_	inciples and Proce	esses	or H	uinan	Lan	iguag	es such	as En	gusn and	otn	ier indian
CO2	Languages usir	oncepts of morpho	21000	crint	O.W. C	amar	tios	discour	00 000	l progmati	00. 6	of notural
COZ	language.	oncepts of morpho	Jiogy	, sym	.ах, s	Ciliai	itics,	uiscoui	se, and	ı pragman	cs c	oi maturar
CO3		tagging for a give	n no	tural	langi	1200	and	calact a	cuitab	la langua	70 T	modelling
03		d on the structure of				iage	anu	sciect a	Surrau	ne langua;	ge i	moderning
CO4	_	dvanced algorithm				ies f	or te	vt_hasec	l proce	esing wit	h re	espect to
CO4	morphology.	avancea argorum	115 a11	u icc	iiiiqu	103 1	or to	At-basec	proce	233111g WIL	11 10	espect to
CO5		tical Mathada fan D	morphology. Develop Statistical Methods for Real World Applications and explore deep learning-based NLP									
		ncai ivietnous for R	keal V	vorla	Appl	icatio	ons a	nd explo	ore deei	n learning.	-bas	ed NLP
	Develop Statist		keal v	Vorld							-bas	
Unit-No.	Develop Statist	Content	keal V	Vorld	Co	ication ntac lour				p learning- utcome	-bas	KL
	Introduction	Content	Lang		Co	ntac	t		ning O			
Unit-No.	Introduction	Content	Lang	guage	Co	ntac lour	t D	Learn escribin	ning O	utcome	d	KL
Unit-No.	Introduction Processing,	Content to Natural	Lang langt	guage uage,	Co	ntac lour	D ur	Learn escribin nderstan	ning O	utcome NLP an	d nt	KL
Unit-No.	Introduction Processing, Regular expre	Content to Natural Ambiguities in	Lang langu	guage uage, logy,	Co	ntac lour	D ur	Learn escribin nderstan LP Proc	g N ding the essing	utcome NLP an ne differer	d nt	KL
Unit-No.	Introduction Processing, Regular expre	to Natural Ambiguities in ession, Words, Moparsing, Word tok	Lang langu orpho	guage uage, logy,	Co	ntac lour	D ur	Learn escribin nderstan LP Proc	g N ding the essing	ULP anne differentechnique	d nt	KL
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo	to Natural Ambiguities in ession, Words, Morarsing, Word token & stemmir orphological analysis	Lang langu orpho	uage uage, logy, ation,	Co	ntac lour	D ur	Learn escribin nderstan LP Proc	g N ding the essing	ULP anne differentechnique	d nt	KL
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo generation usi	to Natural Ambiguities in ession, Words, Mo parsing, Word tok n & stemmir orphological anal	Lang langu orpho ceniza ng, lysis	guage uage, logy, ation, Edit and	Co	ntac lour	D ur	Learn escribin nderstan LP Proc	g N ding the essing	ULP anne differentechnique	d nt	KL
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo generation usi Finite State	to Natural Ambiguities in ession, Words, Morarsing, Word token & stemmir orphological analysis	Lang langu orpho ceniza ng, lysis	guage uage, logy, ation, Edit and	Co	ntac lour	D ur	Learn escribin nderstan LP Proc	g N ding the essing	ULP anne differentechnique	d nt	KL
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo generation usi Finite State transducer.	to Natural Ambiguities in ession, Words, Mo parsing, Word tok n & stemmir orphological anal ing Automata and Fi	Lang langu orpho ceniza ng, lysis nite	guage Jage, logy, ation, Edit and	Co	ntac four 8	D ur N A	Learn escribin nderstan LP Proc pplying	g N ding thessing with ex	NLP anne differentechniques	d nt ss.	KL 1, 2, 3
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo generation usi Finite State transducer. Introduction,	to Natural Ambiguities in ession, Words, Morarsing, Word token & stemmir orphological analong Automata and Fi	Lang langu orpho ceniza ng, lysis nite	guage Jage, logy, ation, Edit and	Co	ntac lour	D ur N A	Learn escribin nderstan LP Proc pplying	g N ding the essing with establishment	ULP anne differentechniques xamples.	d nt ss.	KL
Unit-No.	Introduction Processing, Regular expression Morphology Lemmatization distance. Morgeneration usi Finite State transducer. Introduction, based part of state	to Natural Ambiguities in ession, Words, Moral token & stemmir orphological analong Automata and Fi English word classpeech tagging,	Lang langu orpho ceniza ng, lysis nite	guage Jage, logy, ation, Edit and State	Co	ntac four 8	D ur N A	Learn escribin nderstan LP Proc pplying nderstar ord ru	g N ding the essing with ending alles,	NLP anne differentechniques xamples.	d d nt ss.	KL 1, 2, 3
Unit-No.	Introduction Processing, Regular expre Morphology Lemmatizatio distance. Mo generation usi Finite State transducer. Introduction, based part of s Transformation	to Natural Ambiguities in ession, Words, Mo parsing, Word tok n & stemmir orphological anal ing Automata and Fi English word class speech tagging, on based part of	Lang languorphooxenizang, lysis nite ses, I	guage Jage, logy, ation, Edit and State	Co	ntac four 8	D ur N A	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying	g N ding the essing with ending alles,	differentags etc	d nt ss.	KL 1, 2, 3
Unit-No.	Introduction Processing, Regular expression Morphology Lemmatization distance. Morgeneration usi Finite State transducer. Introduction, based part of so Transformation tagging, Evaluation	to Natural Ambiguities in ession, Words, Moral parsing, Word token & stemmir orphological analog Automata and Fine English word class speech tagging, on based part of luation and error	Lang languorpho enizang, lysis nite ses, I	guage uage, logy, ation, Edit and State Rule- beech	Co	ntac four 8	D ur N A	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying fferent	g N ding the essing with ending adding alles, and	NLP anne differentechniques xamples.	d nt ss.	KL 1, 2, 3
Unit-No.	Introduction Processing, Regular expression Morphology Lemmatization distance. Morgeneration using Finite State transducer. Introduction, based part of some transformation tagging, Evaluation and the some transformation transformat	to Natural Ambiguities in ession, Words, Moral token was temminorphological analoged Automata and Fine English word classpeech tagging, on based part of luation and errorg indeterminated	Lang langu orpho ceniza ng, lysis nite ses, I	guage Lage, logy, ation, Edit and State Rule- beech lysis, and	Co	ntac four 8	D ur N A	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying	g N ding the essing with ending adding alles, and	differentags etc	d nt ss.	KL 1, 2, 3
I II	Introduction Processing, Regular expressing, Morphology of Lemmatization distance. Morgeneration using Finite State transducer. Introduction, based part of some transformation transformation transformation transformation transformation transformation.	to Natural Ambiguities in ession, Words, Moral parsing, Word token & stemmir orphological analog Automata and Fire English word class speech tagging, on based part of luation and error g indeterminate Applications of Ta	Lang languerpho ceniza ng, lysis nite ses, I anal	guage uage, logy, ation, Edit and State Rule- beech lysis, and	Co	ntaccour 8	D ur N A	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying fferent chnique	g N ding thessing with earling adding alles, and	differentags etc analyzinevaluatio	d nt ss.	KL 1, 2, 3
Unit-No.	Introduction Processing, Regular expressing, Morphology Lemmatization distance. Morgeneration using Finite State transducer. Introduction, based part of some Transformation tagging, Evaluation Evaluation. Parsing Basic	to Natural Ambiguities in ession, Words, Moral deparsing, Word token & stemmir orphological analog and Automata and Firm English word class speech tagging, on based part of luation and error g indeterminate Applications of Taconcepts: Statistic	Lang languerpho ceniza ng, lysis nite ses, I of sp anal cy gging cal Pa	guage Lage, logy, ation, Edit and State Rule- peech lysis, and grsing	Co	ntac four 8	D ur N A di te	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying fferent chnique	g N ding the essing with essing and s.	differer tags etc analyzin evaluatio	d nt ss.	KL 1, 2, 3
I II	Introduction Processing, Regular expression Morphology Lemmatization distance. Morgeneration usi Finite State transducer. Introduction, based part of some stagging, Evaluation and the state of the sta	to Natural Ambiguities in ession, Words, Mo parsing, Word tok n & stemmir orphological anal ing Automata and Fi English word class speech tagging, on based part of luation and error g indeterminate Applications of Ta concepts: Statistic babilistic Conte	Lang languerpho seniza ng, lysis nite ses, I of sp anal cy gging cal Pa	guage lage, logy, ation, Edit and State Rule- leech lysis, and grsing Free	Co	ntaccour 8	U w A di te	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying fferent chnique pplying fferent	g N ding the essing with essing and lies, and s.	differentags etcanalyzin evaluatio	d nt ss.	KL 1, 2, 3
I II	Introduction Processing, Regular expressing, Regular expressing, Morphology of the second distance. Moreover, Lemmatization distance. Morphology of the second distance. Morphology of the second distance. Morphology of the second distance. Introduction, based part of second distance of the second d	to Natural Ambiguities in ession, Words, Moral parsing, Word token & stemmir orphological analog Automata and Fi English word class speech tagging, on based part of luation and error g indeterminate Applications of Taleoncepts: Statistic babilistic CKY I	Lang languorpho cenizang, lysis nite ses, I analey gging ext	guage Jage, Jogy, Ation, Edit And State Rule- Joseph Jysis, And Gring Free Jug of	Co	ntaccour 8	U W A di te	escribin aderstan LP Proceute pplying fferent chnique pplying fferent arsing	nding O g N ding the essing with essing with essing and sessing and sessing the control of the	different tags et analyzin evaluation analysin mmar cu	d nt ss.	KL 1, 2, 3
I II	Introduction Processing, Regular expressing, Morphology Lemmatization distance. Morgeneration using Finite State transducer. Introduction, based part of state transformation tagging, Evaluation. Parsing Basic basics: Proferammar; Profess. Problem	to Natural Ambiguities in ession, Words, Moral parsing, Word token & stemmin orphological analog Automata and Firm English word class speech tagging, on based part of luation and error g indeterminate Applications of Talconcepts: Statistic babilistic Conterpolations with PCFGs.	Lang languorpho cenizang, lysis nite ses, I analey gging ext	guage Jage, Jogy, Ation, Edit And State Rule- Joseph Jysis, And Gring Free Jug of	Co	ntaccour 8	U W A di te	Learn escribin nderstan LP Proc pplying nderstar ord ru pplying fferent chnique pplying fferent	nding O g N ding the essing with essing with essing and sessing and sessing the control of the	different tags et analyzin evaluation analysin mmar cu	d nt ss.	KL 1, 2, 3
I II	Introduction Processing, Regular expressions, Regular expressions, Regular expressions, Morphology of the second distance. Morganization using the second distance. Morphology of the second distance. Morphology of the second distance. Morphology of the second distance. Introduction, based part of second distance of the s	to Natural Ambiguities in ession, Words, Moral parsing, Word token & stemmir orphological analog Automata and Fi English word class speech tagging, on based part of luation and error g indeterminate Applications of Taleoncepts: Statistic babilistic CKY I	Lang langue propho cenizang, lysis nite ses, I ses, I ses, I analyzy gging ext Parsin Rea	guage Jage, Jogy, Ation, Edit and State Rule- Joseph Jysis, and Gring Free Jug of Jug	Co	ntaccour 8	U w A di te	escribin aderstan LP Proceute pplying fferent chnique pplying fferent arsing	nding O g N ding the essing with estimation of the estimation of	differentechniques xamples. differentags etcanalyzin evaluation analysin mmar conques with ples.	d nt ss.	KL 1, 2, 3

	similarity, TF-IDF N-Gram Models,		Lexical Semantics different	
	Language Model Adaptation, Types of		modelling techniques form	
	Language Models, and Language-Specific		case study.	
	Modelling Problems. Lexicalized models			
	using derivational histories and			
	dependency-based models. Real-life			
	example and related case study.			
V	Introduction and Application to WordNet.	8	Applying different	3, 4
	Recent trends in NLP. Question		applications and analyses	
	Answering Systems, Social Network		by using different datasets.	
	analysis.			

- 1. Jurafsky Daniel and Martin James H. "Speech and Language Processing", 3rd Edition, Pearson publications, 2018.
- 2. Christopher D. Manning and Hinrich Schutze, "Foundations of Natural Language Processing", 6th Edition, The MIT Press Cambridge, Massachusetts London, England, 2003.

REFERENCE BOOKS:

- 1. Jurafsky Daniel and Martin J. H., "Speech and language processing Natural Language Processing, Computational Linguistics,2ndEdition, Upper Saddle River, NJ: Prentice-Hall, 2008.
- 2. Jalaj Thanaki, Python Natural Language Processing: Explore NLP with Machine Learning and deep Learning Techniques, Packt, 2017.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Realize the principles and Processes of Human Languages such as English and other Indian Languages using computers.	1,2,3,7 and 8						
2	Describe the concepts of morphology, syntax, semantics, discourse, and pragmatics of natural language.	1,2,3,7 and 8						
3	Perform POS tagging for a given natural language and select a suitable language modelling technique based on the structure of the language.	1,2,3,7 and 8						
4	Demonstrate advanced algorithms and techniques for text-based processing with respect to morphology.	1,2,3,7 and 8						
5	Develop Statistical Methods for Real World Applications and explore deep learning-based NLP	1,2,3,7 and 8						

		SEMES	TE	R -	- VI						
Course Title		Deep	Le	ear	ning						
Course code	22BCAO328R	Total	L	T		P	S	R	O/F		C
		credits: 3	3	0		0	0	0	0		3
		Total hours:									
		45L									
Pre-requisite	Machine	Co-requisite	NI	L							
	Learning										
Programme	Bachelor of Con										
Semester	Fall/ II semester					rog	gram				
Course	1.Introduce major		_								
Objectives	2.Differentiate be						•		_		
	3.The problem se			_							ms
CO1	Understand the ba	asics of artificia	l ne	eura	ıl netv	VO1	ks ar	nd dee	p learni	ng.	
CO2	Mathematical intu	uition of Deep l	earr	ning	g netw	or	ks, a	nd the	ir applic	cation.	
CO3	Different Deep Le	earning Tools in	ı ac	ade	emic r	ese	earch	•			
CO4	Identify the deep	_							world a	pplicat	tions which
	are more appropri	ate for various	type	es o	of lear	nir	ng tas	sks in	various	domai	ns.
CO5	Analyze deep lear	rning algorithm	s to	so	lve rea	al-v	world	l prob	lems.		
Unit-No.	Cont	tent	(Contact			Lea	rning	Outco	me	KL
				H	our						
I	Introduction:			1	.0	E	Expla	in and	d under	stand	1, 2, 4
	Various paradig	ms of learning				tl	he	funda	mentals	of	
	problems, Pers	spectives, and				Γ	Deep		lea	rning	
	Issues in d	eep learning				te	echni	ques.	App	lying	
	framework,	review of				v	vith e	xamp	le.		
	fundamental	learning									
	techniques.										
	Feed-forward n	eural network:									
	Artificial Neu	ral Network,									
	activation functi	on, multi-layer									
	neural network.										
II	Training Neural	Network: Risk		1	.0	E	Expla	in	N	leural	1, 2, 3
	minimization,	loss function,				N	letwo	orks		and	
	backpropagation	ı ,				u	nder	stand		the	
	regularization, n	nodel selection,				a	rchite	ecture	and	their	
	and optimization	1.				a	pplic	ations	١.		
	Conditional Ra	andom Fields:									
	Linear chair	n, partition	ı								
	function, Mar	kov network,									
	Belief propaga	tion, Training									
	CRFs, Hidden M	_									
	Entropy.										
III	Deep Learning:	Deep Feed			8	J	Jnder	stand	ing	and	2, 4
	Forward network	k,					analy			the	
	regularizations,	training deep					-	orwar	d	and	
	models, dropout					Γ	Oropo	ut in	CNN		
	minimization, backpropagation regularization, n and optimization Conditional Ra Linear chair function, Mar Belief propaga CRFs, Hidden M Entropy. Deep Learning: Forward network regularizations, n	loss function, nodel selection, nodel selection, nodel selection, nodel selection, nodel selection, nodel selection, raining warkov model, Deep Feed k, training deep				U a a	Jnder Vanaly Jeedfo	orks stand ecture ations rstand sing orward	and	and the their	

	Convolutional Neural Network,			
	Recurrent Neural Network,			
	Deep Belief Network.			
IV	Probabilistic Neural Network:	10	Understanding and	2, 3
	Hopfield Net, Boltzmann		Application of	
	machine, RBMs, Sigmoid net,		Probabilistic Neural	
	Autoencoders.		Network with example.	
V	Deep Learning research:	8	Understanding Deep	2, 3
	Object recognition, sparse		Learning in Computer	
	coding, computer vision,		Vision, NLP etc. Write	
	natural language processing.		the code in different	
	Deep Learning Tools: Caffe,		Application Tools.	
	Theano, Torch.			

- 1. Goodfellow, I., Bengio, Y., and Courville, A., Deep Learning, MIT Press, 2016..
- 2. Bishop, C., M., Pattern Recognition and Machine Learning, Springer, 2006.

REFERENCE BOOKS:

- 1. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
- 2. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the basics of artificial neural networks and deep learning.	1,2,3, and 8
2	Mathematical intuition of Deep learning networks, and their application.	1,2,3, and 8
3	Different Deep Learning Tools in academic research.	1,3, and 8
4	Identify the deep learning algorithms and tools for real- world applications which are more appropriate for various types of learning tasks in various domains.	1,2,3,7, and 8
5	Analyze deep learning algorithms to solve real-world problems.	1,2,3,7, and 8

			SEM	EST	ER –	·VI						
Course				Proj	ect II	[
Title			1		1	1		T				
Course		Total credits:	L	T	P	S	R	O/F	C			
code	R	Total hours:	0	0	0	0	0	0	0			
Pre-		Co-requisite	NIL									
requisite												
	Bachelor of Computer Application (BCA) Fall/ II semester of the third year of the program											
Semester			ear of	the p	progi	ram						
		ne practical skill	1.0	1.1	G 1		1 '1'.'					
		Critical Thinking a					bilities					
	-	Communication ar					. d	40.00				
CO1	Demonstrate a	sound technical k	nowie	age o	n the	selecte	ea projeci	topic.				
CO2	Illustrata probl	em identification,	formu	lation	n one	d coluti	on					
	•	to complex proble										
		totype of the solut		•	•		• •		athods			
	•	al and profession			•							
	*	ffectively for the				•	ine won	ang ma te	aiii aiiu			
Unit-No.	Content	Treetivery for the	ocnen		Conta	•	Learni	nσ	KL			
Cint 110.	Content				Hour		Outcom	_	ILL			
I	Project Intro	duction and Plan	ning			6		e, illustrate	2,3			
_	Overview o		_	nd			and exp	-	_,e			
	objectives.	1 3	proje				technic					
	-	d management.						dge of the				
		elopment: Identi						d project				
	-	or problem Con					topic.	a project				
		esearch Writing a		- 1								
		etting timelines	_									
	milestones	-	locatio									
		ols, etc.) Risk asse										
	and managem											
	e	C										
II	Literature F	Review and R	eseard	ch	8	3	Describ	e, illustrate	2,3,4			
	Methodology	Identifying	ar	nd			and exp	olain				
	reviewing	relevant li	teratu	re			probler	n				
	Summarizing	and synthesizing	existir	ng			identifi	cation,				
	research Hi	ighlighting gap	s ar	nd			formula	ation, and				
	formulating	research qu	uestio	ns			solution	n.				
	Choosing	appropriate r	esearc	ch								
	methods (qua	alitative, quantita	tive,	or								
	mixed metho	ods) Designing r	esearc	ch								
	instruments	(surveys, inte	erview	s,								
	experiments,	etc.)	Ethic	al								
	considerations	s in research										
III	Data Colle	ection and A	Analys	is	8	8	Describ	e, illustrate	2,3,4			
	Gathering p	rimary data (s	survey	s,			and e	xplain data				

	· · · · · · · · · · · · · · · · · · ·		T	
	experiments, interviews, observations)		collection and	
	Ensuring data accuracy and reliability		analysis	
	Storing and organizing data Using			
	statistical tools and software for data			
	analysis Interpreting data and drawing			
	conclusions Visualizing data (charts,			
	graphs, tables)			
IV	Project Implementation and	8	Describe, illustrate	6
	Monitoring Project Execution:		and explain project	
	Implementing the project plan		implementation and	
	Monitoring progress and making		execution	
	adjustments as needed Documentation		Checution	
	and Record Keeping: Keeping detailed			
	1 0			
	outcomes Troubleshooting and			
	problem-solving during			
	implementation Interim Reporting:			
	Preparing and presenting progress			
	reports Receiving and incorporating			
	feedback			
\mathbf{V}	Project Presentation and Evaluation	6	Describe, illustrate	2,3,5
	Final Reporting: Writing the final		and explain testing	
	project report (structure, content,		and documentation	
	formatting) Ensuring clarity,			
	coherence, and completeness Project			
	Presentation: Preparing visual aids			
	(slides, posters, etc.) Practicing			
	presentation skills (public speaking,			
	answering questions) Evaluation and			
	Reflection: Assessing project			
	outcomes against objectives Reflecting			
	on the project process and personal			
	learning Identifying areas for future			
	improvement and potential follow-up			
	projects			
	projects			

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Demonstrate a sound technical knowledge of selected project topics.	1, 2 and 4			
2	Illustrate problem identification, formulation and solution.	1, and 2			
3	Plan solutions to complex problems utilizing a systems approach.	1, 2, 3, 5 and 7			
4	Design the prototype of the solution and analyze the prototype using testing methods.	1, 2, 3, 5, 6, 7, and 8			

	Improve ethical and professional sustainability while	
5	working in a team and communicate effectively for the	1, 2, 3, 6 and 8
	benefit of the society.	

MAPPING TABLE:

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
22BCAO321R	COMPUTER VISION	1	1.4					1.2	2
22BCAO322R	PROJECT I	1.4	2	2.33	1	2	2.5	2	2.5
22BCAO323R	PE III (Applied AI/ML)	3	3	1.8					1.25
22BCAO324R	PE IV (Exploratory Data Analysis)	2	2.6	2.4		2		1	1.5
22BCAO325R	PE V (Applied Analytics in NLP)	1.6	1.6	2.6				0.6	1.2
22BCAO326R	Recommender System	1.2	2	2.4				0.8	1
22BCAO327R	Pattern Recognition	1.4	2	2.6	2	1		1.2	1.2
22BCAO328R	Deep Learning	1.8	1.75	2.2				1	1



Curriculum and Syllabus

Bachelor of Technology in Mechanical Engineering

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 2.0

FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson Board of Studies

Member Secretary Academic Council

Vision

To become a Globally Recognized University from North Eastern Region of India, Dedicated to the Holistic Development of Students and Making Society Better

Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators.
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

Programme Details

Programme Overview (not more than 100 words)

As part of our industry-focused curricula, we, at Assam down town University, with an open collaborative learning ambience offer our students a platform to launch their careers in the right sector. Evolved as one of the best mechanical engineering colleges, we intend to train the skilled workforce to match industry expectations.

I.Specific Features of the Curriculum (To be derived from PSOs. **Not more than** 100 words)

The curriculum provides skill enhancement and value-added courses along with the core papers.

II.Eligibility Criteria: (To be aligned with the admission office)

Minimum 45% in 10+2 with Mathematics, Physics & Chemistry. 5% relaxation for SC/ST, EWS, and Especially abled candidates.

III. Program Educational Objectives (PEOs):

PEO-1: AdtU Mechanical engineering graduates will demonstrate proficiency in core mechanical engineering principles, methodologies, gain knowledge to think, analyze, and solve practical problems in the Mechanical Engineering domain with a holistic approach toward the greater implications of their solutions to society while adhering to ethical standards and professional responsibilities.

PEO-2: AdtU Mechanical Engineering graduates will develop the ability to critically evaluate complex engineering challenges, develop technical and management skills to take on substantial responsibility for engineering projects and research initiatives by inculcating ethical and human values among the students for the betterment of society.

PEO-3: AdtU Mechanical Engineering graduates will exhibit leadership qualities, including effective teamwork, project management, multidisciplinary approach and co-relate engineering challenges to a larger social and human background, in which their engineering assistance will be employed.

IV. Program Specific Outcomes (PSOs):

PSO1: Research and Reasoning: Enables the graduates to manage all kinds of

Mechanical engineering projects requiring analysis, design, cost estimation and execution and also they will be able to comprehend the implications of the project outcomes and roles and responsibilities as Mechanical engineers in global, economic, and societal contexts.

PSO2: Techno-Professional Efficiency: Develop proficiency in modern and emerging subjects of Mechanical Engineering and use them as stepping stones for building their future careers in academics, cooperate, and developmental sectors.

PSO3: Global Competency: Understanding the concepts of Mechanical engineering the graduates will be endowed with soft skills to give them an edge in qualifying for National and International level competitive examinations to excel in their careers through the experiential learning process.

V. Program Outcome: (8-12)

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional

engineering solutions in societal and environmental contexts, and demonstrate the

knowledge of need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and

responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a

member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering

activities with the engineering community and with society at large, such as, being

able to comprehend and write effective reports and design documentation, make

effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and

understanding of the engineering and management principles and apply these to

one's own work, as a member and leader in a team to manage projects and in

multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and

ability to engage in independent and life-long learning in the broadest context of

technological change.

VI. Total Credits to be Earned: 178

VII.Career Prospects:

Graduates with B. Tech in Mechanical Engineering have excellent career prospects in

research & development, industry, academics and sustainable development. The

prospective sectors viz. automobile, oil, aviation, manufacturing, processing industries,

Govt. sectors, teaching, IT industries, Entrepreneurship development, etc. welcome

graduate in B. Tech mechanical Engineering.

6

EVALUATION METHODS

The student performance shall be evaluated through In-semester (Sessional) and semesterend examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

1. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting in-semester (sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks
		Allotted
1.	In-Sem Exam – I (ISE-I) (Written Examination)*	30
2.	In-Sem Exam – II (ISE-II) (Written Examination)*	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

INSTRUCTION

- 1. If a student fails to appear in the any of the component without any valid reason he/she shall be marked zero in that component. However, the course teacher at his discretion may arrange for the missed test on an alternate date for the absentee students after determining ground with genuine/valid reasons for the absent.
- 2. The report of evaluation of an activity towards the in-semester (sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.

3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

2.SEMESTER END EXAMINATION:

Time table for end semester examination is published at least 25 days prior to the start of Examination.

1. Pre-Examination:

Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

 Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

2. Admit Card:

Admit card for the examination may be downloaded through ERP where the system will generate a Unique ID Cards through online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

3. Pattern of Question Papers:

The question paper shall follow the principles of Bloom's Taxonomy.

S. N.	Level	Questions /verbs for test			
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.			
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.			

3	Apply	Predict, apply, solve, illustrate, determine, examine, modify
4	Analyze	Classify, outline, categorize, analyze, diagrams, illustrate, infer, etc.
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.
6	Create	Design, Formulate, Modify, Develop, integrate, etc.

Note: No course is to be evaluated on basis of all 6 knowledge levels.

The format of the question paper across all the program follow a unique pattern and the total marks is 60

Table 1: Question paper pattern for End semester examination

Sl. No.	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

4. Examination Duration:

Each paper of 60 marks shall ordinarily be of two hours duration.

5. Practical Examinations, Viva-Voce etc.:

- i) Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

6. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the center may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the

exam with new answer sheet or may expel the student from appearing the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribe expulsion form. The student may not be allowed to write that examination.

7. Instruction to the Students:

- (i) The students shall not bring to the Examination Hall, any electronic gadget used as a means of communication or record except electronic calculator, if required.
- (ii) The students shall not receive any book or printed or hand written or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during course of examination.
- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.
- (iv)The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi)The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix)The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

8. Provision for an Amanuensis (writer):

(i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down

by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by Medical Certificate from a competent Medical Officer.

- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.
- (iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

3. Credit Point:

It is the product of grade point and number of credits for a course, thus, $CP = GP \times CR$

i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

(i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.

- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in TaBLe 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

Table 2: Letter Grades and Grade Points

Letter Grade	Grade Points	Description
0	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
C	5	Average
P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

iv. Grade Point Average:

a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

$$(1.1)$$

The SGPA of a student in a Semester shall be calculated on a 10-point scale using

Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

b. CGPA (Cumulative Grade Point Average)

- (i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrollment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrollment.
- (ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and C_i is the Credit (weight)of that Course.

$$CGPA = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{i=1}^{N} C_i}$$
 (1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

4. Post-Examination

i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

- (i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.
- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a University appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or viva voce and wish to appear again may apply to be evaluated can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of Vice Chancellor.
- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.



INSTRUCTION TO TEACHERS AND STUDENTS

(Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centric classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- **a. Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programme the student has to undergo project-based learning at least 4 months' duration. This approach will help the student to think critically, evaluate, analyze, make decisions, collaborate, and more.
- **b. Inquiry-Based Learning:** The teacher/ students are supposed to list at least five questions in each contact hour and student solve these question or search for answer which becomes the home work for the students "question-driven" learning

approach. The teacher may look for the correctness of the solution or the best possible answer and discuss in the successive class. This will help in the preparation for various competitive examination and develop a habit for search for solutions.

c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watch video or lecture prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time in-classroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are more passive to an approach where students are active participants. As a result, this approach is also a student-centric teaching method.

d. Cooperative Learning: The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence of	
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

Inquiry-based approach has to be followed in all of the classes

The teacher has to distribute the topics to be considered for teaching by the abovementioned approaches and prepare a lesson plan for execution and maintain a file.

Curriculum Framework

Breakdown of Credits (for 2022-23 Syllabus)

Sl. No	Category	Total number of Credits
1	University Core(UC)	17
2	University Elective (UE)	16
3	Program Core(PC)	57
4	Program Elective (PE)	52
5	Faculty Elective (FE)	36
	Total number of credit	178

Breakdown of Credits according to NEP 2020 Credits (for 2023-24 Syllabus)

Sl. No	Category	Total number of Credits
1	University Core(UC)	<mark>5</mark>
2	University Elective (UE)	<mark>7.5</mark>
3	Program Core(PC)	<mark>65</mark>
4	Program Elective (PE)	<mark>68</mark>
<mark>5</mark>	Skill Enhancement Course(SEC)	<mark>18.5</mark>
<mark>6</mark>	Value Added Course (VAC)	<mark>25</mark>
7	Multidisciplinary Course(MDC)	1
	Total	190

Breakdown by categories of courses

Sl. no	Category	Credits	%
1	Engineering	117	65.73
2	Science	23	12.92
3	Value added course	20	11.23
4	Humanities	18	10.11
	Total	178	100

PCI, INC, AICTE regulated programs shall have to follow the regulating body

SEMESTER WISE COURSE DISTRIBUTION

	S.			Course		E	nga	ıgeı	nei	nt		Maxii	mum M fo		
	N.	Course Code	Course Title	Category	L	T	P	S	R	o	C	IA*	SEE*	PE*	Total
	1	22BTME111R	Engineering Mathematics I	FE	3	1	0	0	0	0	4	40	60	0	100
ır I	2	22BTME112R	Introduction to Basic Mathematics, Logic and Coding	FE	2	1	2	0	0	0	4	40	60	100	200
este	3	22BTME113R	Engineering physics	FE	2	1	2	0	0	0	4	40	60	100	200
Semester	4	22BTME114R	Basic Electrical Engineering	PE	2	1	2	0	0	0	4	40	60	100	200
	5	22BTME115R	Workshop/Manufactu ring Practices	PC	1	0	4	0	0	0	3	40	60	100	200
	6	22UBPD114R	Introductory English for Engineers	UE	0	0	4	0	0	0	2			100	100
	7	22UBEC111	Extra-curricular	UC	0	0	0	4	0	0	1			100	100
		To		10	4	14	4	0	0	22	200	300	600	1100	

	S.	Course Code	Course Title	Course]	Eng	gag	eme	ent		Maxim	um Ma	rks for	
	No.	Course Coue	Course Title	Category	L	T	P	S	R	0	С	IA*	SEE*	PE*	Total
	1	22BTME121R	Engineering Mathematics II	FE	3	1	0	0	0	0	4	40	60	0	100
п	2	22BTME122R	Engineering Chemistry	FE	2	1	2	0	0	0	4	40	60	100	200
Semester II	3	22BTME123R	Programming for Problem Solving	FE	3	0	2	0	0	0	4	40	60	100	200
Š	4	22BTME124R	Engineering Graphics and Design	PC	1	0	4	0	0	0	3	40	60	100	200
	5	22BTME125R	Fundamentals of C Programming	PC	0	0	2	0	0	0	1	0	0	100	100
	6	22UBPD124R	Effective English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100

	7	MOSY121R/122 R/123R	MOOCSI	FE	0	0	0	0	0	0	2			100	100
	8	22UBCC121	Co-curricular II	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22UBEC121	Extra-curricular II	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22BTME126R	Techno- Professional Skills I	PC	0	0	2	0	0	0	1	0	0	100	100
-	11	22UUHV102R	Human Values (UHV)+ Professional Ethics	UC	1	0	2	0	0	0	2	40	60	100	200
	12	22UUDL103R	Computational Systems and Digital World	UC	0	0	2	0	0	0	1	0	0	100	100
		Total			10	2	18	8	0	0	25	200	300	1000	1500

	S.	Course Code	Course Title	Course]	Eng	gag	eme	ent		Maxim	um Ma	rks for	
	No.	Course Coue	Course Tide	Category	L	T	P	S	R	0	С	IA*	SEE*	PE*	Total
	1	22BTME211R	Biology for Engineers	FE	2	1	0	0	0	0	3	40	60	0	100
	2	22BTME213R	Basic Electronic Engineering	PE	2	1	0	0	0	0	3	40	60	0	100
	3	22BTME214R	Engineering Mechanics	PC	2	1	0	0	0	0	3	40	60	0	100
Semester III	4	22BTME215R	Thermodynamics	PC	2	1	0	0	0	0	3	40	60	100	200
Sei	5	22BTME212R	PDE and Transform Mathematics	FE	2	1	0	0	0	0	3	40	60	0	100
	6	22UBPD214R	English for Employability for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	7	22UBCC211	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	8	22UBEC211	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	MOSY211R/212 R/213R	MOOCSII	FE	0	0	0	0	0	0	2			100	100

10	22BTME216R	Techno- Professional Skills II	PC	0	0	2	0	0	0	1	0	0	100	100
11	22UUHV102R	Universal Human Values (UHV) + Professional Ethics	UC	1	0	2	0	0	0	2	40	60	0	100
	Total		11	2	8	8	0	0	24	240	360	600	1200	

	S.	Course Code	Course Title	Course	, 					Maxim	um Ma	rks for			
	N.	Course Code	Course Title	Category	L	T	P	S	R	0	С	IA*	SEE*	PE*	Total
	1	22BTME221R	Applied Thermodynamics	PC	3	0	0	0	0	0	3	40	60	100	200
	2	22BTME222R	Fluid Mechanics and Fluid Machines	PC	3	0	2	0	0	0	4	40	60	0	100
	3	22BTME223R	Strength of Materials	PC	3	0	0	0	0	0	3	40	60	0	100
IV	4	22BTME224R	Materials Engineering	PC	3	0	0	0	0	0	3	40	60	100	200
Semester IV	5	22BTME225R	Instrumentation and Control	PE	3	0	2	0	0	0	3	40	60	100	200
Sem	6	22BTME227R	Environmental Science	UC	2	0	0	0	0	0	2	40	60	0	100
	7	22UBPD224R	English Language Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	8	22UBCC221	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22UBEC221	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22BTME226R	Techno- Professional Skills III	PC	0	0	2	0	0	0	1	0	0	100	100
	11	MOSY221R/222 R/223R	MOOCSIII	FE	0	0	0	0	0	0	1	0	0	100	100

12	22UUFL202R	Personal Financial Planning	UC	0	0	2	0	0	0	1	0	0	100	100
13	22UULS202R	Basic Life Saving Skills	UC	0	0	0	0	0	0	0	0	0	100	100
14	22UULS201R	Basic Acclimatizing Skills (BAS)	UC	0	0	0	0	0	0	0	0	0	100	100
	Total			17	0	12	8	0	0	25	240	360	1100	1700

	S. No.	Course Code	Course Title	Course]	Eng	gage	eme	ent		Ma	ximum	Marks for	
	110.	Course Code	Course Title	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTME311R	Heat Transfer	PC	3	0	2	0	0	0	4	40	60	100	200
	2	22BTME312R	Solid Mechanics	PC	3	0	0	0	0	0	3	40	60	0	100
	3	22BTME313R	Manufacturing Process	PC	3	0	0	0	0	0	3	40	60	0	100
	4	22BTME314R	Kinetics and Theory of Machines	PC	3	0	0	0	0	0	3	40	60	100	200
er V	5	22BTME316R	Project-I	PE	0	0	6	0	0	0	3	0	0	100	100
Semester V	6	22BTME317E	Generic Elective I	UE	2	0	0	0	0	0	2	40	60	0	100
	7	MOSY311R/312R /313R	MOOCSIV	FE	0	0	0	0	0	0	1	0	0	100	100
	8	22UBPD314R	Competent English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	9	22UBCC311	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22UBEC311	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	11	22BTME315R	Techno- Professional Skills IV	PC	0	0	2	0	0	0	1	0	0	100	100
		Total			14	0	14	8	0	0	24	200	300	800	1200

	S.			Course]	Eng	gag	eme	ent		Ma	ximum	Marks for	
	No.	Course Code	Course Title	Category	L	T	P	S	R	O	C	IA*	SEE*	PE*	Total
	1	22BTME321R	Manufacturing Technology	PC	3	0	0	0	0	0	3	40	60	100	200
	2	22BTME322R	Design of Machine Elements	PC	2	1	2	0	0	0	4	40	60	0	100
	3	22BTME325E	Professional Elective I	PE	3	0	0	0	0	0	3	40	60	0	100
	4	22BTME326E	Professional Elective II	PE	3	0	0	0	0	0	3	40	60	0	100
Semester VI	5	22BTME327E	Generic Elective II	UE	2	0	0	0	0	0	2	40	60	0	100
Sem	6	22UBPD324R	Corporate Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	7	22UBCC321	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	8	22UBEC321	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22BTME323R	Techno- Professional Skills V	PC	0	0	2	0	0	0	1	0	0	100	100
	10	MOSY321R/322R /323R	MOOCSV	FE	0	0	0	0	0	0	1	0	0	100	100
	11	22BTME324R	Project II	PE	0	0	6	0	0	0	3	0	0	100	100
		Total			13	1	14	8	0	0	24	200	300	700	1200

	S.	Course Code	Course Title	Course	Engagement							Maximum Marks for			
	N.	Course Code	Course Title	Category	L	T	P	S	R	0	C	IA*	SEE*	PE*	Total
	1	22BTME411R	Automation in Manufacturing	PC	3	0	0	0	0	0	3	40	60	100	200
	2	22BTME416E	Professional Elective III	PE	3	0	0	0	3	3	3	40	60	0	100
ter VII	3	22BTME417E	Professional Elective IV	PE	3	0	0	0	3	3	3	40	60	0	100
Semester	4	22BTME412R	Manufacturing Lab	PC	0	0	6	0	0	0	3	0	0	0	100
Ser	5	22BTME413R	Project III	PE	0	0	12	0	6	6	6	0	0	100	100
	6	22BTME415R	Industrial Mock Viva	PC	0	0	0	0	0	0	0	0	0	100	100
	7	22BTME414R	Techno-Professional Skills VI	PC	0	0	2	0	1	1	1	0	0	100	100
	8	22UBCC411	Co-curricular	UC	0	0	0	4	1	1	1	0	0	100	100
	Total			9	0	20	4	14	14	20	120	180	500	900	

	S.		Course Title	Course	Engagement							Maximum Marks for			
I	N.	Course Code		Category	${f L}$	T	P	S	R	o	C	IA*	SEE*	PE*	Total
er VIII	1.	22BTME422E	Professional Elective V	PE	3	0	0	0	0	0	3	40	60	0	100
Semester	2	22BTME423E	Professional Elective VI	PE	3	0	0	0	0	0	3	40	60	0	100
S	3	22BTME424E	Professional Elective VII	PE	3	0	0	0	0	0	3	40	60	100	100
	4	22BTME425E	Professional Elective VIII	PE	0	0	0	0	0	0	3	40	60	100	100
		22BTME421R	Project IV	PE	0	0	12	0	0	0	6	0	0	100	100
		То	tal		9	0	12	0	0	0	18	160	240	300	500

*IA: Internal Assessment, SEE: Semester End Examination,

PE: Practical Examination

	SEMESTER I												
Course Title		Engineering	Mathen	nati	cs I								
Course code	22BTME111R	Total cred		L	T	P	S	R	O/F	C			
		Total hour		3	1	0	0	0	0	4			
Pre-	Nil	Co-requ	isite					Nil					
requisite													
Programme	Bachelor of												
Semester		nester of firs											
Course	1. To make understand to e			_	_		-		_				
Objectives	some special functions li							intro	oduced.				
`	2. To provide the application			_									
3)	3. To make understand the						_						
CO1	Apply differential and integra	oply differential and integral calculus to notions of curvature and improper integrals											
CO2	Understand the concept of ca												
CO3	Understand the concept of co	-	_			_		anc	d series				
CO4	Understand the application or		_	-									
CO5	Understand the concepts o	f matrices t	o solve	sys	tems	s of	lin	ear	equation	ons and			
	application problems requirir	ng them.											
Unit-No.	Content		Contac	ct	Le	earn	ing (Out	come	BL			
			Hour	•									
I	U	and its	10			ablir	_		olving	1,2,3			
	applications								te and				
	Evolutes and involutes; Ev				imp	prop	er in	tegr	als				
	definite and improper inte	-											
	and Gamma functions	and their											
	properties; Applications of												
	integrals to evaluate surface	e areas and											
	volumes of revolutions.												
II	Application of Differential		10				tand		Rolle's	3,4			
	Rolle's Theorem, Me						-	lean	value				
	theorems, Taylor's and					oren			and				
		remainders;						inim	a of a				
	indeterminate forms and l	L'Hospital's			tun	ctio	n						
	rule; Maxima and Minima.												
III	Sequences and series:		10		Int	rodu	ction	1	to	3,4			
	Convergence of sequence	and series,			Pov	wer			series,				
	tests for convergence; Po	wer series,			Tay	ylor'	'S		series,				
	Taylor's series, series for e	_				urier			series,				
	trigonometric and logarithm	n functions;			Par	seva	al's t	heoi	rem				
	Fourier series: Half range												
	cosine series, Parseval's the	orem.											

IV	Multivariable Calculus	8	Introduction to	4
	(Differentiation):		Differentiation,	
	Limit, continuity and partial		Limits, Continuity,	
	derivatives, directional derivatives,		Gradient, Curl and	
	total derivative;		Divergence	
	Tangent plane and normal line;			
	Maxima, minima and saddle points;			
	Method of Lagrange multipliers;			
	Gradient, curl and divergence.			
V	Matrices:	10	Understanding	4
	Inverse and rank of a matrix,		matrices and their	
	ranknullity theorem; System of linear		types.	
	equations; Symmetric, skew-			
	symmetric and orthogonal matrices;			
	Determinants; Eigenvalues and			
	eigenvectors; Diagonalization of			
	matrices; Cayley Hamilton Theorem,			
	and			
	Orthogonal transformation.			

- 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- 2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.

REFERENCE BOOKS:

- 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

OTHER LEARNING RESOURCES:

1. https://nptel.ac.in

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply differential and integral calculus to notions of curvature and improper integrals	1,2
2	Understand the concept of calculus and linear algebra.	1,2,3
3	Understand the concept of convergence and divergence of sequence and series.	1,3
4	Understand the application of differential and integral calculus.	1,3
5	Understand the concepts of matrices to solve systems of linear equations and application problems requiring them.	1,3&4

		SEMESTER –	I							
Course Title	Intro	duction to basic matl	nematics,	logic a	ınd	co	din	g		
Course code	22BTME112R	Total credits: 4	L	T	P	S	R	O/F		C
		Total hours:	2	1	2	0	0	0		4
		36T+12P								
Pre-	Nil	Co-requisite				N	Vil			
requisite										
Programme		elor of Technology in						g		
Semester		ll/ I semester of first		• •						
Course		and be able to use	e the lan	iguage,	, sy	ym	bol	s and	nota	ation of
Objectives	mathematics				_					
(Minimum	•	ability to create a prog					_	•		
3)		fident in using mathen	_	ic, reas	soni	ng	an	d codin	g to	analyze
G01	*	ems in real-life situation		-						
CO1	Understand the concepts			_						•
CO2	Applications of the cor	ncepts in other discipl	ines such	as en	gın	eer	ıng	, comp	uter	science,
	physics, etc.			.1	40		1			h1
CO3	Learn to solve and de mathematics and program		ange of 6	eiemen	ıary	y r	ear-	-woria	proi	diems in
CO4	Explore and apply key c		lzina to hu	cinocc	nro	hla	.			
CO4	Enables students to cr				_				vide	nce and
CO5	construct reasoned argui		mation in	i oraci	· ic	, (vai	uate c	viuci	nec and
Unit-No.		Content		Conta	act		Le	arning	,	BL
		Sometic		Hou				utcome	_	DL
I	Basics of Set Theory a	and Functions:		10		Т		studer		1,2,3
	Sets: Basic definitions		rinciple			v	vill	be ab	ole	, ,
	of exclusion and inc	•	_			t	О			
	union, intersection, dif	ference, complement	etc., De			d	lem	onstrate	e	
	Morgan laws, Venn Di	agram Cartesian				t	he	ability	to	
	Products and Relation	ns:				u	ınde	erstand		
	Basic Definitions, bir	nary relations - com	position			t	he	concep	ots	
	and inverse, binary re	elation on a set: prop	erties –			C	of			
	reflexive, irreflexive,	symmetric, antisyn	nmetric,			n	natl	nematic	es,	
	transitive, equivalence	e relations, partial	order			10	ogi	С,		
	relations							oning		
	Functions:							codin	_	
	Basic definition, doma		_				The	·	ill	
	range, identity func	•						me		
	functions, bijections		unction,					ident	in	
	composition of functi						ısin	_		
	operations on sets: un							nematic	es,	
	binary operators – asso	ciativity, commutativi	ty				ogi			
	Number systems:	1 1 ' .						oning		
	Natural numbers, who	_						coding		
	numbers, real number	ers, operations on n	umbers:			a	ınal	yze a	na	

	addition, subtraction, multiplication and division		solve	
	addition, saotraction, multiplication and division		problems in	
			real-life	
			situations	
II	Introduction to Mathematical Logic and	8	The students	2,3
	Induction:		will be able	
			to	
	Mathematical Logic:		demonstrate	
	Truth values of mathematical statements, formulas in		the ability to	
	mathematical logic, logical operators - AND, OR,		understand	
	NOT etc, De Morgan Laws, Truth values of		the concepts	
	formulas, Truth tables		of	
	Torniuras, Trutti tables			
	Duran antition all I anti-		mathematics,	
	Propositional Logic:		logic,	
	Constants, variables, assignment of variables in a		reasoning	
	formula, tautology, contradiction and satisfiability,		and coding.	
	truth table of a formula, equivalence of formulas,		They will	
	proving formulas and equivalences by truth table		become	
	method		confident in	
			using	
	Mathematical Induction:		mathematics,	
	Principle of mathematical induction – induction		logic, and	
	basis and induction step, examples		reasoning	
			and coding to	
			analyze and	
			solve	
			problems in	
			real-life	
			situations.	
III	Introduction to Logic and Reasoning:	10	The students	3
	g		will be able	
	Alphanumeric series, Direction, Logical Reasoning,		to	
	Data Sufficiency, Ranking and order, Puzzle, Blood		demonstrate	
	Relations, Analogy, Cube and Dice,		the ability to	
	Coding Decoding		understand	
	County Decounty		the concepts	
			of	
			mathematics,	
			logic,	
			•	
			reasoning	
			and coding.	
			Explore and	
			apply key	
			concepts in	
			logical	
			thinking to	
			business	

			problems.	
			problems.	
IV	Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement, Types of ifelse Block, Switch case block, GOTO statement. Looping: Concept of Loop, For loop, While loop, Do- while loop, jumping in Loop, break and continue statement	10	The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding. Solve and devise solutions to a range of elementary real-world problems in mathematics and programming	1,3
V	Introduction to Arrays, Strings and Functions Arrays: One Dimensional Arrays, Two Dimensional Arrays, Multidimensional Arrays, Dynamic Arrays. Strings: Implementing String Variables, String handling Functions. Functions: Concept of Functions, user-defined Functions, System-defined Functions, passing in Functions.	10	The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding. Solve and devise solutions to a range of	1,3

	elementary	
	real-world	
	problems in	
	mathematics	
	and	
	programming	

- 1. Schaum's Outline of Programming with C by Byron Gottfried, Third Edition
- 2. Programming in ANSI C by E. Balaguruswamy, Eight Edition
- 3. Discrete Mathematics by Lipschutz, Lipsonand and Patil, Revised Third Edition
- 4. A Textbook on Discrete Mathematics by Sastry and Nayak

REFERENCE BOOKS:

- 1. A Modern Approach to Verbal & Non Verbal Reasoning by R S Agarwal, Revised Edition
- 2. Analytical and Logical Reasoning by Sijwali B S, Revised Edition
- 3. The C Programming Language, by Brian W. Kernighan and Dennis M. Ritchie, Second Edition
- 4. 2000 Solved Problems in Discrete Mathematics by Lipschutz and Lipson

OTHER LEARNING RESOURCES:

- 1. https://www.javatpoint.com/discrete-mathematics-tutorial
- 2. https://www.khanacademy.org/test-prep/lsat/lsat-lessons/logical-reasoning/a/logical-reasoning
- 3. https://www.javatpoint.com/c-programming-language-tutorial

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the concepts of mathematics, logic, reasoning and coding.	1,8
2	Applications of the concepts in other disciplines such as engineering, computer science, physics, etc.	3,7
3	Learn to solve and devise solutions to a range of elementary real-world problems in mathematics and programming.	6,9,10

4	Explore and apply key concepts in logical thinking to	5,9
	business problems	3,9
	Enable students to critically analyze information in	
5	order to evaluate evidence and construct reasoned	7,1,12
	arguments	

SEMESTER – I											
Course Title		Engineerin	g Physics								
Course code	22BTME113R	Total credits: 4	L	Г Р	S R	O/F	C				
		Total hours:									
		36T+12P	2	2	0 0	0	4				
Pre-requisite	Nil	Co-requisite			Nil	U	4				
Programme		_	Mechanical Engineering								
Semester		I semester of first y									
Course		nd the theories of phy		pros							
Objectives		concepts in practical									
(Minimum 3)		3. To understand the physics of any process.									
		onal understanding of	_	rs an	d scala	r repre	sentation				
('())	of forces and nature	_				·r					
G04	Illustrate conservati	ve and non-conserva	ative force	es, an	gular 1	nomen	tum and				
CO2	energy equations										
CO2	Explain basics of n	on-inertial frames ar	nd acceler	ation	and its	appli	cation in				
CO3	engineering field										
CO4	Comprehend on osc	cillations and its ap	plication	in the	field	of eng	gineering				
CO4	kinematics										
CO5		dimensional rigid be	ody motio	n and	determ	ine the	moment				
	of inertia.										
Unit-No.	Con	Contact		Learni	_	BL					
		Hour		Outcor		1.0					
	Unit I: Electrostat	10		vill pro	ovide	1, 2					
		ctric field intensity,		an	14	40					
I		its applications,		understanding to							
1		nd potential energy, costatic equilibrium,									
	capacitors an	•									
	calculations.	u capacitance		and	i dicatio	its					
	Unit II: Magnetos	tatics	10		vill hel		1, 2, 3,				
		Ampère's law and	10		dents	to	4				
		nagnetic vector			uire	to					
II	potential, magnet	•		_	wledge	of					
	materials	(diamagnetism,			gnetosta						
	paramagnetism, fer										
III	Unit III: Faraday'		10	Intr	oductio	n to	1, 2, 3,				
	Electromagnetic in	nduction, Faraday's	Faraday's law 4,								
	law (integral and	differential forms),									
	magnetic flux, ind	uced electromotive									
	force (emf), practic	al applications.									
IV	<u> </u>	ment Current and	10		oductio		2, 3, 4				
	Maxwell's Equation		displacement								
	_	ent, magnetic field									
	due to time-depen	dent electric field,		Ma	xwell						

	Maxwell's equations in integral and		equations	
	differential forms, boundary conditions			
	for electromagnetic fields.			
	Unit V: Electromagnetic Waves	8	Understanding	2, 3, 4,
	Wave equation for electromagnetic		of	5
	fields, propagation of electromagnetic		Electromagnetic	
V	waves in free space and in materials,		waves and its	
·	energy and momentum of		properties	
	electromagnetic waves, reflection and			
	refraction, polarization,			
	electromagnetic wave applications			

- 1. Introduction to Electrodynamics. David Griffiths. Prentice Hall, Upper Saddle River, New Jersey, 07458
- 2. Basic Laws of Electromagnetism. IE IRODOV

REFERENCE BOOKS:

1. Principles of physics. Halliday Resnick

OTHER LEARNING RESOURCES:

1. https://www.sciencedirect.com/science/article/pii/S0951832022005142

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Develop a foundational understanding of the vectors and scalar representation of forces and nature of forces.	1,2				
2	Illustrate conservative and non-conservative forces, angular momentum and energy equations	3,5				
3	Explain basics of non-inertial frames and acceleration and its application in engineering field	6,9,10				
4	Comprehend on oscillations and its application in the field of engineering kinematics	5,9				
5	Understand the three dimensional rigid body motion and determine the moment of inertia.	4,1,11				

SEMESTER – I								
Course Title		Basic Electrical Eng	ineering					
		Total credits: 4	L T	P S	R	O/F	C	
Course code	22BTME114R	Total hours:	$\begin{bmatrix} 2 & 1 \end{bmatrix}$	$\begin{vmatrix} 2 \\ 0 \end{vmatrix}$	0	0	4	
		36T+12P				v	•	
Pre-requisite	Nil	Co-requisite			Vil			
Programme		of Technology in Mec						
Semester		semester of first year o						
	Explain operative princip		•	_	neti	c circu	iits.	
Objectives	Classify and compare diff	7 I						
	To understand and analyz							
	Understand the concept		electric a	nd mag	gnet	ic circ	cuits for	
	analyzing and designing e	·						
CO2	Analyze the working pri		e ac circui	ts, thre	e p	hase l	palanced	
	circuits, star and delta cor							
CO3	Identify the magnetic con	iponents and efficiency	of auto-tra	nstorm	er a	nd thre	ee-phase	
	transformer connections.		1	• .			1 .1 .	
CO4	Explain the working p	orinciples of common	electrical	ınstru	ımeı	nts ai	nd their	
	characteristics.	1,	•		1 T	T. C	. 1	
CO5	Acquire skills in DC-DC				ıa L	11 SW	ntcngear	
	components and elementa	ry calculations for energ			•			
Unit-No.	Cont	ent	Contact Hour	Lea	ırnı tcor	_	BL	
	DC Circuit		Hour	Under				
	Electrical circuit elemen	ate (P. I. C), voltage		and a		_		
	and current source, K			basic	mary	ysing		
I	voltage law, analysis		5	electri	cal	and	1, 2	
	Thevenin, Norton and	or simple effects,				and		
	Superposition theorem			magnetic circuits.				
	AC Circuit:			Study		the		
	Representation of sinuso	oidal waveforms neak		worki	_			
	and rms values, phaso			princi	_	of		
	power, reactive power, a	•		electri	•	01		
II	factor, Analysis of sin		7	machi		and	2, 3, 4	
	consisting of	R,L,C.RL,RC,RLC	,	power		una	2, 3, 1	
	combination(series and			conve		2		
		in star and delta		Conve	1 (01)	·		
	connection	in star and delta						
	Transformer:			Introd	ucti	on		
	Magnetic materials,	ideal and practical		to		the		
	transformer, equivalent	•		compo	oner		1, 2,	
III	transformer, regulation		6	of lov			3, 4	
	transformer, three	phase transformer		electri			- , -	
	connection			install		ns		
			<u> </u>					

	Electrical Machines:		To understand	
IV	Generation of rotating magnetic fields, construction and working of three phase induction motor, torque-slip characteristics, losses and efficiency, Single phase induction motor, working of synchronous generator	6	the rotating magnetic fields, single phase and three phase induction motor and working of	1, 2
V	Power converter and electrical installation: DC-DC buck and boost converter, single phase and three phase voltage source inverter, Fuse, MCB, ELCB, MCCB,	6	synchronous generator. Introduction to power converter and electrical	2, 3, 4, 5
	Earthing, wires and cables, types of batteries		installations.	

1. D. P. Kothari and I. J.Nagrath, Basic Electrical Engineering , Tata McGraw $Hill_{1}$, 2010

REFERENCE BOOKS:

- 1. D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill, 2009
- 2. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010

OTHER LEARNING RESOURCES:

1. https://nptel.ac.in

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Understand the concept and theorems of basic electric and magnetic circuits for analyzing and designing electrical systems	1,2				
2	Analyze the working principles of single-phase ac circuits, three phase balanced circuits, star and delta connection etc.	3,10				
3	Identify the magnetic components and efficiency of auto- transformer and three-phase transformer connections.	6,9,12				
4	Explain the working principles of common electrical instruments and their characteristics.	5,9				
5	Acquire skills in DC-DC converters, voltage source inverters, and LT Switchgear components and elementary calculations for energy consumption	4,1,7				

		SEMESTER	$-\mathbf{I}$						
Course Title	W	orkshop/Man	ufa	ctur	ing F	ract	ices		
Course code	22BTME115R T	otal credits:	L	T	P	S	R	O/F	C
	12		1	0	4	0	0	0	3
		otal hours:							
	-	2T+24P							
Pre-	Nil	Co-requisite					Nil		
requisite									
Programme		of Technology							
Semester		emester of fir	_				_		
Course	1. Learning this			you	to ui	nders	tand l	pasic conc	cepts of
Objectives	workshop and		-	c				6	
(Minimum	2. Apply fundam		dge	ot '	work	shop	and	manutactu	iring in
3)	day-to-day life		1.0	rc.			ı		
001	3. Recognize con							•	1
CO1	Infer about various ma	anutacturing n	neth	ods	like (castır	ig, foi	rmıng, ma	chining
G04	etc.								
CO2	Apply fitting operation								
CO3	Demonstrate to Carpen	<u> </u>					* *		
CO4	Enhance skills in mac	hining operati	ons	like	mate	erial (cutting	g and prep	paration
	of mould etc.		1 1'			1	· ·	1 '4 (" 11 C
CO5	Critique the different	types of w	eldi	ng,	meta	1 cas	sting	and its i	ield of
Unit-No.	application. Content	Cont	oot		Tar		~ Ow	taama	BL
Umt-No.	Content	Hot			Lea	4F11111	ig Ou	tcome	BL
I	Manufacturing Metl			т.	atmo d	المحداد	to	various	1,2,3
_		ming,							, ,-
	•	ining,					_	methods	
	Advanced	, ,					_	Forming,	
	manufacturing method	ds		n	nachi	ning	etc.		
II	CNC machi								3,4
	Additive Manufactu	<u> </u>			nnlic	notion	of .	computer	-,:
		CNC						•	
	machining pro	ocess,			_		auton	nation of	
		ditive		N	Iachi	nes.			
	manufacturing								
III	Carpentry & F	itting 6		Ir	ntrodi	uctio	n to (Carpentry	3,4
	operations:	_						ions and	
	Carpentry tools, carp	entry				-	_		
	operations, fitting	tools,		it			licatio	on in	
	fitting operations			11r	ıdustı	ries.			
IV	Machining operation		_	Ir	ıtrodı	uctio	n to	various	4
	Turning, milling, tu	•		n	nanuf	actur	ing	methods	
	processes, m	illing		li	ke	casti	ng.	forming,	
	processes.				nachi		•	6,	
V	Welding:	8							4
,	Arc welding &	gas			ntrodi			•	-
	welding, brazing	Sus		p	recau	tions	in we	elding.	
	welding, brazing								

1. Elements of Workshop Technology, Vol. I 2008 and Vol. II 2010, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy Media promoters and publishers private limited, Mumbai.

REFERENCE BOOKS:

- 1. Manufacturing Technology I Gowri P. Hariharan and A. Suresh Babu Pearson Education, 2008
- 2. Processes and Materials of Manufacture Roy A. Lindberg 4th edition, Prentice
- 3. Hall India, 1998

OTHER LEARNING RESOURCES:

1. https://nptel.ac.in

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Infer about various manufacturing methods like casting, forming, machining etc	1,3,5					
2	Apply fitting operation and power tools in manufacturing works	2,4					
3	Demonstrate to Carpentry & fitting operations and its application in industries	6,8					
4	Enhance skills in machining operations like material cutting and preparation of mould etc.	7,10,12					
5	Critique the different types of welding, metal casting and its field of application.	8,9					

		SE	EMESTER -	- I							
Course Title	Introductory English	for Engine	eers								
Course code	22UBPD114R	Total credi	its: 2	L	T	P	S	R	O/F	C	
		Total hour	s: 30T	0	0	4	0	0	0	2	
Pre-	Nil	Co-requisi	te	Nil							
requisite											
Programme	Bachelor of Technolo	gy in Mecl	nanical Engi	ineeri	ng						
Semester	Fall: Winter/ I semes	Fall: Winter/ I semester of first year of the programme									
Course	1	l			D : -	E 13	.1				
Objectives	1. To capacitate the		_			_	_				
(Minimum	2. To Enable the		communicat	te con	fident	ly with	n a foc	us o	n listenii	ng	
3)	and speaking sl		· cm	.•	.1 .	1 .	*11		. 1		
	3. With the help			etics,	the st	udents	W1II	be a	ble to		
	pronounce wor	•									
001	4. To interact suc					3 1.	مائیہ -		of a	ا است ا	1
CO1	Understand and correct	•	•				٠.		•		
	auxiliary verbs, determented sentences.	illiners, and	i degrees o	1 COII	ірагія	on, to	Const	ruct	differen	ı types	OI
CO2	Analyze and comprehe	and written	taxte throu	gh co	mnrak	ancio	n over	cicac	demon	etrating	an
CO2	understanding of senter			-	mprei	iciisioi	i exci	CISCS	, ucmon	strating	an
CO3	Understand the process		• •		fferen	tiate h	etwee	n list	ening a	nd heari	inσ
003	identify factors affecting			_					•		_
CO4	Develop speaking ski									_	
	pronunciation through	•	•		_		•		•	•	_
	for self-reflection.	,	C	1	1		,		C		0
CO5	Understand the fundar	nentals of o	communicati	ion, in	ıcludi	ng its	types,	purp	oses, ba	arriers,	and
	importance, and apply	this knowl	edge to imp	rove t	heir c	ommu	inicatio	on sk	cills in b	oth for	mal
	and informal contexts.										
Unit-No.	Content		Contact		т		ng Ou	toom		В	T
UIIIt-No.	Content		Hour		L	earm	ng Ou	tcom	ie	D	L
I	Module 1 – Grammar		6	In th	is mo	odule,	stude	nts v	vill mas	ter 1,	, 2
	Parts of Speech								f gramm		
	Articles			•		•			of speed		
	Auxiliary Verbs				_		_		ns, ver		
	Affirmative and	Negative			tives,		verbs,	•	epositio		
	Sentences				ınctio		and		terjection		
						-			finite a		
			indefinite) and their correct usage will								
			be emphasized. Students will learn about auxiliary verbs and their role in								
						-					
									nd moo		
									cover t		
					tructio			firma		nd to	
				_					students	_	
				ound	gra	ummat	ically	COI	rrect a	nd	

			meaningful sentences.	
II	Module 2- Grammar Determiners Sentence Construction Types of Sentences (Assertive, Imperative, etc.) Degree of Comparison Comprehension Exercises	7	Building on the basics, this module will delve into determiners and their functions in sentences. Students will learn sentence construction techniques and the different types of sentences (assertive, imperative, interrogative, and exclamatory). The concept of the degree of comparison (positive, comparative, and superlative) will be explored. The module will also include comprehension exercises designed to enhance students' ability to understand and interpret written texts effectively	2, 3, 4
III	Module 3 - Listening Skills What is listening? The Process of Listening Factors that adversely affect Listening Difference between Listening and Hearing, Purpose and Importance of Effective Listening How to Improve Listening Process.	6	Students will be introduced to the fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	1, 2, 3, 4
IV	Module 4 - Speaking Skills Introducing yourself Self-discovery Basics of Phonetics, Pronunciation Extempore speech Video Recording for Self reflection	5	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	Module 5- Communication Skills Introduction to Communication,	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of	2, 3, 4, 5

Importance of Communication	communication, distinguishing
Skills,	between formal and informal contexts.
Purpose of Communication,	Students will learn about the
Types of Communication,	importance of communication skills
Formal and informal	and the barriers that can impede
communication	effective communication. Tips and
Importance of Communication,	strategies to improve communication
Barriers to Communication,	skills will be provided. The module will also include exercises on
How to improve/ tips to	responding to different questions in
improve Communication skills.	various situations, enhancing students'
Responding to different	adaptability and effectiveness in both
questions in various situations	formal and informal interactions.
(formal/informal)	

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011.Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first edition, S. Chand & Company Ltd.: New Delhi.

REFERENCE BOOKS:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2. Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Blett

OTHER LEARNING RESOURCES:

- 1. https://youtu.be/bEB8-SWMYhI
- 2. https://youtu.be/-zZau_dttRY

SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and correctly use various grammar	1,2
	elements, including parts of speech, articles, auxiliary	
	verbs, determiners, and degrees of comparison, to	
	construct different types of sentences.	
2	Analyze and comprehend written texts through	3,5
	comprehension exercises, demonstrating an	
	understanding of sentence construction and types.	
3	Understand the process and purpose of listening	6,9,10
	differentiate between listening and hearing; identify	
	factors affecting listening, and implement strategies to	

	improve their listening skills.	
4	Develop speaking skills by introducing themselves,	5,9
	practicing self-discovery, improving pronunciation	
	through phonetics, delivering extempore speeches, and	
	using video recordings for self-reflection.	
5	Understand the fundamentals of communication,	1, 4,11
	including its types, purposes, barriers, and importance,	
	and apply this knowledge to improve their	
	communication skills in both formal and informal	
	contexts.	

		SEMESTER -	- I							
Course Title		EXTRA-CURRIC	CULAI	R A(CTIVITI	ES				
Course code	22UBEC121	Total credits: 1	L	T	P	S	R	O/F	C	
		Total hours: 10P	0	0	0	4	0	0	1	
Pre-	Nil	Co-requisite				Ni	l			
requisite										
Programme		B. Tech Mech								
Semester		Fall/ I semester of fir	st year	of t	he progr	amme				
Course	1. To develop soft an									
Objectives	*	stic development of the l								
(Minimum 3)		arning experience in diff								
CO1	management, and tea	evelop personal skills amwork, contributing to	o their	ove	rall char	acter d	levelopi	ment and		
CO2	responsibility, empat society	Engagement in Community service and outreach activities will cultivate a sense of social responsibility, empathy, and civic awareness, encouraging students to actively contribute to society								
CO3	interest.	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.								
CO4	_	given a platform to earn								
CO5		ractices different activ	ities,	by]	ntegratir	ng lear	ning e	xperience	s by	
	demonstrating transfe									
Unit-No.	Cor	ntent	Conta Hou		Le	earning	Outco	me	BL	
T	Different types of act	tivities outside regular			1 AdtI	encou	rages a	range of	1.2	
I	Different types of accurriculum	tivities outside regular	10		activities curriculi learner? activities the soci promotes develop 2. Keep degree the studifferen under Dance, drama, la 3. The state of the studies of the state	s outs. um int s in s are a ial and c ment or oing in learnin dents a t act differe music literary students cipate s, tions	ide the tended terest. imed to soft si a f the lear mind are engivities int clust, photetc. It are end in regular wo	the 360 nodology gaged in headed lbs viz. cography, couraged lar club orkshops,	1,2, 3,4, 5	

	4. The student members of the	
	club are trained represent	
	AdtU in various inter	
	University student and national	
	level competitions.	
	5. Renewed personalities are	
	invited to conduct workshops	
	that benefit the members and	
	students by giving them the	
	platform to learn from experts	
	in the respective fields.	

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Participants will develop personal skills, such as leadership, communication, time management, and teamwork, contributing to their overall character development and self-confidence.	1,3							
2	Engagement in Community service and outreach activities will cultivate a sense of social responsibility, empathy, and civic awareness, encouraging students to actively contribute to society	3,4,7							
3	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	6,8							
4	The students will be given a platform to earn from invited experts in their respective fields.	4,6							
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	7,11							

MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO 10	P O 11	PO12
22BTME111R	Engineering Mathematics I	3	3	2	2	1				1			1
22BTME112R	Introduction to Basic Mathematics, Logic and Coding	3	3	2	2	1				1			1

22BTME113R	Engineering Physics	3	2	3	2	2			1			1
22BTME114R	Basic Electrical Engineering	3	2	2	2	2	1		2			1
22BTME115R	Workshop/Manufact uring Practices	3	2	2	2	2	1		2	2		1
22UBPD114R	Introductory English for Engineers						2		2	3	2	2
22UBEC111	Extracurricular activities							1	2	1		1

		SEMESTER	2 – I	Ι						
Course Title		Engineer	ing	Mat	thema	atics				
Course code		Total credits: 4 Total hours: 40	3	T 1	P 0	S 0	R 0	O/F 0	C 4	
Pre-requisite	Nil	Co-requisite			<u> </u>	1	Nil			
Programme		of Technolog	gy ii	n Mo	echan	ical l	Engine	ering		
Semester	Fall/ II	semester of	irst	yea	r of t	he pr	ogran	nme		
Course	1. Describe the co	oncept of first	orde	er di	fferen	tial e	quatio	n and		
Objectives	apply them in u	understanding	con	nple	x prob	olems				
(Minimum 3)	Develop studer analysis of prostatistical parameters.	2. Apply the concept of ordinary differential equations of higher orders.								
CO1	Understand to solve di problems.	nderstand to solve differential Equations and their applications in engineering								
CO2	Understand the basic different complex prob Apply the concepts of I	lems. proposition log	gic.					them in	solving	
CO4	Analyze the concept of						tion			
CO5	Understand the concept	•								
Unit-No.	Content	Con Ho		t	Lea	arnin	g Out	come	BL	
I	First order ordifferential equations. Exact, linear and Berrequations, Euler's equations not of degree: equations solvations solvations, equations solvations, equations solvations of the equations of the equati	noulli's lations, first blvable ble for		ddir see see see see see see see see see se	olving sernouvell a por rige tuden andle arst mose ser xx, quation ocus	ntial c und g exa illi s Eu tid b ts wi equa degre solval and ons. T or cal g skill	erstand ct, lin equati- ler's e ody d ll also tions n ee, i ole for Clairan These on en	equations ding and ear, and ons, as equations ynamics. learn to not of the including pp, yy, ut's type outcomes inhancing problem-fferential	1	

II	Ordinary differential equations of higher orders: Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation.	9	Method of variation of parameters. Students will also understand and solve the Cauchy-Euler equation, which is a specific type of second-order linear differential equation useful in various applications.	3
III	Complex variable- Differentiation: Differentiation, Cauchy- Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions(exponential, trigonometric, logarithm) and their properties.	8	Gaining proficiency in solving second-order linear differential equations with variable coefficients using techniques like the variation of parameters. Additionally, students will learn to solve the Cauchy-Euler equation, a particular type of second-order differential equation, and comprehend its applications and solution methods. This expertise prepares students to tackle complex differential equations found in various scientific and engineering contexts	6
IV	Basic probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution.	8	Understanding the foundational concepts of probability spaces and the ability to calculate conditional probability and determine the independence of events. Students will also learn about discrete random variables and how to analyze distributions involving independent random variables. Additionally, they will gain proficiency in working with the multinomial distribution and applying the Poisson approximation to the binomial	4

			distribution, equipping	
			them with essential tools	
			for solving a variety of	
			probabilistic problems.	
V	Basic and applied	7	Understanding and	3
	Statistics:		calculating measures of	
	Basic: Measures of central		central tendency such as	
	tendency: Moments,		mean, median, and mode.	
	skewness and Kurtosis-		Students will also learn to	
	Probability distributions:		compute moments, and	
	Binomial, Poisson and		analyze skewness and	
	Normal-evaluation of		kurtosis to describe data	
	statistical parameters for		distribution shapes.	
	these three distributions,		Additionally, they will gain	
	Correlation and regression.		proficiency in working	
	Applied: Test of		with key probability	
	significance: Large sample		distributions (Binomial,	
	test for single proportion.		Poisson, and Normal),	
	Difference of proportions,		including evaluating their	
	single mean, difference of		statistical parameters.	
	means and difference of		Furthermore, students will	
	standard deviations.		develop skills in	
			correlation and regression	
			analysis to examine	
			relationships between	
			variables.	

- Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley 1. & Sons, 2006.
- N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi 2. Publications, Reprint, 2010.

REFERENCE BOOKS:

- S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002. S. L. Ross, Differential Equations, 3rd Ed. Wiley India, 1984. 1.
- 2.

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Understand to solve differential Equations and their	1,2									
	applications in engineering problems.										
2	Understand the basic principles of set theorem and apply	3,4,8									
	them in solving different complex problems.										
3	Apply the concepts of proposition logic.	6,8,10									

Ī	4	Analyze the concept of basic probability and its	4,6
		application	
Ī	5	Understand the concept of basic and applied statistics.	7,11,12

		SEMESTE	R – II								
Course		Enginee	ring Ch	emistr	y						
Title											
Course	22BTME122R	Total credits: 4	L	T	P	S	R	O/F	С		
code		Total hours: 30T	3	0	2	0	0	0	4		
Pre-	Nil	Co-requisite				N	il				
requisite											
Programm		Bachelor of Technolog	gy in Me	chanio	cal Eng	ineerii	ng				
e											
Semester		Fall/II semester of f									
Course	1. To develop a deep	understanding of aton	nic and n	nolecu	lar stru	ctures,	includi	ing the appl	ication		
Objectives	•	of quantum mechanics to solve complex problems.									
(Minimum											
3)		and understanding spectroscopic techniques.									
		3. To foster critical thinking and analytical skills necessary for interpreting complex chemical									
		phenomena.									
CO1	Apply the Schrödinge	•	-		n a bo	x solu	utions	and analyz	e their		
	mplications for conjugated molecules and nanoparticles. Evaluate the spatial variations of hydrogen atom wave functions through graphical representations										
CO2	Evaluate the spatial variand interpret their significant			e func	tions th	rough	graphic	cal represer	itations		
CO3	Analyze molecular or	bitals of diatomic m	olecules	and	multi-c	enter	orbital	s using q	uantum		
003	mechanical equations ar	nd visualize these orbita	als throug	gh plot	s.						
CO4	Explain the concept of	aromaticity and predic	t the pi-	molec	ular orb	itals o	f butad	liene and be	enzene		
CO4	using molecular orbital	*									
CO5	Illustrate the energy lev	-	tion meta	ıl ions	using c	crystal	field th	neory and a	nalyze		
	their magnetic propertie								_		
Unit-No.	Con	tent	Contac		Le	arning	g Outco	ome	BL		
			Hour								
I	Atomic and molecular		6		emonstr		profici	•	1		
	Schrodinger equation				lving	quant		mechanical			
	solution and their	* *		_				tomic and			
	conjugated molecules	•		mo	olecular	structi	ures.				
	Forms of the hydrogen										
	and the plots of these	•									
	their spatial variations.										
	diatomic molecules ar	ia piots of the multi-									

	center orbitals. Equations for atomic and							
	molecular orbitals. Energy level diagrams of							
	diatomic. Pi-molecular orbitals of butadiene							
	and benzene and aromaticity. Crystal field							
	theory and the energy level diagrams for							
	transition metal ions and their magnetic							
	properties. Band structure of solids and the							
	role of doping on band structures			-				
II	Spectroscopic techniques and applications	6	Analyze spectroscopic data to	2				
	Principles of spectroscopy and selection		deduce molecular structures and					
	rules. Electronic spectroscopy. Fluorescence		dynamics.					
	and its applications in medicine. Vibrational							
	and rotational spectroscopy of diatomic							
	molecules. Applications. Nuclear magnetic							
	resonance and magnetic resonance imaging,							
	surface characterization techniques.							
	Diffraction and scattering.							
III	Use of free energy in chemical equilibria	6	Evaluate the impact of	3				
	Thermodynamic functions: energy, entropy		intermolecular forces on the					
	and free energy. Estimations of entropy and		physical and chemical properties					
	free energies. Free energy and emf. Cell		of substances.					
	potentials, the Nernst equation and							
	applications. Acid base, oxidation reduction							
	and solubility equilibria. Water chemistry.							
	Corrosion.							
IV	Intermolecular forces and potential energy	6	Apply thermodynamic principles	4				
	surfaces		to chemical equilibria and					
	Ionic, dipolar and van Der Waals		electrochemical systems.					
	interactions. Equations of state of real gases							
	and critical phenomena. Potential energy							
	surfaces of H3, H2F and HCN and							
	trajectories on these surfaces.							
	Periodic properties							
	Effective nuclear charge, penetration of							
	orbitals, variations of s, p, d and f orbital							
	energies of atoms in the periodic table,							
	electronic configurations, atomic and ionic							
	sizes, ionization energies, electron affinity							
	and electronegativity, polarizability,							
	oxidation states, coordination numbers and							
	geometries, hard soft acids and bases,							
	molecular geometries.							
V	Stereochemistry	6	Interpret periodic trends and their	6				
,	Representations of 3 dimensional structures,	v	implications on chemical					
	structural isomers and stereoisomers,		behaviour and reactivity.					
	configurations and symmetry and chirality,							
	enantiomers, diastereomers, optical activity,							

ab	bsolute configurations and conformational		
ar	nalysis. Isomerism in transitional metal		
co	ompounds		
O	Organic reactions and synthesis of a drug		
m	nolecule		
In	ntroduction to reactions involving		
su	ubstitution, addition, elimination,		
OX	exidation, reduction, cyclization and ring		
op	penings. Synthesis of a commonly used		
dr	rug molecule		

- 1. University chemistry, by B. H. Mahan
- 2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

REFERENCE BOOKS:

- O. V. Roussak and H. D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013.
- 2. S. S. Dara, A Text book of Engineering Chemistry, S. Chand & Co Ltd., New Delhi, 20thEdition, 2013.

OTHER LEARNING RESOURCES:

1. Home :: NPTEL

CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome		
	Apply the Schrödinger equation to predict the particle			
1	in box solutions and analyze their implications for	1,3		
	conjugated molecules and nanoparticles.			
	Evaluate the spatial variations of hydrogen atom			
2	wave functions through graphical representations and	3,4,7		
	interpret their significance in atomic structure.			
	Analyze molecular orbitals of diatomic molecules and			
3	multi-center orbitals using quantum mechanical	6,8,12		
	equations and visualize these orbitals through plots.			
	Explain the concept of aromaticity and predict the pi-			
4	molecular orbitals of butadiene and benzene using	4,6		
	molecular orbital theory.			
	Illustrate the energy level diagrams for transition			
5	metal ions using crystal field theory and analyze their	7,11,12		
	magnetic properties			

		SEMESTE	R – II						
Course		Programming	for Prob	olem S	Solving				
Title									
Course	22BTME 123 R	Total credits: 4	L	T	P	S	R	O/F	C
code		Total hours: 36T	3	0	2	0	0	0	4
Pre-	Nil	Co-requisite		Nil					
requisite									
Programm	l	Bachelor of Technolog	gy in Med	chanic	al Eng	ineeri	ng		
e									
Semester		Fall/ II semester of f					;		
Course	1. To formulate simple a	•	_	•					
Objectives	2. To test and execute th		•	_	•	ors.			
*	3. To implement the pro	gramming in real life p	ractical a	pplica	tions				
3)									
CO1	Apply programming corcomputational problems								
CO2	Analyze and synthesize precedence rules.								priate
CO3	Evaluate conditional state efficiency.	•	•			•			
CO4	Create and implement manipulate and store dat	ta effectively.							
CO5	Design and develop sol		and recu	rsion,	includ	ing ad	vanced	examples s	uch as
	Quick Sort and the Acke								
Unit-No.	Cont	tent	Contac	t	Le	arning	g Outco	ome	BL
т	Introduction to Pr	rogramming (Flow	Hour 8	Da	monstr		fi ai	ency in	1.0
I	chart/pseudocode,	compilation etc.),	ð	co	nstructi	ng a		nterpreting	
	Variables (including da	ata types)			wchart gorithm		•	locode for	
II	Arithmetic expression	-	12	_			•	variables,	3,4
	Conditional Branching			da	-	pes,	and	arithmetic	
	and evaluation of				pressio			appropriate	
	consequent branching,	•		_		_	-	ning tasks.	1
III	Arrays (1-D, 2-D), (Character arrays and	8					branching	
	Strings							to control	
				_	ogram	flow		optimize	
TX 7	Desir Al 14 C	authina D. C. C. C.		`	gorithm				4
IV	Basic Algorithms: Sea	C .	4		evelop	•	roficien	•	
	Algorithms, Finding ro	oots of equations, idea			nipulat	_	•	character	
	of time complexity Function and Re	cursion: Functions			-		_	nanage and	
				pro	ocess di	ata ette	ectively	•	
		ouilt in libraries),							
	Recursion with examp Quick sort, Ackerman								
	Quick sort, Ackerman	runction etc.							1

1	Structure and Pointers: Pointers, Structures (including self referential structures e.g., linked list, notional introduction) File handling	4	Analyze and evaluate algorithm efficiency through the application of basic searching and sorting techniques, understanding time complexity implications.	
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- 1. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill.
- 2. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

REFERENCE BOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply programming concepts such as flowcharts and pseudocode to design algorithms for solving computational problems.	1,3
2	Analyze and synthesize variables and data types to construct arithmetic expressions with appropriate precedence rules.	3,4,8
3	Evaluate conditional statements and loops to control program flow and optimize algorithm efficiency.	6,8,12
4	Create and implement algorithms using arrays (1-D and 2-D), character arrays, and strings to manipulate and store data effectively.	4,6
5	Design and develop solutions using functions and recursion, including advanced examples such as Quick Sort and the Ackermann function.	7,11,12

		SEMESTE	R – II						
Course	Engineering Graphics and Design								
Title									
Course	22BTME 124 R	Total credits: 4	L	T	P	S	R	O/F	С
code		Total hours:	1	0	4	0	0	0	3
		10T+30P							
Pre-	Nil	Co-requisite				N	il		
requisite									
Programm		Bachelor of Technolog	gy in Mec	hanio	al Eng	ineerii	ıg		
e									
Semester		Fall/ II semester of t							
Course	_	ility to communicate wi	th others	throug	gh the la	anguag	e of tec	chnical drav	ving
Objectives	and sketching.								
(Minimum		lents with various conce	_		_			and standard	ds
3)		ing drawings in order to	-	-				11	1.
		lents with various conce	_		_			ind standard	18
CO1		ing drawings in order to							
CO1		es of engineering graphi	cs and usa	ige or	urawii	ig msu	umems		
CO2	To discuss orthographic	• •							
CO3	<u> </u>	mensioning methods and		11.1	G L D				
CO4		l views for different geo						•	
CO5	To give examples of iso	ometric views by using	•		annota	itions a	ind laye	ering.	1
Unit-No.	Con	ntent	Contact	t Learning Outcome			BL		
			Hour						
I		ring Graphics and their	Hour 2			_	ciples o		2,4
I	significance, usage of	ring Graphics and their Drawing instruments,		en	gineerii	ng grap	hics an	f d usage of	2,4
I				en		ng grap	hics an		2,4
I	significance, usage of lettering, numbering			en; dra	gineerii awing i	ng grap nstrum	ohics and ents		2,4
	significance, usage of lettering, numbering Plain, Diagonal and	Drawing instruments,	2	en; dra	gineerii awing i	ng grap nstrum	ohics and ents	d usage of	
	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula	Orawing instruments, Vernier Scales. Conic	2	en; dra	gineerii awing i	ng grap nstrum	ohics and ents	d usage of	2,4,
	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular s	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute;	2	en; dra	gineerii awing i	ng grap nstrum	ohics and ents	d usage of	2,4,
	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; colids and lines inclined to	2	en dra Di	gineerii awing i scuss o	ng grap nstrum rthogra	phics and ents aphic property of the control of the	d usage of	2,4,
П	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projections	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined	2	en dra Di	gineerii awing i scuss o	ng grap nstrum rthogra	phics and ents aphic property of the control of the	d usage of	2,4,
III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Planes	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; colids and lines inclined to ons of planes inclined nes	2 2	eng dra Di	gineering in scuss of assify ethods a	ng grap nstrum rthogra differe	phics and ents phic property ent din les.	d usage of rojections	2,4, 5
П	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Planes - Auxiliary Planes, Cylinder, Pyranes	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary	2	eng dra Di	gineering in scuss of assify ethods anderstar	ng grap nstrum rthogra differe and sca	ents and phic property din din les.	d usage of rojections nensioning ews for	2,4, 5 2,4, 5
III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates - Auxiliary Plates - Prism, Cylinder, Pyrate Views; Development	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; colids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right	2 2	eni dra Di Cla me	gineering in scuss of assify ethods anderstar	ng grap nstrum rthogra differe and sca	ents and phic property din din les.	d usage of rojections	2,4, 5
III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates, Cylinder, Pyran Views; Development Regular Solids - Prise	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary	2 2	eni dra Di Cla me	gineering in scuss of assify ethods anderstar	ng grap nstrum rthogra differe and sca	ents and phic property din din les.	d usage of rojections nensioning ews for	2,4, 5 2,4, 5
III IV	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Platerism, Cylinder, Pyrate Views; Development Regular Solids - Prisand Cone	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right cm, Pyramid, Cylinder	2 2	eng dra Di Cla me	gineering in scuss of assify ethods anderstareferent gawing.	ng grap nstrum rthogra differend and sca and secti	ents and ents aphic property din les.	d usage of rojections mensioning ews for lids, CAD	2,4, 5 2,4, 5
III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates, Cylinder, Pyrate Views; Development Regular Solids - Prisand Cone Isometric Scale,	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; colids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right m, Pyramid, Cylinder Isometric Views,	2 2	eni dra Di Cla me Ur dif dra Gi	gineering awing in scuss of assify ethods anderstare awing.	differend sca	ents phic property din les. onal vierical so	d usage of rojections mensioning ews for lids, CAD	2,4, 5 2,4, 5 2,4, 5
III IV	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Pla Prism, Cylinder, Pyrat Views; Development Regular Solids - Prisand Cone Isometric Scale, Conventions; Isometeric Scale,	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right m, Pyramid, Cylinder Isometric Views, ric Views of lines,	2 2	enindra Di Clame Ur diff dra Gi by	assify ethods a derstar ferent gawing.	differend scand secting	ents ent din les. onal vical solution of isome ic scale	d usage of rojections mensioning ews for lids, CAD etric views es,	2,4, 5 2,4, 5
III III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates, Cylinder, Pyrate Views; Development Regular Solids - Prisand Cone Isometric Scale, Conventions; Isomete Planes, Simple and	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; colids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right m, Pyramid, Cylinder Isometric Views, ric Views of lines, il compound Solids;	2 2	enindra Di Clame Ur diff dra Gi by	assify ethods a derstar ferent gawing.	differend scand secting	ents phic property din les. onal vierical so	d usage of rojections mensioning ews for lids, CAD etric views es,	2,4, 5 2,4, 5 2,4, 5
III IV	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates, Cylinder, Pyrates, Cylinder, Pyrates, Development Regular Solids - Prist, and Cone Isometric Scale, Conventions; Isometric Planes, Simple and Conversion of Is	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right m, Pyramid, Cylinder Isometric Views, ric Views of lines, d compound Solids; ometric Views to	2 2	enindra Di Clame Ur diff dra Gi by	assify ethods a derstar ferent gawing.	differend scand secting	ents ent din les. onal vical solution of isome ic scale	d usage of rojections mensioning ews for lids, CAD etric views es,	2,4, 5 2,4, 5 2,4, 5
III III	significance, usage of lettering, numbering Plain, Diagonal and sections - Rectangula Epicycloid, Hypocyc Projection of regular sections of Points both planes; Projection Planes - Auxiliary Plates, Cylinder, Pyrate Views; Development Regular Solids - Prisand Cone Isometric Scale, Conventions; Isomete Planes, Simple and	Vernier Scales. Conic r Hyperbola; Cycloid, cloid and Involute; solids and lines inclined to ons of planes inclined nes mid, Cone – Auxiliary of surfaces of Right om, Pyramid, Cylinder Isometric Views, ric Views of lines, d compound Solids; ometric Views to nd Vice-versa	2 2	Clame Ur diff dra Gi by	assify ethods a derstar ferent gawing.	differend scand secting and secting sometrins and	ents phic property din les. onal vice rical solution of isome ic scale layering	d usage of rojections mensioning ews for lids, CAD etric views es,	2,4, 5 2,4, 5 2,4, 5

2.	Hyperbola cycloid, hypocycloid and	drawing and apply it in practical	3,4
	involute, projection of regular solids	application.	
3. 1	Projection of points, lines, planes		
4.	Solid Surface drawing of Prism,		
	cylinder, pyramid, cone- auxiliary views		
5.	Isometric views and drawing of different		
	objects		

- 1. Venugopal K and Prabhu Raja V, "Engineering Graphics", New AGE International Publishers, 2015.
- 2. N. D. Bhatt, Engineering Drawing, Charotar publishing House, 2012.

REFERENCE BOOKS:

1. Natarajan, K. V., A Text book of Engineering Graphics, Dhanalakshmi Publishers, 2012.

OTHER LEARNING RESOURCES:

1. Home:: NPTEL

	CO PO Mapping					
SN Course Outcome (CO)		Mapped Program Outcome				
1	To understand principles of engineering graphics and usage of drawing instruments	1,3				
2	To discuss orthographic projections.	1				
3	To classify different dimensioning methods and scales.	1,3				
4	To understand sectional views for different geometrical solids, CAD drawing.	1,3				
5	To give examples of isometric views by using isometric scales, annotations and layering	1,3&4				

		SEMESTER	R – II						
Course Tit	tle Techno	-professional Skills (Skills (Fundamentals of C Programming)						
Course co	de 22BTME125R T	otal credits: 1	L	T	P	S	R	O/F	С
	T	otal hours: 20 P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				Ni	il		
requisite									
Programn		chelor of Technolog	-						
Semester	L	'all/ II semester of fi			e progr	amme	!		
Course	1. Derive problem specific	-							
Objectives	1 0	• • •	•		et stated	l specif	rication	s.	
(Minimum	3. Justify, understand and i	modify code written b	by others						
3)									
CO1	Compute algorithmic solut	ions to problems							
CO2	Design and code a medium	application							
CO3	Justify, understand and mo	Justify, understand and modify code written by others							
Unit-	Content		Contact	;	Learning Outcome			ome	BL
No.			Hour						
I	INTRODUCTION TO '	C' LANGUAGE	6		•	•	hmic so	olutions to	1,2
	Docion Style goding styl	Style, coding style, functions and							
	Design Style, county styl	e, functions and		1	oblems.				
	operators	e, functions and		r	JUICIIIS.				
II			8				ode a	medium	3,4
II	operators	YS	8	De		and c	ode a	n medium	3,4
п	operators FUNCTIONS AND ARRA	YS eclaration function	8	De	esign a	and c	ode a	n medium	3,4
II	operators FUNCTIONS AND ARRA Functions definition and de	YS eclaration function uments, Recursion	8	De	esign a	and c	ode a	n medium	3,4
II	operators FUNCTIONS AND ARRA Functions definition and de types, Actual and formal arg	YS cclaration function uments, Recursion ration, Processing	8	De	esign a	and c	ode a	n medium	3,4
II	FUNCTIONS AND ARRA Functions definition and detypes, Actual and formal argarray notation and Declar	YS cclaration function uments, Recursion ration, Processing	8	De	esign a	and c	ode a	n medium	3,4
III	FUNCTIONS AND ARRA Functions definition and detypes, Actual and formal argarray notation and Declar	YS cclaration function uments, Recursion ration, Processing ion.	8	De	esign a	and c		n medium	3,4
	FUNCTIONS AND ARRA Functions definition and de types, Actual and formal arg array notation and Declar with arrays, Array and Funct POINTERS, STRUCTURE Pointer Declaration, Poi	YS eclaration function uments, Recursion ration, Processing ion. ES AND UNIONS anter Arithmetic,		De ap	esign a	and c	and ar		
	FUNCTIONS AND ARRA Functions definition and de types, Actual and formal arg array notation and Declar with arrays, Array and Funct POINTERS, STRUCTURE	YS cclaration function uments, Recursion ration, Processing ion. CS AND UNIONS anter Arithmetic, Structure- Union-		De ap	esign a	and c	and ar		

1. Herbert Schildt, Java The Complete Reference, Seventh Edition: The Complete Reference, Seventh Edition

REFERENCE BOOKS:

1. Raymond Gallardo, Scott Hommel, Sowmya Kannan, Joni Gordon, Sharon Bicocca Zak hour, The Java Tutorial: A Short Course on the Basics, sixth edition

OTHER LEARNING RESOURCES:

- 1. http://www.tutorialspoint.com/java/
- 2. http://academy.javacodegeeks.com/course/advanced-java/

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Compute algorithmic solutions to problems	3&5			
2	Design and code a medium application	4&5			
3	Justify, understand and modify code written by others	4&5			

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cs.				
	DI			
ne	BL			
nalvea	1,2			
•	1,2			
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skills of	3,4			
SKIIIS OI	3,1			
ion.				
	3,4			
gathering	- 7 -			
m a text				
boost	3,4			
ize time	me 3,4			
o s is e n t	and use to steners. Ses. The malyse skills of on. Schniques gathering m a text poost			

- 1. Wren,P.C and Martin,H. 1995. High School English Grammar and Composition, S Chand publishing.
- 2. Barrett, Grant. 2016. Perfect English Grammar: The Indispensable Guide to Excellent Writing

REFERENCE BOOKS:

- 1. McCarthy. (2008) English Vocabulary in Use Upper Intermediate with
- 2. CD-ROM, Cambridge University Press

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Enable students to understand grammar to write effectively and speak flawlessly, knowing correct usage of tenses and rectifying grammatical errors.	9,10					
2	Students will acquire the technique of expanding vocabulary and creating new words and use them in different contexts.	10					
3	Encouraging and helping them to sharpen their listening skills and to become good listeners.	9,10,11					
4	To make them prepare for various public and private sector exams & placement drives.	1,2,12					
5	To enhance the analytical skill and problem-solving skill of the students	4,5					

		SEMESTER	– II						
Course	Computational Systems and Digital World								
Title									
Course	22UUDL103R	Total credits: 4	L	T	P	S	R	O/F	C
code		Total hours: 20P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite									
Programme	Ba	chelor of Technology	in Mec	hanica	l Engiı	neering	3		
Semester	I	Fall/ II semester of fi	rst year	of the	progra	mme			
Course	1. Students will be a	ble to understand the	fundame	entals o	of comp	uter sy	stems a	and Interne	-
Objectives	search along with	advanced features of	MS-Off	ice.					
(Minimum	2. Students will be a	ble to learn data mana	agement,	statist	ical ana	lysis a	nd visu	alization.	
3)	3. Students will be a	ble to use social medi	a and e-	comme	rce por	tals, D	igital Pa	ayment sys	tems,
	and other utility s	oftware.							
CO1	Students will have basic und	lerstanding of Compu	ter Syste	ms and	l Intern	et searc	ch.		
G0.4	Students will be able to solv	e data analysis, manag	gement a	nd visu	ıalizatio	on issu	es using	MS-Offic	e
CO2	products.								
CO3	Students will be able to efficient	ciently and ethically us	se Social	Media	and e-	comme	erce site	es.	
GO4	Students will have introduct	ion to various utility s	oftware	used ir	resear	ch and	inform	ation	
CO4	management.								
CO5	Application of basic accoun	ting using utility softw	vare						
Unit-No.	Conter	nt	Contac	et	Le	arning	Outco	ome	BL
			Hour	,					
I	Fundamentals of Compu	ter Systems, Office	7	Ba	sic unc	lerstan	ding of	Computer	2,3,
	Automation and Internet S	earch		Sy	stems a	nd Inte	ernet se	arch.	4
II	Internet & Cyber World		5	ДЪ	ole to	solve	data	analysis,	2,3
	miornot & Cybor World							sualization	4,
					-			products.	',
III	Introduction to Social Med	ia and E-Commerce	3		abled	to	efficie	•	2,3
								edia and e-	4
				l l	mmerce				
IV	Digital Payments and Digi	tal Transactions	2				vario	ous utility	2,3
	5 , 1 11 11 1 - 16-							earch and	4
							agemer		
V	Basic Accounting and Util	ity Software	3				-	counting	2,3,
		•		_	ing utili			S	4
]

- 1. Sinha Pradeep K. and Priti Sinha. Computer Fundamentals: Concepts Systems & Applications. 3rd ed. New Delhi: BPB Publications.
- 2. Goel, A, 2010. Computer Fundamentals, PearsonIndia.

REFERENCE BOOKS:

- 1. Balaguruswamy, E. 2009 Fundamentals of Computers, Tata McGraw-Hill Education.
- 2. Balaguruswamy, 2014. E. Fund Of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-HillEducation.
- 3. Lawson, C. 2022. Introduction to Social Media, Oblahoma StateUniversity.

OTHER LEARNING RESOURCES:

- 1. https://www.w3schools.com
- 2. https://edu.gcfglobal.org
- 3. https://www.tutorialspoint.com
- 4. https://www.javatpoint.com

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Students will have basic understanding of Computer Systems and Internet search.	3,4&5					
2	Students will be able to solve data analysis, management and visualization issues using MS-Office products.	3,4&5					
3	Students will be able to efficiently and ethically use Social Media and e-commerce sites.	8,9,10					
4	Students will have introduction to various utility software used in research and information management.	4,11					
5	Application of basic accounting using utility software	4,5					

		SEMESTE	R – II									
Course	UNIVERS	AL HUMAN VALU	ES (UF	IV) + 1	PROFI	ESSIO	NAL E	ETHICS				
Title												
Course code	22UUHV101R	Total credits: 2	L	T	P	S	R	O/F	C			
		Total hours: 40P	1	0	2	0	0	0	2			
Pre-	Nil	Co-requisite				N	Vil					
requisite												
Programme		achelor of Technolo			nical E	ngine	ering					
	Fall/ II semester of f											
Course	_	To help the students appreciate the essential complementarily between 'VALUES' and										
Objectives	'SKILLS' to ensure su	istained happiness and	d prospe	erity, v	which a	are the	core a	spirations	of all			
`	human beings							1 110				
	2. To facilitate the de	-				_						
	profession as well as	• •		•					ng of the			
	Human reality and the				• •							
	Universal Human Va 3. To highlight plausi					_		-	001			
	human conduct, trust	•					_					
	interaction with Natur	· · · · · · · · · · · · · · · · · · ·	iiiig iiu	man o	CHavio	ui and	mutua	my chricin	ng			
		evelop a basic understanding of Computer Hardware, Software, and Computer handling.										
CO2	Acquire the skills to s											
CO2	Acquire the skill to ef							Jilice Pioc	iucis.			
CO4	Acquire the skill to u	<u> </u>			•			nd legally t	for day-			
	to-day use.	se computing technic	any cui	iicairy,	, saiciy	, sccu	iciy, ai	id legally i	ioi day-			
	Develop self-explorate	ion skills which will	help Er	nable t	he stud	lents t	o critic	ally evalua	ate their			
	pre-conditionings and		p 2.				0 011010	or care				
			Conta	act		•						
Unit-No.	Con	tent	Hou	r	L	earnın	g Out	come	BL			
I	Course Introductio	n - Need, Basic		,	Studen	ts will	be able	e to				
	Guidelines, Conten	t and Process for	12	;	analyse	and to	ransfor	m the	1,2			
	Value Education		12	(differe	nt type	s of se	ntences.				
II	Understanding Harn	•										
	Being - Harmony in	Myself			Helpfu		-	_				
			8				-	l speaking	3,4			
					in prof							
				(commu	inicati	on.					
III	Understanding Ham	nony in the Esmily		1	Ualna	in	onoly	aina tha	-			
1111	and Society- Harr	Harmony in the Family Helps in analysing the techniques of effective 3,4										
	Human Relationship	•	8			•		ideas and				
	Truman Keranonsinp	,			inform	_	_					
IV	Understanding Harn	ony in the Nature			Dress c				1,2			
1,4	and Existence - Who	*	6		boost tl		_		1,2			
	and Landence Will	chistorice as Co-										

	existence			
V	Implications of the above Holistic Understanding of Harmony on Professional Ethics	6	Students will learn to utilize time effectively.	3,4

- 1. The text book R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excelbooks, New Delhi, 2010, ISBN 978-8-174-46781-2
- 2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics Teachers Manual, Excel books, New Delhi, 2010

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- 1. The text book R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
- 2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics Teachers Manual, Excel books, New Delhi, 2010

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze the need for value education and its impact on personal and societal well-being.	1,4
2	Evaluate the concepts of self-exploration, natural acceptance, and experiential validation as mechanisms for understanding human aspirations.	3,4,7
3	Differentiate between happiness and prosperity and assess their implications on human aspirations in the current scenario.	6,8,10
4	Demonstrate understanding of harmony in human relationships, family, society, nature, and existence.	4,6,8
5	Apply principles of professional ethics to develop sustainable and humanistic solutions in their professional practice.	7,11

		SEMESTER	l – II										
Course Title		CO-CURRIC	CULAR	R ACT	IVITIE	S							
Course code	22UBCC121	Total credits: 1	L	T	P	S	R	O/F	`	C			
	3.741	Total hours: 10P	0	0	0	4	0	0		1s			
Pre-requisite	Nil	Co-requisite	<u>. </u>	1.			Vil						
Programme		B. Tech Med											
Semester	1 Masting the no	Fall/ II semester of						thair ab	:1:+:0	a and			
Course Objectives	· ·	eds of the students and	i cover	mg a	Droau/w	iue ra	nge or	meir ab	mne	s and			
(Minimum	talents.		1		1		. 141 4	11 41	4 1				
3)		2. To stimulate the interests in the students and provide equal opportunities to all the students to											
- /	participate 3. To enhance the learning experience of the students and help in recognizing and developing												
					_		-	g and dev	elop	ıng			
		n as leadership qualities											
CO1	1	ill be able to analyze ar		uate th	e effecti	venes	s of va	rious co-	curri	cular			
		to their academic curric				,		1					
CO2		will be able to organi				•	s, exhi	bitions, a	and g	guest			
CO3		deeper understanding outs will be able to demo					ond a	ntituda b	u cot	ivolv			
COS		ed tests and activities.	mstrate	шрго	vea son	SKIIIS	and a	putude b	y act	ivery			
CO4		vill develop the ability	to inde	nender	ıtly nlan	and	mnlen	nent nrog	rams	that			
CO4	•	ge of ideas and informat			• •	ana	шртеп	iciit prog	,i aiii	tilut			
CO5		will evaluate the impa				ctivitie	es on	their pers	sonal	and			
		particularly in terms of						•					
Unit-No.	Cor	ntent	Cont	tact	L	æarni	ng Ou	tcome		BL			
			Ho										
I		co-curricular activities	10		Engage			datory	co-	1,2,			
	as an integral and i	mandatory part of the						s to fo		3,4,			
	curriculum with an a	nim to encourage team			teamwo			self-relia		5			
	work and the spirit	of self-reliance among			curricul		and	ding of impr					
	the students. Stud	ents will plan and						h organiz					
	organize various pro	grams like Workshop,			•		_	in vari	_				
	Project Exhibition,	Guest Lectures, Soft-			progran	_	_						
	skill and Aptitude	Test etc. These											
	activities will provide	le a common platform											
	_	exchange ideas and											
		topics of their interest											
		mployment / higher											
	-	rtunities, emerging											
	trends, new deve												
	activities will	enhance the											
		id the degree of											
	association of students with their												
	_	um and help them											
	perform better fi	rom a 360 degree											
	perspective.												

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze: Students will be able to analyze and evaluate the effectiveness of various co-curricular activities in relation to their academic curriculum.	1,3
2	Organize: Students will be able to organize and execute workshops, exhibitions, and guest lectures that foster a deeper understanding of their academic subjects.	3,4,7
3	Demonstrate: Students will be able to demonstrate improved soft skills and aptitude by actively participating in related tests and activities.	6,8
4	Develop: Students will develop the ability to independently plan and implement programs that promote the exchange of ideas and information among peers.	4,6
5	Evaluate: Students will evaluate the impact of co- curricular activities on their personal and professional growth, particularly in terms of employment and higher education opportunities.	7,11

		SEMESTER											
Course Title		EXTRA-CURI					1	, · · · · · · · · · · · · · · · · · · ·					
Course code	22UBEC121	Total credits: 1	L	Т	P	S	R	O/F	C				
		Total hours: 10P	0	0	0	4	0	0	1				
Pre-requisite	Nil	Co-requisite	1				Nil						
Programme		B. Tech Me											
Semester	1 m 1 1 c	Fall/ II semester of first year of the programme											
Course	_	To develop soft and social skills											
Objectives	_	2. To promote a holistic development of the learners 3. To enhance the learning experience in different stages etc.											
(Minimum 3) CO1		<u> </u>				4:ff		sha namalsi	donos				
COI	music, photography	e engaged in different a	ictivitie	s nead	dea unae	a uni	erent ch	ios namery	uance,				
CO2		rticipate in regular club	activiti	ies lik	e worksh	ions c	ompetit	ions as ner i	their				
CO2	interest and hobbies		activiti	ics iik	e worksi.	iops, c	ompeti	ions as per	шеп				
		•											
CO3		e trained to represent	ADTU	in vai	rious inte	er uni	versity,	state and na	ational				
	level competitions.		2					,					
CO4		given a platform to ear											
CO5	_	et an exposure of 360	degree	Iearni	ng metho	odolog	gy consi	idering the o	overall				
T1 *4 N1-	growth along with the		C	44	т				DI				
Unit-No.	Co	ntent	Cont Ho			come	BL						
I	Different types of	of activities outside	1(1 A dtl	Lance	Olltagae	a range of	1,2,3				
1	regular curriculum	n activities outside	10	J			•	he regular	,4,5				
	regular culticulari							to meet	, ,,,,				
					learner		interest						
								to develop					
								skills and					
					promot	e a ho	olistic d	evelopment					
					of the 1	earnei	s.						
					2. Kee	ping	in min	d the 360					
					_		-	ethodology					
								engaged in					
					differer		activities						
					under			clubs viz.					
							_	notography,					
					drama,		•	1					
								encouraged					
					activiti	_		egular club workshops,					
					compet			per their					
					_		as nobbies.	per men					
								bers of the					
								esent AdtU					
							_	University					
1					student			-					
			<u> </u>					10,01	1				

competitio	ns.	
5. Renew	ed personalities are	
invited to	conduct workshops	
that benef	it the members and	
students b	y giving them the	
platform to	o learn from experts	
in the respe	ective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The students will be engaged in different activities headed under different clubs namely dance, music, photography, drama, literacy, etc	1,3
2	The students will participate in regular club activities like workshops, competitions as per their interest and hobbies.	3,4,7
3	The students will be trained to represent ADTU in various inter university, state and national level competitions.	6,8
4	The students will be given a platform to earn from invited experts in their respective fields.	4,6
5	The students will get an exposure of 360 degree learning methodology considering the overall growth along with the academics.	7,11

		SEMESTER -	·II										
Course Title	Community Engagement and Social Responsibility												
Course code	22MOSY123R	Total credits: 1	L	T	P	S	R	O/F	C				
		Total hours: 10P	0	0	0	0	0	0	2				
Pre-requisite	Nil	Nil Co-requisite Nil											
Programme	B. Tech Mechanical Engineering												
Semester		Fall/ II semester of first year of the programme											
Course	To develop known	owledge about communi	ty										
Objectives	2. To promote diff	ferent culture and its live	elihood	l									
(Minimum 3)	3. Development o	f rural programmes and	institut	ions									
CO1	Helps in understan	ding the concept of ethic	cs										
CO2	Learn the different	stages of components, o	commu	nity et	c.								
CO3	Understand the pri	nciples of community de	evelopi	ment a	nd utili	ty of pi	ublic re	sources.					
CO4	Creating different	self-help groups that can	helpe	d each	other in	n differ	ent situ	ations					
CO5	Development rural	programmes and institu	tions										
Unit-No.	C	ontent	Con	tact	L	earnin	g Outc	ome	BL				
				our			6						
I	Concept, Ethics	and Spectrum of		3	Help	1,2,							
	Community engag	•			_		of ethic	•					
2	Local community	, Rural culture and		5	Understanding the culture								
-	Practice of commu		•				nmunity		1,2				
		inty engagement			0110	our con							
3	Ct C	-4 1 D.::-1f		_	T	. 41	1: CC		1.2.2				
3		nts and Principles of		5		n the d		t stages	1,2,3,				
		lopment, Utility of			of		_	onents,	4				
	public resources.					nunity							
4	Contributions of so	elf-help groups		1	II.	_	lifferen	t self-	5,6				
					_	grou	-						
						ed ea		her in					
							uations						
5	Rural Developmen	nt Programs and Rural	3 Development					rural	5,6				
	institutions				progr	amme	S	and					
					instit	utions							
									<u> </u>				

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Helps in understanding the concept of ethics	8
2	Understanding the culture of local community	9,10
3	Learn the different stages of components, community etc.	9,10

4	Creating different self-help groups that can helped each other in different situations	11,12
5	Development rural programmes and institutions	11,12

Mapping Table

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME121R	Engineering Mathematics II	3	2	2	2								1
22BTME124R	Engineering Graphics and Design	2	1	1	2								1
22BTME123R	Programming for Problem Solving	2	2	2	2	2				1		1	1
22BTME122R	Engineering Chemistry	2	1										1
22UBPD124R	Effective English For Engineers						2			2	3	2	2
22BTME125R	Techno-professional Skill	3	2	2	2	2	1			2			1
22UUDL103R	Computational Systems and Digital World	3	2	2	2	2	1			2	2		1
22UUHV1011	Universal Human Values (UHV) + Professional Ethics						2			2	3	2	2
22MOSY123R	MOOCS I					1	2	2	2	3			1
22UBCC121	Co-Curricular Activity							2		2	1		1
22UBEC111	Extra-Curricular Activity							1		2	1		1

	SE	MESTER – I	II							
Course Title		Biology for	Engiı	iee	rs					
Course code	22BTME211R	Total credits	_	Ĺ	T	P	S	R	O/F	C
		Total hours: 36T	: 2	2	1	0	0	0	0	3
Pre-	Nil	Co-requisi	ite					Nil		
requisite										
Programme	Bachelor of T									
Semester	Fall/ III seme									
Course	1. To introduce the st		the bio	olo	gic	al c	once	epts	from ar	1
Objectives	engineering perspe		4	. 1.		1	1	- C C		
(Minimum	2. To Enable the stud					wie	ige	oi iu	inction	ing of an
3)	ecosystem and ide 3. To introduce with					nd 1	mac	hani	eme ral	ated to
	it.	me concepts (or gene	Juc	.8 a	iiiu i	HCC.	Haili	81118 161	aled to
CO1	Discuss biological science	s its scope an	d pers	nec	tiv	es				
	Discuss ofotogical science.	s, its scope an	ia pers	PCC	, t. 1 V	.				
CO2	Discuss regarding the identification of organisms	•	energet	ics	,	its	WO	rkinş	g mec	hanism,
CO3	Analyze the mechanism generation.		of c	haı	rac	ter	froi	n p	arent	to next
CO4	Explain the genetic code as	nd production	of pro	tei	ns.					
CO5	Interprets the relation betw						ces	ses c	of our b	ody
Unit-No.	Content		Conta Hou					rnir	_	BL
I	Introduction		10]				ogical	1,2,5
	 Importance and s 	cope of							scope	
	Biology as an im	•				and	per	spec	tives	
	scientific discipli	ne.								
	 Branches of biolo 	ogical								
	sciences.									
	 Fundamental diff 									
	between science	and								
	engineering.	_								
	Comparison betw									
	working mechani	•								
	and camera, Bird and aircraft.	Hying								
		votions of								
	 Biological observers 18th century that 									
	major discoveries									
	world	, in the								
	Steps in scientific	c research								
	works.									
	Brownian motion	ı in								
	biological science	es.								
II	Classification & Ecology	y	10			Disc	cuss	rega	arding	2,3
		_				th	e ec	olog	gical	
	Classification of organis					er	erg	etics	s, its	
	of classification: Morpho	logical,					_	rkin		
	I .								~	ı

	biochemical or ecological, level of		mechanism,	
	organization, symmetry, germ layer organization, segmentation, notochord.		identification of organisms.	
	 Concept of unicellular and multicellular organisms; prokaryotes and eukaryotes; Habitat & Adaptations. Concept of Ecosystem: Structure & Function. Energy flow in an ecosystem: Lindemann ten percent law. Types of excretion: Ammonotelism, Ureotelism and Uricotelism. 			
	 Animal Kingdom: Characters of phylum with examples. Model organisms for the study of biology come from different groups. E. coli, S.cerevisiae, D. Melanogaster, C. elegance, A. Thaliana, M. musculus 			
III	Genetics & Biomolecules Concept of Allele; Dominance & Recessive; Monohybrid, Dihybrid & Trihybrid cross; Mitosis & Meiosis. Mendel's laws, Concept of Segregation and Independent assortment. Concept of co-dominance and incomplete dominance with illustrations. Sex determination in human. Genetic disorders in human beings. DNA & RNA as genetic material. Enzymes: Classification; Mechanism of enzyme action	6	Analyse the mechanism of transfer of character from parent to next generation.	2,6

IV	Information Transfer & Metabolism •Genetic code: Properties •Structure of DNA •Concept of recombination and crossing over •Proteins: Primary secondary, tertiary and quaternary structure. •Concept of Central dogma •ATP as an energy currency of cell. •Concept of docking: Protein Ligand interaction	4	Explain the genetic code and production of proteins	1,3
V	 Physiology Human Circulatory System: Heart and its working mechanism; Blood groups; Erythroblastosis fetalis Neuroendocrine system of human: Endocrine glands and their functions. Human Excretory system: Structure of Kidney and Nephron Nervous system of human: Structure of neuron; Resting Membrane Potential; Origin and conduction of nerve impulse. Human Respiratory System: 4Structure of lungs and exchange of gases. Human digestive enzymes: Components and enzymes. Mechanism of muscle contraction. 	6	Interprets the relation between various physiological processes of our body	2,3,5

- 1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- 2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- 3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company

REFERENCE BOOKS:

- 1. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS PuBLisher
- 2. Microbiology, Prescott, L.M J.P. Harley and C.A. Blein 1995. 2nd edition Wm, C.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Discuss biological sciences, its scope and perspectives.	7,12				
2	Discuss regarding the ecological energetics, its working mechanism, identification of organisms.	7,12				
3	Analyse the mechanism of transfer of character from parent to next generation.	8,9				
4	Explain the genetic code and production of proteins.	8,9				
5	Interprets the relation between various physiological processes of our body	7,12				

	SEMESTER – III										
Course Title		Mather	natics III (PD)	E, Probak	oility ar	nd St	atis	stic	es)		
Course code	22BT	TME212R	Total ci	edits: 4	L	T	P	S	R	O/F	C
			Total h	ours:	4	0	0	0	0	0	4
			40T								
Pre-requisite		Nil	Co-re	quisite		•		N	il		
Programme		Bachelo	r of Technolog	y in Mec	hanica	l Eng	ine	eri	ing		
Semester		Fall/ III	semester of se	cond yea	r of the	e pro	gra	mı	me		
Course	1. To in	ntroduce the	e solution meth	odologies	for sec	ond o	ord	er l	Part	tial Di	fferential
Objectives	Equa	ations with	applications in	engineeri	ng.						
(Minimum	2. To i	introduce t	he solution m	ethodolog	gies of	initi	al a	anc	l b	ounda	ary value
3)	prob	lems.									
	3. To in	ntroduce the	e solution meth	odologies	of ranc	lom v	ari	abl	es.		
	4. To p	rovide an o	verview of pro	bability to	engine	ers.					
	5. To p	rovide an o	verview of stat	istics to e	ngineer	s.					
CO1	Enable to so	lve fields p	roblems in engi	neering in	nvolving	g PDI	Es.				
CO2	Enable to so	lve fields p	roblems in engi	neering ir	nvolving	g PDI	Es.				
CO3	Enable to for	rmulate and	l solve problem	s involvin	g rando	om va	ıria	ble	S		
CO4	Enable to solve problems of various probability distribution.										
CO5	Analyzing ex	Analyzing experimental data by applying statistical methods.									
Unit-No.		Cor	ntent		Conta	act	I	∠ea	rni	ng	BL
					Hou	ır	_()ut	coı	me	

I	Partial Differential Equation:	8	To solve	1,2
	First order partial differential equations,		fields	,
	solutions of first order linear and non-linear		problems in	
	PDEs, Solution to homogenous and non-		engineering	
	homogenous linear partial differential		involving	
	equations second and higher order by		PDEs.	
	complimentary function and particular			
	integral method. Flows, vibrations and			
	diffusions, second-order linear equations and			
	their classification.			
II	Initial and Boundary value problem:	10	To solve	2,3,4
	Initial and boundary conditions (with an		fields	
	informal description of well-posed problems),		problems in	
	D'Alembert's solution of the wave equation;		engineering	
	Duhamel's principle for one dimensional		involving	
	wave equation. Separation of variables		PDEs.	
	method to simple problems in Cartesian			
	coordinates. The Laplacian in plane,			
	cylindrical and spherical polar coordinates,			
	and solutions with Bessel functions and			
	Legendre functions. One dimensional			
	diffusion equation and its solution by			
	separation of variables.			
III	Basic Probability:	8	To formulate	2,3,4,5
	Probability spaces, conditional probability,		and solve	
	independence; Discrete random variables,		problems	
	Independent random variables, the		involving	
	multinomial distribution, Poisson		random	
	approximation to the binomial distribution,		variables	
	infinite sequences of Bernoulli trials, sums of			
	independent random variables; Expectation of			
	Discrete Random Variables, Moments,			
	Variance of a sum, Correlation coefficient,			
	Chebyshev's Inequality.			
IV	Continuous Probability Distributions:	5	To solve	5,6
	Continuous random variables and their		problems of	
	properties, distribution functions and		various	
	densities, normal, exponential and gamma		probability	
	densities. Bivariate distributions and their		distribution.	
	properties, distribution of sums and quotients,			
	conditional densities, Bayes' rule.			

	Basic Statistics:	9	Analyzing	5,6
	Measures of Central tendency: Moments,		experimental	
	skewness and Kurtosis - Probability		data by	
	distributions: Binomial, Poisson and Normal -		applying	
	evaluation of statistical parameters for these		statistical	
	three distributions, Correlation and regression		methods.	
	 Rank correlation. 			
	Curve fitting by the method of least squares-			
V	fitting of straight lines, second degree			
V	parabolas and more general curves. Test of			
	significance: Large sample test for single			
	proportion, difference of proportions, single			
	mean, difference of means, and difference of			
	standard deviations. Test for single mean,			
	difference of means and correlation			
	coefficients, test for ratio of variances - Chi-			
	square test for goodness of fit and			
	independence of attributes.			

Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley &

Sons, 2006.

2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition,

2000.

REFERENCE BOOKS:

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Enable to solve fields' problems in engineering involving PDEs.	1,2,4							
2	Enable to solve fields' problems in engineering involving PDEs.	1,3,4							
3	Enable to formulate and solve problems involving random variables	1,2,4							
4	Enable to solve problems of various probability distributions.	1,2,4							

5	Analysing experimental data by applying statistical	1,2,4
	methods.	, ,

			SEMESTER	R – III								
Course Ti	itle		Basic Elec	ctronics E	ics Engineering							
Course co	de	22BTME213R	Total credits: 3	L	T	P	S	R	O/F	C		
			Total hours: 36T	3	0	0	0	0	0	3		
Pre-requi	site	Nil	Co-requisite				N	il	•			
Programm	ne		Bachelor of Technolo	ogy in Mo	echar	nical En	gineeı	ing				
Semester			Fall/ III semester o	f 2nd yea	r of t	the prog	gramn	1e				
Course		1. To provide an over	rview of electronic dev	ice compo	onent	s to Med	chanic	al engii	neering stud	ents		
Objective	S	2. To provide an over	rview of Basic knowled	dge of Dig	gital e	lectroni	cs					
(Minimun			rview of communicatio									
CO1		Uses of the Diode and	d Transistors in various	s Circuits.								
CO2		Operations of the OP	AMP in various kinds	of Circuit	s.							
CO3		Applications of IC 55	55 timer circuit.									
CO4		Determination of the	Fundamentals of Digit	al Electro	nics.							
CO5		Summarization of the	e basics of Electronic C	Communic	ation	System	s.					
Unit-		Conte	nt	Contac	t	Le	arnin	g Outc	ome	BL		
No.				Hour								
Ι	Sem	iconductor Devices	and Applications:	5		o prov				1,2		
		•	ction Diode and V-I						ponents to			
		racteristics, Half wave and Full-wave			M	echanic	al engi	neering	g students			
		etifiers, capacitor filter. Zener diode and its										
		aracteristics, Zener diode as voltage										
	_	lator. Regulated power										
		XX and 79XX series, Introduction to BJT,										
		input-output and transfer characteristics,										
			amplifier, frequency									
***	_	onse and bandwidth.	1 '4 1' 4'	_	T			1 1'.00	2	1.2		
II	_	-	and its applications:	5					Ferent types Electronics	1,2		
		ntroduction to operational amplifiers, Op- mp input modes and parameters, Op-amp				ngineeri		iseu iii	Electronics			
	_	•	ation, op-amp with			igineen	ng					
			dy of practical op-									
	_		and non-inverting									
	_	lifier applications										
	_		unity gain buffer,									
		parator, integrator a										
III			Oscillators: RC-	10	To	summ	arize t	he diff	erent types	1,2		
		iming circuits, IC 555 and its applications							Electronics			
	as s	s stable and mono-stable multi-vibrators,			Eı	ngineeri	ng					
pos		ositive feedback, Barkhausen's criteria for										
osc		llation, R-C phase	e shift and Wein									
	brid	ge oscillator.										
IV	Digi			8		•			w of Basic	1,2		
			nalogy and digital		kn	owledg	e of D	igital e	lectronics			
	sign	als, Boolean alg	gebra, Basic and									

	Universal Gates, Symbols, Truth tables, logic expressions, Logic simplification using K- map, Logic ICs, half and full adder/subtractor, multiplexers, demultiplexers, flip-flops, shift registers, counters, Block diagram of microprocessor/microcontroller and their			
V	applications. Electronic Communication Systems:	8	To provide an overview of	1,2
	The elements of communication system, IEEE frequency spectrum, Transmission media: wired and wireless, need of modulation, AM and FM modulation schemes, Mobile communication systems: cellular concept and Block diagram of GSM system.		communication system	

1. Basic Electrical Engineering by Mehta V.K. & Mehta Rohit

REFERENCES BOOK:

1. Basic Electronics, B.L Thereja

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Uses of the Diode and Transistors in various Circuits.	2,3&4						
2	Operations of the OPAMP in various kinds of Circuits.	1,2&4						
3	Applications of IC 555 timer circuit.	1,2&4						
4	Determination of the Fundamentals of Digital Electronics.	3,4,5						
5	Summarization of the basics of Electronic Communication Systems.	5,6						

	SEM	IESTER – III							
Course Title		Engineering Mo	echanic	es					
Course code	22BTME214R	Total credits:	L	T	P	S	R	O/F	С
		3	2	1	0	0	0	0	3
		Total hours:							
		36T							
Pre-	Nil	Co-requisite				Ni	l		
requisite									
Programme	Bachelor of T	echnology in M	echanic	al E	ngi	nee	rin	g	
Semester	Fall/ III seme	ster of second ye	ear of t	he p	rog	ran	nm	e	
Course	1. Confidently tackl	e equilibrium	equatio	ns,	moı	mei	nts	and	inertia
Objectives	problems.								
(Minimum	2. Master calculator/		c skills	s to	use	e t	o a	idvant	age in
3)	solving mechanics	•							
	3. Gain a firm found	-	ering M	[echa	nics	s fo	or f	urther	ing the
	career in Engineeri								
CO1	Use scalar and vector		niques	for	an	aly	zin	g for	ces in
	statically determinate str								
CO2	Apply fundamental conce		es and l	kinet	ics	of	pai	rticles	to the
002	analysis of simple, practica	•							
CO3	Apply basic knowledge	of mathematics	and pl	nysic	s to	O S	olv	e real	-world
004	problems.	1		•		c		1 1	
CO4	Understand basic structural	<u>*</u>							
CO5	Understanding the concept	s of Virtual Wo	rk and	intro	auc	2110	n to) Kine	etics of
	Rigid Bodies		C4-	4			•		
Unit-No.	Content		Conta				rni	_	BL
I	Introduction to	E sin sanin s	Hou 7				tcor		2.2
1	Introduction to Mechanics covering:	Engineering	/					stand tems,	2,3
	Force Systems Basic con	ncante Particla			resi		•	tems,	
	equilibrium in 2-D & 3-	-						m of	
	equilibrium; System of Fo				fore			111 01	
	Concurrent Forces, C				equ			of	
	Space – Resultant- Mon				-			m of	
	and its Application;				Cop			111 01	
	Resultant of Force System	_			sys	-			
	of System of Forces	-			595	.011			
	diagrams, Equations of	•							
	Coplanar Systems and S	-							
	Static Indeterminacy	pariar Systems,							
1	~ tadio indeterminacy								I

II	Friction covering & Mechanical	7	To understand	2,3
	Vibrations covering:		Friction	
	Types of friction, Limiting friction,		covering and	
	Laws of Friction, Static and Dynamic		Mechanical	
	Friction; Motion of Bodies, wedge		Vibrations	
	friction, screw jack & differential screw		covering	
	jack			
	Basic terminology, free and forced			
	vibrations, resonance and its effects;			
	Degree of freedom; Derivation for			
	frequency and amplitude of free			
	vibrations without damping and single			
	degree of freedom system, simple			
	problems, types of pendulum, use of			
	simple, compound and torsion			
	pendulums.			
III	Basic Structural Analysis covering &	7	To understand	2,4
	Review of particle dynamics:		basic	
			structural	
	Equilibrium in three dimensions;		analysis	
	Method of Sections; Method of Joints;		covering and	
	How to determine if a member is in		review of	
	tension or compression; Simple Trusses;		particle	
	Zero force members; Beams & types of		dynamics	
	beams; Frames & Machines;			
	Rectilinear motion; Plane curvilinear			
	motion (rectangular, path, and polar			
	coordinates). 3-D curvilinear motion;			
	Relative and constrained motion;			
	Newton's 2nd law (rectangular, path,			
	and polar coordinates). Work-kinetic			
	energy, power, potential energy.			
	Impulse-momentum (linear, angular);			
	Impact (Direct and oblique).			
IV	Centroid and Centre of Gravity	8	To understand	3,4,5
	covering:		the concept of	
			Centroid and	
	Centroid of simple figures from first		Centre of	
	principle, centroid of composite		Gravity.	
	sections; Centre of Gravity and its			
	implications; Area moment of inertia-			
	Definition, Moment of inertia of plane			
	sections from first principles, Theorems			
	of moment of inertia, Moment of inertia			
	of standard sections and composite			
	sections; Mass moment inertia of			
	The state of	<u> </u>		

	circular plate, Cylinder, Cone, Sphere, Hook			
V	Virtual Work and Energy Method &	7	Understanding	2,3,4
	Introduction to Kinetics of Rigid		the concepts	
	Bodies covering:		of Virtual	
			Work and	
	Virtual displacements, principle of virtual work for particle and ideal system		introduction to Kinetics of	
	of rigid bodies, degrees of freedom.		Rigid Bodies	
	Active force diagram, systems with		ragia Boales	
	friction, mechanical efficiency.			
	Conservative forces and potential energy			
	(elastic and gravitational), energy			
	equation for equilibrium. Applications of			
	energy method for equilibrium. Stability			
	of equilibrium			
	Basic terms, general principles in			
	dynamics; Types of motion,			
	Instantaneous centre of rotation in plane			
	motion and simple problems;			
	D'Alembert's principle and its			
	applications in plane motion and			
	connected bodies; Work energy principle			
	and its application in plane motion of			
	connected bodies; Kinetics of rigid body rotation			
	TOTATION			

Text Books:

- 1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
- 2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I Statics, Vol II, Dynamics, 9th Ed, Tata McGraw Hill

Reference Books:

1. R. C. HibBLer (2006), Engineering Mechanics: Principles of Statics and Dynamics Pearson Press.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Use scalar and vector analytical techniques for analysing forces in statically determinate structures.	1,2,3&4
2	Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.	1,2,3&4
3	Apply basic knowledge of maths and physics to solve real-world problems.	3,4
4	Understand basic structural analysis covering and review of particle dynamics	3,4
5	Understanding the concepts of Virtual Work and introduction to Kinetics of Rigid Bodies	3,4

	SEM	IESTER – III							
Course Title		Thermodyna	mics						
Course code	22BTME215R	Total credits:	L	T	P	S	R	O/F	C
		3	2	1	0	0	0	0	3
		Total hours:							
		36T							
Pre-	Nil Co-requisite Nil								
requisite									
Programme	Bachelor of Technology in Mechanical Engineering								
Semester	Fall/ III seme	Fall/ III semester of second year of the programme							
Course	1. To learn about we	ork and heat int	eraction	ıs, ar	nd b	ala	nce	of er	nergy
Objectives	between system an	d its surrounding	s.						
(Minimum	2. To learn about ap	plication of I la	aw to v	ariou	is e	ner	gy	conve	rsion
3)	devices.								
	3. To evaluate the	changes in prop	perties	of s	ubst	anc	es	in va	rious
	processes.								
	4. To understand the	e difference bety	ween hi	igh g	grade	e a	nd	low g	grade
	energies and II law	limitations on er	nergy co	nver	sion				
	After completing this co	urse, the studen	nts will	be a	ble	to	app	oly en	ergy
CO1	balance to systems and	control volume	es, in s	ituat	ions	ir	ivo	lving	heat
	and work interactions								
CO2	Students can evaluate chan	ges in thermodyn	amic pr	opert	ties (of s	subs	stances	S.
CO3	The students will be able	to evaluate the p	erforma	ance	of e	nei	gy	conve	rsion
CO3	devices								
CO4	The students will be able	to differentiate b	etween	high	gra	de	and	low	grade
	energies								
CO5	The students will unders		_	-					-
	unavailability, Exergy anal	ysis, Brayton cyc							ele
Unit-No.	Content		Conta				rniı	_	BL
			Hou				con	ne	
I	Fundamentals - System		7		Stud			can	2,3
	volume; Property, State &				eval				
	& Inexact differentia	*			char	-		in	
	Thermodynamic definiti						•	amic	
	examples; Displacemen				prop			of	
	dependence of displacer				subs	tan	ices	•	
	illustrations for simp								
	electrical, magnetic, grav	itational, spring							
	and shaft work.								

II	Temperature, Definition of thermal	7	The students	22
11		/		2,3
	equilibrium and Zeroth law; Temperature		will be able to	
	scales; Various Thermometers-		evaluate the	
	Definition of heat; examples of heat/work		performance of	
	interaction in systems- First Law for		energy	
	Cyclic & Non-cyclic processes; Concept		conversion	
	of total energy E; Demonstration that E		devices	
	is a property; Various modes of energy,		devices	
	Internal energy and Enthalpy	_		
III	Definition of Pure substance, Ideal Gases	7	To understand	3,4
	and ideal gas mixtures, Real gases and		the properties	
	real gas mixtures, Compressibility charts-		of pure	
	Properties of two phase systems - Const.		substance	
	temperature and Const. pressure heating			
	of water; Definitions of saturated states;			
	P-v-T surface; Use of steam tables and			
	R134a tables; Saturation tables;			
	Superheated tables; Identification of			
	states & determination of properties,			
	Mollier's chart			
IV	First Law for Flow Processes -	8	To understand	3,4
	Derivation of general energy equation for		the concept of	- ,
	a control volume; Steady state steady		Centroid and	
	1			
	flow processes including throttling;		Centre of	
	Examples of steady flow devices;		Gravity.	
	Unsteady processes; examples of steady			
	and unsteady I law applications for			
	system and control volume			
V	Clausius inequality; Definition of entropy	7	Understanding	3,4
	S; Demonstration that entropy S is a		the concepts of	
	property; Evaluation of S for solids,		Virtual Work	
	liquids, ideal gases and ideal gas		and	
	mixtures undergoing various processes;		introduction to	
	Determination of s from steam tables-		Kinetics of	
	Principle of increase of entropy;		Rigid Bodies	
	Illustration of processes in T-s			
	coordinates; Definition of Isentropic			
	efficiency for compressors, turbines and			
	nozzles- Irreversibility and Availability,			
	Availability function for systems and			
	Control volumes undergoing different			
	processes, Lost work. Second law			
	analysis for a control volume. Exergy			
	balance equation and Exergy analysis,			
	Thermodynamic cycles - Basic Rankine			
	cycle; Basic Brayton cycle; Basic vapor			
	compression cycle and comparison with			
	compression cycle and comparison with			

Carnot cycle		

- 1. Sonntag, R. E, Borgnakke, C. and Van Wylen, G. J., 2003, 6th Edition, Fundamentals of Thermodynamics, John Wiley and Sons.
- 2. Jones, J. B. and Duggan, R. E., 1996, Engineering Thermodynamics, Prentice-Hall of India

REFERENCE BOOKS:

- 1. Moran, M. J. and Shapiro, H. N., 1999, Fundamentals of Engineering Thermodynamics, John Wiley and Sons.
- 2. Nag, P.K, 1995, Engineering Thermodynamics, Tata McGraw-Hill Publishing Co. Ltd

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome

1	After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions	1,2&3
2	Students can evaluate changes in thermodynamic properties of substances.	2,3&4
3	The students will be able to evaluate the performance of energy conversion devices	1,3&4
4	The students will be able to differentiate between high grade and low grade energies	2,3&4
5	The students will understand Clausius Inequality, Entropy, Availability, unavailability, Exergy analysis, Brayton cycle, Rankine cycle, Carnot cycle	1,3&4

		SEMES'	TER – II	[
Course Title	7	Гесhnо р	rofession	al Sl	cills I	Ι			
Course code	22BTME216R	Total cre	dits: L	T	P	S	R	O/F	С
	2	2	0	0	2	0	0	0	1
	П	Γotal hoι	ırs:						
	2	20P							
Pre-requisite	Nil	Co-requ	isite				Nil		
Programme	Bachelor of Technol	ogy in M	lechanica	l Eng	ginee	ring			
Semester	Fall/ III semester of	second y	ear of the	e pro	gram	ıme			
Course	1. This course	will help	p the stu	dents	s to	learn	abo	ut the di	fferent
Objectives	engineering gr	raphical v	view in 2I	as v	vell a	s 3D.			
(Minimum	Different type	es of mad	chining p	roces	ses u	sed i	n the	industry	can be
3)	learnt through	this cour	rse						
	3. Learn the imp								
CO1	Illustrate various pr	rojected	views of	f obj	ects	of e	ngine	ering gra	aphics
	and design.								
CO2	Demonstrate various n					shop.			
CO3	Learn real time application								
CO4	Encourage the student								
CO5	Effectively communic	ate scien	tific and t	echn	ical k	nowl	edge i	in a profes	ssional
	manner	-							
Unit-No.	Content		Contact		Lea	ırnin	g Out	tcome	BL
			Hour						
I	Different types	of	5		llustr			various	1,2
I	projected view	in		p	rojec	ted		ws of	1,2
I	• 1	in		p o	rojec bject	ted s of	eng	ws of ineering	1,2
	projected view engineering applicati	in on.		p o g	rojec bject raphi	ted s of ics ar	eng	ws of ineering	
I	projected view engineering applicati Different types	in		p o g	rojec bject raphi Demor	ted s of ics an	eng nd des	ws of ineering sign.	1,2
	projected view engineering applicati	in on.	5	p o g D	roject bject raphi Demor nachin	eted s of ics ar istrat ning	eng	ws of ineering sign.	
II	projected view engineering applicati Different types machining processes	on.	7	p o g D	rojec bject raphi Demor	eted s of ics an istrat ning nop.	eng nd der e proce	ws of ineering sign. various esses in	1,2
	projected view engineering applications Different types machining processes Applications of logical services applications.	on.	5	p o g C m w	roject bject raphi Demor nachin vorksh earn	eted s of ics ar instrat ning nop.	eng nd des e proce	ws of ineering sign. various esses in time	
II	projected view engineering applicati Different types machining processes	on.	7	p o g C m w L aj	roject bject raphi emor pachin orksh earn pplica	s of ics an istrations	eng nd des e proce	ws of ineering sign. various esses in	1,2
III	projected view engineering applicati Different types machining processes Applications of logicoding	on. of c and	7	p o g E m w L ap co	roject bject raphi Demon achin vorksh earn pplica oding	eted s of ics an instrat ning nop.	engend des	ws of ineering sign. various esses in time ogic and	3,4
II	projected view engineering applications Different types machining processes Applications of logicoding Critical thinking	on.	7	p o g E m w L and co	roject bject raphi Demon nachin vorksh earn pplica oding	eted s of ics an istrat ning nop.	e processed of 1	ws of ineering sign. various esses in time ogic and students	1,2
III	projected view engineering applicati Different types machining processes Applications of logicoding	on. of c and	7	p o g C m w L a j c t t t t	roject bject raphi Demon nachin vorksh earn pplica oding	s of ics an istrations.	e processed of 1	ws of ineering sign. various esses in time ogic and	3,4
III IIV	projected view engineering applications. Different types machining processes. Applications of logicoding. Critical thinking learning.	on. of c and and	7 3	p o g D m w L a p c ttt	roject bject raphi Demon achin vorksh earn pplica oding ncous	eted s of ics an instrations in ing in ing in ing in ing in ing in ing in ing in ing in ing ing	real the Non-tri	ws of ineering sign. various esses in time ogic and students raditional	3,4
III	projected view engineering applications Different types machining processes Applications of logicoding Critical thinking learning Communication in	on. of c and and	7	p o g E m w L a c c t t t E	roject bject raphi Demon nachin vorksh earn pplica oding ncous oward ninkir	etted s of ics an instrat ning nop. ations rage ls ling vely	real the Non-tri	ws of ineering sign. various esses in time ogic and students raditional municate	3,4
III IIV	projected view engineering applications. Different types machining processes. Applications of logicoding. Critical thinking learning. Communication in scientific and professions.	on. of c and and	7 3	p o g D m w L ap co th	rojecto bjecto raphicachin rachin rockshearn pplicaching raching raching raching rachinkir affecticienti	eted s of ics an instrat ning nop. rage ls I	real the Non-triand	ws of ineering sign. various esses in time ogic and students raditional municate technical	3,4
III III	projected view engineering applications Different types machining processes Applications of logicoding Critical thinking learning Communication in	on. of c and and	7 3	p o g E to th	roject bject raphicaching orkslearn pplicaching oward minkir offection oward feeting o	eted s of ics an istrat ning nop. ations rage ls li ig vely fic edge	real the Non-triand	ws of ineering sign. various esses in time ogic and students raditional municate technical in a	3,4

1. Workshop Technology, Hazra and Choudhury

REFERENCE BOOKS:

1. Fundamentals of C programming, by Abubeker K M

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Illustrate various projected views of objects of engineering graphics and design.	1,2,3&4
2	Demonstrate various machining processes in workshop.	1,2,3&4
3	Learn real time applications of logic and coding	3,4
4	Encourage the students towards Non-traditional thinking	3,4
5	Effectively communicate scientific and technical knowledge in a professional manner	3,4

G Titl	SEMESTER – III CO-CURRICULAR ACTIVITIES								
Course Title	22LID.CC211						ъ	O/E	
Course code	22UBCC211	Total credits: 1 Total hours: 10P	L 0	T 0	P 0	S 4	R 0	O/F 0	1 C
Pre-requisite	Nil	Co-requisite		•	1 0	-	il		
Programme									
Semester	Fall/ III semester of first year of the programme								
Course									
Objectives	_	eds of the students and	coveri	ing a	broad/w	ide ra	nge of	their abiliti	es and
(Minimum	talents.								
3)			1				•.•	11 .1 . 1	
		nterests in the students	ana pro	ovide 6	equal op	portun	ities to	all the stud	ents to
	participate								
	3. To enhance the le	earning experience of the	e stude:	nts an	d help in	n recog	nizing	and develor	oing
		n as leadership qualities,			•	_			: 0
CO1		ill be able to analyze an						ious co-curi	icular
	1	to their academic curricu							
CO2		will be able to organiz					, exhib	itions, and	guest
		deeper understanding of							
CO3		its will be able to demon	nstrate	ımpro	ved soft	t skills	and ap	titude by ac	tively
CO4	<u> </u>	ed tests and activities. Vill develop the ability t	o inder	andar	ntly plan	and i	mnlama	ant program	e that
CO4		ge of ideas and informati				i and i	прит	ont program	.s triat
CO5		will evaluate the impac				ctivitie	s on th	neir persona	ıl and
		particularly in terms of							
Unit-No.	Co	ntent	Cont Hot				earning Outcome		BL
I	AdtU has included	co-curricular activities	10		Engage	e in ma	ındatory	y co-	1,2,
	as an integral and	mandatory part of the			curricu		•		3,4,
	~	nim to encourage team			teamwo				5
	work and the spirit	of self-reliance among						ng of the	
	the students. Stud	ents will plan and			curricu		_	ove organizing	
	organize various pro	grams like Workshop,			and par				
	Project Exhibition,	Guest Lectures, Soft-			program				
	skill and Aptitude	Test etc. These							
	activities will provide	le a common platform							
	for the students to	exchange ideas and							
	information on the	copics of their interest							
	e.g. curriculum, e	mployment / higher							
	educational oppo	rtunities, emerging							
	trends, new deve	elopment etc. Such							
	activities will	enhance the							
	understanding ar	nd the degree of							
	association of s	tudents with their							
	prescribed curricul	um and help them							
	perform better f	rom a 360 degree							
	perspective.								
	^	rom a 360 degree							

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze: Students will be able to analyze and evaluate the effectiveness of various co-curricular activities in relation to their academic curriculum.	1,3
2	Organize: Students will be able to organize and execute workshops, exhibitions, and guest lecturers that foster a deeper understanding of their academic subjects.	3,4,7
3	Demonstrate: Students will be able to demonstrate improved soft skills and aptitude by actively participating in related tests and activities.	6,8
4	Develop: Students will develop the ability to independently plan and implement programs that promote the exchange of ideas and information among peers.	4,6
5	Evaluate: Students will evaluate the impact of co- curricular activities on their personal and professional growth, particularly in terms of employment and higher education opportunities.	7,11

			MESTER -							
Course Title			RA-CURRI						,	
Course code	22UBEC2111	Total credit		L	T	P	S	R	O/F	С
		Total hours		0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requ						Nil		
Programme			Tech Mec							
Semester		Fall/ III se		first <u>y</u>	year of	the pr	ogram	me		
Course	1. To develop soft			_						
Objectives	2. To promote a ho	_								
(Minimum 3)	3. To enhance the l						11.00			
CO1	The students will be music, photography			t1V1 t 16	es head	ed und	er diffe	erent cl	ubs namely	dance,
CO2	The students will pa interest and hobbies		gular club a	ctivit	ies like	worksl	nops, c	competi	tions as per	their
CO3	The students will b level competitions.	e trained to re	epresent Al	OTU	in vari	ous int	er uni	versity,	state and n	ational
CO4	The students will be	given a platfo	orm to earn	from	invited	l expert	s in th	eir resp	ective fields	
CO5	The students will g growth along with the	•	e of 360 de	gree	learnin	ig meth	odolog	gy cons	idering the	overall
Unit-No.	Conten	t	Contact Hour	t		Lear	ning (Outcom	ne	BL
I	Different types of outside regular curri		10		outside to me activities social holistic 2. Kee learning engage under dephotogrammer of the particip workshinterest 4. The trained Universe compet 5. Rene conduction membe the plat	the reget leaders are and so developing in general din did in ular corner's aimed ft skil pment in mino odolog fferent clubs drama, ints air regulompeti bbies. membert Addent a ersonal shops student learn	intered to d ls and of the l d the st activity viz. Da literary re encour club tions a turn of the lities are that lats by g	of activities in intended est. These evelop the promote a earners. 360 degree students are ties headed ince, music, etc. ouraged to activities, is per their the club are arious intertional level e invited to benefit the giving them aperts in the		

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The students will be engaged in different activities headed under different clubs namely dance, music, photography, drama, literacy, etc	1,3
2	The students will participate in regular club activities like workshops, competitions as per their interest and hobbies.	3,4,7
3	The students will be trained to represent ADTU in various inter university, state and national level competitions.	6,8
4	The students will be given a platform to earn from invited experts in their respective fields.	4,6
5	The students will get an exposure of 360 degree learning methodology considering the overall growth along with the academics.	7,11

				SEMESTER	2 – III						
Course	Title		En	glish for Emp	oloyabili	ity for	Engi	neers			
Course	code	22UBPD213R	Total c	redits: 2	L	T	P	S	R	O/F	C
			Total h	ours: 30T	0	0	4	0	0	0	2
Pre-rec		Nil	Co-req		Nil						
Progra		Bachelor of Techno	••								
Semest		Fall: Winter/ III se									
Course				dents with mas	-		_	_			
Object				its to commun	icate cor	nfiden	tly wit	h a foc	cus o	n listeni	ng
(Minin	1um 3)	and speaking			_					_	
		3. With the hel	_		onetics,	the sti	udents	will b	e aB	Le to	
		pronounce w									
				lly and with d		• .	1 .	C' 1			1: 1 6 11
C	D1	The mastery of Basic	_	n grammar wil	I make t	he stu	dents	confide	ent to	use En	glish for all
		professional purpose		S-1114-4-4 1 1 4	1		11 1 1.	. 41	1		C. 1
CC)2	The communication successful conversati		acintated in t	ms cour	rse wi	ii neij	men	ı maı	ke meai	ningiui and
CO)2	The students will have		nommunication	n improx	rad in	all da	moins			
		Develop and deliver			_					oring la	nguaga and
CO)4	communication techn	_	ionai presenta	mons us	mg ap	ppropr	iate ci	iginic	aring rai	iiguage aiiu
		Analyze and adapt of	_	ication strates	ries for	diver	se eno	ineerir	10 W	orknlace	ccenarios
CO)5	demonstrating cross-			gies for	uivei	se eng	meem	ıg w	открисс	sectiatios,
Unit-		Content	Cartarar	Contact		Le	arnin	g Outo	come		BL
No.		Content		Hour				5 0 411			
I	Parts o	f Speech		5	In this	modu	le, stu	dents	will	master	the 1, 2
	Article	•			foundat	tional	eleme	nts of	gram	ımar. Tl	ney
	Auxilia	ary Verbs			will e	explore	e the	part	s o	f spee	ch,
	Affirm	ative and Negative			includi	ng 1	nouns,	pro	noun	s, ver	bs,
	Senten	ces			adjectiv	ves,	adv	erbs,	pr	epositio	ons,
					conjunc	ctions,	,	and	in	terjectio	ns.
					Unders		•				and
										age will	
					•					earn ab	
						•				in form	•
										he mod	
										ruction	
					affirma		and	negati		sentenc	· ·
									_	nmatica	шу
II	Detern	niners		5	Correct					odule v	vill 2, 3,
11		ce Construction		3	delve	-		rminei			neir 2, 3,
		of Sentences (Asserti	ve							dents v	
		tive, etc.)	,							techniq	
	_	of Comparison								senten	
	_	ehension Exercises								gative, a	
	Compi				(3330111	, 111	-r -r uu	, 1110		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	

	T	Т	T	
III	What is listening?	5	exclamatory). The concept of the degree of comparison (positive, comparative, and superlative) will be explored. The module will also include comprehension exercises designed to enhance students' ability to understand and interpret written texts effectively Students will be introduced to the	1, 2,
	The Process of Listening Factors that adversely affect Listening Difference between Listening and Hearing, Purpose and Importance of Effective Listening How to Improve Listening Process.		fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	3, 4
IV	Introducing yourself Self-discovery Basics of Phonetics, pronunciation Extempore speech Video Recording for Self reflection	10	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	Introduction to Communication, Importance of Communication Skills, Purpose of Communication, Types of Communication, Formal and informal communication Importance of Communication, Barriers to Communication, How to improve/ tips to improve Communication skills. Responding to different questions in various situations (formal/informal)	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of communication, distinguishing between formal and informal contexts. Students will learn about the importance of communication skills and the barriers that can impede effective communication. Tips and strategies to improve communication skills will be provided. The module will also include exercises on responding to different questions in various situations, enhancing students' adaptability and effectiveness in both formal and informal interactions.	2, 3, 4, 5

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011.Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first edition, S. Chand & Delhi.

REFERENCE BOOKS:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2. Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Blett

OTHER LEARNING RESOURCES:

1. https://youtu.be/bEB8-SWMYhI

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
	The mastery of Basic English grammar will make the	
1	students confident to use English for all professional	6,10
	purposes.	
	The communication skills facilitated in this course	
2	will help them make meaningful and successful	6,10
	conversations.	
3	The students will have their communication	6,10
	improved in all domains.	0,10
	Develop and deliver professional presentations using	
4	appropriate engineering language and	6,10
	communication techniques.	
	Analyze and adapt communication strategies for	
5	diverse engineering workplace scenarios,	6,10
	demonstrating cross-cultural competence.	

	SEMESTER – III										
Course Title			Basic Life	e Savin	g Skil	lls					
Course code	22UULS212R	Total credi	ts: 1	L	T	P	S	R	O/F	C	
		Total hour	s: 15T	0	0	2	0	0	0	1	
Pre-requisite	Nil	Co-requisi		Nil							
Programme	Bachelor of Techno										
Semester	Fall: Winter/ III ser										
Course	1. Equip studer	nts with e	essential k	nowled	lge a	and s	kills	in b	asic li	ife-sav	ing
Objectives	techniques, in	cluding CF	PR and first	t aid.							
(Minimum 3)	2. Develop the ab	oility to asse	ess emergen	cy situa	ations	and r	espond	l effe	ctively	to vari	ous
	types of injurie	s and medic	cal condition	ıs.							
	3. Foster an unde	erstanding of	f preventive	measu	res ar	nd safe	ety pro	tocol	s to mi	nimize	the
	occurrence of e						-	•			
CO1	Demonstrate proficie		forming CP	R, adm	iniste	ring fi	irst aic	l, and	d using	autom	ated
	external defibrillators										
CO2	Exhibit the ability to	_	ssess emerge	ency sit	tuatio	ns and	l make	info	rmed d	lecision	is to
	provide immediate ca										
CO3	Understand and appl	y basic saf	ety protoco	ls to pr	event	accid	lents a	nd h	andle e	mergen	icies
	efficiently.	1		1:		· C · · · ·	1'1			C	•
CO4	Display confidence a injuries to life-threate	_		iing a ra	ange o	or med	ncai ei	nerge	encies, i	irom m	inor
	Advocate for and			provon	tivo	mancu	roc II	ithin	tho	ommu	nity
CO5	contributing to a safe	•	•	preven	uve	measu	iies w	1111111	the C	Jonninu	iiity,
			Contact								
Unit-No.	Content		Hour		L	earnir	ıg Out	com	e	I	BL
I	Unit 1: Introductio	n to Life-	5	This u	ınit co	vers t	he imp	ortar	ce of li	fe- 1	., 2
	Saving Skills			saving	g skil	ls and	the b	asic	princip	les	
	Importance	of life-		of firs	st aid.	It dis	scusses	s the	legal a	ind	
	saving skills				•		f prov	iding	first a		
	Basic princi	ples of		empha		_		nport		of	
	first aid			persor		•	and			of	
	• Legal and e			_					lents v		
	aspects of p	roviding							ene of		
	first aid			_	-		ensure		fety a	ınd	
	Personal saf vac of prote	•		епис	ency 1	n prov	iding a	aa.			
	use of prote equipment	cuve									
	Assessing the second control of the sec	ne scene									
	of an emerg										
II	Unit 2: Cardiopuln		5	Stude	nts w	ill del	ve int	o the	anatoi	my 2	, 3,
	Resuscitation (CPF	•							to CF	•	4
	Automated Extern					••			ning Cl		
	Defibrillators (AEI	O)			-	_	_		ants. T		
	Anatomy an	ıd		unit	inclu	des	the p	rinci	ples a	ınd	
	physiology	relevant to		proced	dures	for u	ising a	an A	ED, w	ith	

	CPR		then the community of	
	 Steps for performing CPR on adults, children, and infants Use of an AED: principles and procedures Hands-on practice sessions for CPR and AED use Recognizing and responding to cardiac emergencies 		hands-on practice sessions to ensure proficiency. The unit also focuses on recognizing and responding to cardiac emergencies.	
III	 Unit 3: First Aid Techniques Managing Bleeding, wounds, burns, and fractures Providing first aid for choking, poisoning, and shock Practical sessions for bandaging, splinting, and other first aid procedures 	5	This unit teaches essential first aid techniques for managing Bleeding, wounds, burns, and fractures. Students will learn how to provide first aid for choking, poisoning, and shock. The unit includes practical sessions to practice bandaging, splinting, and other first aid procedures	1, 2, 3, 4
IV	Unit 4: Emergency Medical Conditions Recognizing symptoms of heart attacks, strokes, asthma attacks, and diabetic emergencies Immediate response actions for medical emergencies Ongoing care until professional help arrives Importance of staying calm and effective communication during emergencies	5	Students will explore common medical emergencies such as heart attacks, strokes, asthma attacks, and diabetic emergencies. This unit covers the recognition of symptoms, immediate response actions, and ongoing care until professional help arrives. Emphasis is placed on staying calm and effective communication during emergencies.	1, 2
V	Unit 5: Safety and Prevention • Home and workplace safety measures • Fire prevention and electrical safety	5	The final unit focuses on preventive measures to minimize the occurrence of emergencies. Students will learn about home and workplace safety, including fire prevention, electrical safety, and accident prevention. The	2, 3, 4, 5

Accident prevention	unit also covers community safety
strategies	programs and how to advocate for
Community safety	safety and preventive measures within
programs	the community.
Advocating for safety	y
and preventive	
measures within the	
community	

- 1. "First Aid Manual" by British Red Cross, St John Ambulance, St Andrew's First Aid, 2016.
- 2. "Emergency Care and Transportation of the Sick and Injured" by American Academy of Orthopaedic Surgeons (AAOS), 2016.
- 3. "Advanced First Aid, CPR, and AED" by American Academy of Orthopaedic Surgeons (AAOS), 2011.

REFERENCE BOOKS:

- 1. "Wilderness First Responder: How to Recognize, Treat, and Prevent Emergencies in the Backcountry" by Buck Tilton, 2010.
- 2. "Prehospital Trauma Life Support" by National Association of Emergency Medical Technicians (NAEMT), 2014.
- 3. "Fundamentals of Basic Emergency Care" by Richard W. O. Beebe, Deborah L. Funk, 2013.
- 4. "CPR and AED" by Alton L. Thygerson, Steven M. Thygerson, 2011.
- 5. "Basic Life Support (BLS) Provider Manual" by American Heart Association, 2020.

CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate proficiency in performing CPR, administering first aid, and using automated external defibrillators (AEDs).	6,9					
2	Exhibit the ability to quickly assess emergency situations and make informed decisions to provide immediate care	6,9					
3	Understand and apply basic safety protocols to prevent accidents and handle emergencies efficiently.	6,9					
4	Display confidence and competence in handling a range of medical emergencies, from minor injuries to life-threatening conditions.	6,9					
5	Advocate for and promote safety and preventive	6,9					

measures within the community, contributing to a safer environment.

	SEMESTER – III													
Course		Pers	onal Financ	cial Pl	anniı	ıg								
Title														
Course	22UUFL213R	Total credit	ts: 1	L	T	P	S	R	O/F	C				
code		Total hours	s: 15T	0	0	2	0	0	0	1				
Pre-	Nil	Co-requisit	te	Nil	-									
requisite														
Programme	Bachelor of Technolo													
Semester	Fall: Winter/ III sem													
Course	1. Understand the				•	•			-		_			
Objectives	2. Develop skills	_		_			-		_	_				
(Minimum	3. Gain knowled		investment	vehic	les, th	eir risl	ks, retu	ırns, a	and suit	abilit	y for			
3)	different finan	•												
	4. Learn strategie			_					_					
	5. Acquire know	ledge of esta	te planning of	essent	ials aı	nd lega	l consi	iderat	tions for	asse	t			
	distribution.													
CO1	Ability to create comprehensive personal financial plans aligned with individual goals an										ls and			
	values. Proficiency in analyzing and selecting appropriate investment options based on risk tolerance													
CO2	1	U	ting appropi	rate 11	nvesti	nent o	ptions	base	d on ris	k tole	erance			
602	and financial objective		1 1 4	CC 4	. 1	1	,	C.						
CO3	Competence in manag													
CO4	Capability to navigate tax laws and regulations to minimize tax liabilities and maximize savings.													
	Understanding of estate planning strategies to protect and transfer wealth according to personal													
CO5	rishes and legal requirements.													
Unit-No.	Content		Contact	T	1	Learni	ing Or	ıtcon	1e		BL			
			Hour		-									
I	UNIT 1- Fundamenta	ls of	5	Thi	s uni	it cov	ers th	e fo	undatio	nal	1, 2			
	Financial Planning			prir	nciple	s of	finan	cial	plannii	ng,				
	Principles of	financial		incl	uding	setti	ng fi	nanc	ial goa	als,				
	planning			crea	ating	budget	dgets, and managing cash							
	Setting finance	cial goals		flov	v eff	ectivel	y. It e	emph	asizes 1	the				
	Budgeting an	d cash		imp	ortan	ce	of	und	erstandi	ng				
	flow manage	ment		pers	sonal	financ	ial stat	temer	nts and	the				
				role	e of	fina	ncial	pla	nning	in				
				ach	ieving	g lo	ong-ter	m	financ	ial				
				seci	urity.									
II	UNIT 2- Investment	•	5						ent types		2, 3,			
	Types of inve			of investments such as stocks, bonds,							4			
	(stocks, bond	s, mutual				ınds, a								
	funds, etc.)			_		risk an			-					
	Risk and retu	-				cation	_							
	Portfolio mai	nagement		_		_			niques t	О				
	strategies								manage					
				thei	r inve	estmen	t portfo	olios						

			effectively.	
III	 UNIT 3- Retirement Planning Retirement savings vehicles (401(k), IRA, pension plans) Estimating retirement needs Social Security and Medicare considerations 	5	Retirement planning addresses the process of saving and investing for retirement. It covers retirement savings vehicles like 401(k) plans and IRAs, estimating retirement needs based on lifestyle expectations, and navigating Social Security and Medicare benefits to optimize retirement income.	1, 2, 3, 4
IV	 UNIT 4- Tax Planning Tax-efficient investment strategies Tax deductions and credits Tax implications of retirement distributions 	5	Tax planning involves strategies to minimize tax liabilities and maximize after-tax income. This unit discusses tax-efficient investment strategies, deductions, credits, and tax implications related to retirement contributions, distributions, and estate planning.	1, 2
V	 UNIT 5-Estate Planning Wills, trusts, and probate Power of attorney and healthcare directives Charitable giving and legacy planning 	5	Estate planning encompasses the process of managing and distributing assets in accordance with an individual's wishes upon death. It covers essential topics such as wills, trusts, probate, power of attorney, healthcare directives, charitable giving, and strategies for minimizing estate taxes.	2, 3, 4, 5

- 1. "Personal Finance" by Jeff Madura, 2016.
- 2. "Personal Financial Planning" by Lawrence J. Gitman, Michael D. Joehnk, and Randy Billingsley, 2013.
- 3. "Fundamentals of Financial Planning" by Michael A. Dalton, James F. Dalton, 2011.

REFERENCE BOOKS:

- 1. "The Bogleheads' Guide to Retirement Planning" by Taylor Larimore, Mel Lindauer, Richard A. Ferri, Laura F. Dogu, 2009.
- 2. "The Financial Planning Workbook: A Practical Guide to Creating Your Own Financial Plan" by Coventry House Publishing, 2018.
- 3. "The Millionaire Next Door: The Surprising Secrets of America's Wealthy" by Thomas J. Stanley, William D. Danko, 2010.

- 4. "Your Money or Your Life: 9 Steps to Transforming Your Relationship with Money and Achieving Financial Independence" by Vicki Robin, Joe Dominguez, 2008.
- 5. "Smart Couples Finish Rich: 9 Steps to Creating a Rich Future for You and Your Partner" by David Bach, 2009.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Ability to create comprehensive personal financial	11,12
1	plans aligned with individual goals and values.	11,12
	Proficiency in analysing and selecting appropriate	
2	investment options based on risk tolerance and	10,11
	financial objectives.	
3	Competence in managing cash flow, budgeting	9,11
	effectively, and optimizing financial resources.	9,11
4	Capability to navigate tax laws and regulations to	11,12
-	minimize tax liabilities and maximize savings.	11,12
	Understanding of estate planning strategies to	
5	protect and transfer wealth according to personal	11,12
	wishes and legal requirements.	

		SE	MESTER –	III							
Course Title	MO	OCSII (Introduction	on to A	Artific	cial I	ntellig	ence)			
Course code	22MOSY211R Tot	al credit	ts:2	L	T	P	S	R	O/F	(С
	Tot	al hours	s: 20T	0	0	0	0	0	0	2	21
Pre-requisite	Nil Co-	-requisit	te	Nil							
Programme	Bachelor of Technology	y in Mec	hanical En	gineer	ing						
Semester	Fall: Winter/ III semest	Fall: Winter/ III semester of second year of the programme									
Course	Understanding A	Understanding AI Fundamentals									
Objectives	2. Exploring AI Techniques and Algorithms										
(Minimum 3)	3. Future Trends in AI										
CO1	Understanding AI Fundamentals, AI Techniques and Algorithms										
CO2	Understanding AI Concepts and Terminology										
CO3	Understanding AI Ethics	and Prin	nciples								
CO4	Predicting Future Application	ations of	AI								
CO5	Advocate for and procontributing to a safer en		-	preve	ntive	mea	sures	withi	n the	co	mmunity,
Unit-No.	Content		Contact	Learning Outcome						BL	
			Hour								
I	What is AI? Applicatio Examples of AI	ons and	5			_	AI Fu		entals.	, A	I 1, 2
II	AI Concepts, Termin	nology,	5	Unde	erstanc	ding	ΑI	Conc	epts	and	1 2, 3,
11	and Application Areas		3	Term	inolo	gy					4
Ш	AI: Issues, Concerns	s and	5		erstand	ding	ΑI	Eth	nics	and	d 1, 2,
111	Ethical Considerations		J	Princ	iples						3, 4
IV	The Future with AI, and Action	d AI in	5	Predicting Future Applications of AI						3,4	
	Action										

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understanding AI Fundamentals ,AI Techniques and Algorithms	1, 3
2	Understanding AI Concepts and Terminology	4,5
3	Understanding AI Ethics and Principles	3,4,5
4	Predicting Future Applications of AI	3,4,5
5	Advocate for and promote safety and preventive measures within the community, contributing to a safer environment.	1,7

MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME211R	Biology for Engineers	1		2	1	2		1	1				1
22BTME212R	PDE and Transform Mathematics	3	2	2	2								1
22BTME215R	Thermodynamics	3	3	2		1		1	1				2
22BTME214R	Engineering Mechanics	3	2	2	2	2	1			2			1
22BTME213R	Basic Electronics Engineering	3	2	2	2	2	1			2	2		1
22UBPD213R	English for Employability for Engineers						2			2	3	2	2
22BTME216R	Techno-Professional Skills II	2	2	3	2	3							1
22UBCC211	Co-Curricular							2		2	1		1
22UBEC211	Extra-Curricular	2	1	2	1								1
22MOSY211R	MOOCS II					2	2	2	2	3			1
22UULS212R	Basic Life Saving Skills							1	1	2	2		2
22UUFL213R	Personal Financial Planning					2	1		2	1	1		1

		SEMESTER	R – IV						
Course Title		Fluid Mechan	ics and	Fluid	Machin	nes			
Course code	22BTME222R	Total credits: 4	L	T	P	S	R	O/F	C
		Total hours: 36T	3	0	2	0	0	0	4
Pre-requisite	Nil	Co-requisite				N			
Programme	_	Bachelor of Technolo							
Semester		Vinter/ IV semester o							_
Course		it the application of ma				nservat	ion law	s for fluid f	lows
Objectives		d the importance of dir			-	c		a	
(Minimum 3)		velocity and pressure							
		n to discover the importance of various fluid properties at rest and in transit.							
		tudents to classify the i							
CO3		choose the velocity and						of simple	flows.
		dents to analyze the flo					nes.		
	Learn to utilize mathe	ematically to analyze fl	uid dyna	ımıc p					
Unit-No.	Cor	ntent	Contac		Le	earning	g Outco	me	BL
			Hour						
I		, Newton's law of	6					s of fluid,	
	viscosity, Units	and dimensions-			nits and				
	Properties of flu							's equation	
	specific volume,	specific gravity,		ar	nd its ap	piicatio	on.		2,4
		sibility and surface lume- application of							
		n and momentum							
		npressible flow,							
		and its applications.							
II		ns in channels and	6	L	earning	about	the flo	w of fluid	
	ducts, Couette ar	d Poisuielle flow,			channe				
	laminar flow throu	gh circular conduits		D	erivatio	n of	Darcy	-Weisbach	2,4,
		concept of boundary		ec	quation				5
		of boundary layer							
		Weisbach equation,							
***	friction factor, Mood		1		•	1 .	.1 1		
III	Need for dimension	al analysis – methods	4		_			imensional	
		ysis – Similitude – ude Dimensionless			nalysis ethods.	unro	ough	different	2,4,
	types of similit parameters –	application of		111	emous.				5
	•	ameters – Model							
	analysis	1,10001							
IV	Euler's equation – th	neory of	10	L	earning	about t	he diffe	erent types	
	Rotodynamic machi	-			_			orinciples.	
	efficiencies – veloci				erivatio				
	entry and exit of the	• •			nd its ap				2,4,
	triangles – Centrifug			_				5	
	principle, work done								
	performance curves								
	pumps Reciprocating	g pump – working							
**	principle	1	40	Ψ.	•	1	1 1:00		2.4
V		rater turbines, heads	10		_			erent types	2,4,
	and efficiencies,	• •		of	turbine	es and 1	ıs parts.		5
	Axiai, radial and n	nixed flow turbines-							

Pelton wheel, Francis turbine and Kaplan
turbines, working principles – draft tube-
Specific speed, unit quantities,
performance curves for turbines –
governing of turbines.

- 1. Fluid Mechanics and hydraulic machines, R. K. Bansal
- 2. Fluid Mechanics by Yunus Cengel, Jhon Cimbala, Tata Macgraw Hill, New Delhi

REFERENCE BOOKS:

1. Fluid Mechanics by Streeter & Wylie, Tata McGraw Hill

OTHER LEARNING RESOURCES:

1. Home :: NPTEL

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to discover the importance of various fluid properties at rest and in transit.	1&2
2	Learn to outline the students to classify the importance of dimensional analysis.	2,3
3	Learn to point out to choose the velocity and pressure variations in various types of simple flows.	1,2
4	Learn to relate the students to analyze the flow in water pumps and turbines.	2,4
5	Learn to utilize mathematically to analyze fluid dynamic properties.	2,3

Course Title		SEMESTER Streng	th of Ma	teria	ls					
		~ · · · · · · ·	VII 01 1/1							
Course code	22BTME223R	Total credits: 4	L	T	P	S	R	O/F	(C
		Total hours: 36T	3	0	2	0	0	0	4	4
Pre-requisite	Nil	Co-requisite					il			
Programme		Bachelor of Technolog								
Semester		Fall/ IV semester of se	econd ye	ar of	the pr	ogran	ıme			
Course		d the nature of stresses of	-			-				
Objectives		eams, shafts, cylinders a	_					_		
(Minimum 3)	2. To calculate	the elastic deformation of	occurring	g in va	arious s	simple	geomet	ries for dif	feren	nt
	* *	types of loading								
CO1	Analyze and calculat	e different types of stre	esses and	strai	ns, incl	luding	axial, t	orsional, b	endi	ng
	and shear stresses.									
CO2	Determine material	properties such as elast	icity, pla	sticit	y, and	creep,	and th	eir effects	on 1	the
	behavior of materials	under various loading c	condition	s.						
CO3	Analyze and calcula	ate the deformation and	d stabili	ty of	struct	ural el	ements	, such as	bear	ms
	columns, and shafts.									
CO4	Choose appropriate	materials for specific e	engineeri	ng ap	plicati	ons ba	sed on	their med	hani	ica
	properties, durability	, and cost.								
CO5	Identify and analyze	the different failure crite	eria of m	ateria	ls and	their e	ffects o	n the perfo	rmar	nce
	and safety of structur	es.								
Unit-No.	Con	Contact	;	Learning Outcome			ome	В	BL	
			Hour							
I	Deformation in so	olids- Hooke's law,	8	Le	arn abo	out Ho	oke's la	w.		1
	stress and strain-	tension, compression		To	find the	he shea	ar stress	s and shea	r	
	and shear stresses-	elastic constants and		str	ain l	y g	raphical	l method	1	
	their relations- vo	lumetric, linear and		(M	Iohr's (Circle)				
	shear strains- pri	ncipal stresses and								
	principal planes- Mo	ohr's circle.								
II	Beams and types, t	ransverse loading on	6	Le	an ab	out d	ifferent	types o	f Z	2
	beams- shear force	e and bend moment		be	ams an	d their	analysi	s.		
	diagrams- Types	of beam supports,								
	simply supported	and over-hanging								
		Theory of bending of								
		ress distribution and								
	1	stress distribution,								
	point and distributed	d loads.								
III	_	about an axis and	6	Le	arn abo	out Ma	xwell's	s reciproca	1 :	3
		ertia, deflection of a						_		
	polar moment of inertia, deflection of a beam using double integration method, theorems, moment of inertia etc.									
	computation of slopes and deflection in									
	beams, Maxwell's r									
			T a	arn al	out d	ifforont	4	f 4	4	
IV	Torsion stresses and	d deformation in	6	Ι μ				IVDEC A		4
IV	Torsion, stresses and circular and hollow		6					t types o r analysis.	•	4

SEMESTER – IV

	shafts, deflection of shafts fixed at ends,			
	stresses and deflection of helical springs.			
V	Axial and hoop stresses in cylinders	10	Learn about thick cylinders and	6
	subjected to internal pressure,		their analysis	
	deformation of thick and thin cylinders,			
	deformation in spherical shells subjected			
	to internal pressure.			
Practical	Impact Test (Izod)	20	Learn about the hardness and	1,2,
	Impact Test (Charpy)		toughness of the materials through	3,4
	Torsion Test of Metal rod		different methods.	
	Hardness (Rockwell & Brineil)			

- 1. Egor P. Popov, Engineering Mechanics of Solids, Prentice Hall of India, New Delhi, 2001.
- 2. R. Subramanian, Strength of Materials, Oxford University Press, 2007.
- 3. Ferdinand P. Been, Russel Johnson Jr and John J. Dewole, Mechanics of Materials, Tata McGraw Hill Publishing Co. Ltd., New Delhi 2005.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze and calculate different types of stresses and strains, including axial, tensional, bending, and shear	2,3
2	Determine material properties such as elasticity, plasticity, and creep, and their effects on the behaviour of materials under various loading conditions.	1,2
3	Analyze and calculate the deformation and stability of structural elements, such as beams, columns, and shafts.	1,3&4
4	Choose appropriate materials for specific engineering applications based on their mechanical properties, durability, and cost.	1,4&5
5	Identify and analyze the different failure criteria of materials and their effects on the performance and safety of structures.	1,3&4

		SEMESTER	- IV						
Course Title		Materia	ls Engin	eerin	g				
Course code	22BTME224R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite				N			
Programme		Bachelor of Technolog	•		`				
Semester	V	Vinter/ IV semester of s	second y	ear o	f the pi	rogran	nme		
Course	1 75 '1 1 1 1	C.1 1.1 1.	.1	. ,	1 .		C ,	. 1 .1 .	
•	•	ge of the correlation bet							
(Minimum 3)	criteria.	and various methods to	quantity	ıneir	mecnan	icai in	tegrity a	and ranure	
3)		l interpretation of equili	brium ph	ase d	liagram	c			
	_	ent phases and heat trea	_		_		nronerti	es of Fe-C	allovs
		princes and non trou				J. 1110	riopoit	01100	
001	Learn to identify the c	crystal structures of diff	ferent m	ateria	ls and	unders	tand th	e defects ir	such
CO1	structures.	•							
CO2	Learn the different med	chanical property measu	rement n	netho	ds and e	evaluat	te their	performance	es.
CO3	Learn how to tailor the	material properties of fe	errous an	d nor	ı-ferrou	s alloy	rs.		
CO4	Learn to identify and	understand different he	at treatn	nent p	processe	es and	determ	ine their sp	pecific
CO4		manufacturing processe							
CO5	Learn to evaluate the po	erformance of alloying s			facturin	g appl	ications	5.	
Unit-No.	Con	tent	Contact		Le	arning	g Outco	ome	BL
_			Hour	1					
I	Crystal Structure:		4			-	the cry		2,4
	crystal structures, Ce	-						aterials	
	in solids: Point, li volume defects; dislo						ne dete	cts in such	
	mechanisms and slip			Str	uctures.	•			
	resolved shear stress.	5 systems, critically							
II	Mechanical Proper	rty Measurement:	6	Le	arn the	e diff	erent r	nechanical	2,4,
	Tensile, compression	-	v					methods	5
	Young's modulus, re							rmances.	
	and engineering s						•		
	generalized Hooke's	law, yielding and							
	yield strength, d	uctility, resilience,							
	toughness and elastic	recovery; Hardness:							
	Rockwell, Brinell an	d Vickers and their							
	relation to strength								
III	Static failure theorie		6					e material	2,4,
	failure mechanisms,			_	_		errous	and non-	5
	Maximum normal st			ter	rous all	oys.			
	and Modified Mohr mechanics: Introduction								
i	r mechanics, introducti	OIL TO STRESS-INTENSITY		1					1
	factor approach and	·							

	Fatigue failure: High cycle fatigue, Stress- life approach, SN curve, endurance and fatigue limits, effects of mean stress using the Modified Goodman diagram; Fracture with fatigue, Introduction to non-			
IV	destructive testing (NDT) Alloys, substitutional and interstitial	8	Learn to identify and understand	2,4,
- '	solid solutions: Phase diagrams:	Ü	different heat treatment processes	5
	Interpretation of binary phase diagrams		and determine their specific	
	and microstructure development; eutectic,		application in different	
	peritectic, peritectoid and monotectic		manufacturing processes.	
	reactions. Iron Iron-carbide phase diagram			
	and microstrctural aspects of ledeburite,			
	austenite, ferrite and cementite, cast iron.			
V	Heat treatment of Steel: Annealing,	12	Learn to evaluate the performance	2,4,
	tempering, normalising and spheroidising,		of alloying steels in	5
	isothermal transformation diagrams for Fe-		manufacturing applications.	
	C alloys and microstructure development.			
	Continuous cooling curves and			
	interpretation of final microstructures and			
	properties- austempering, martempering,			
	case hardening, carburizing, nitriding,			
	cyaniding, carbo-nitriding, flame and			
	induction hardening, vacuum and plasma			
	hardening, Alloying of steel, properties of stainless steel and tool steels, maraging			
	stamess steel and tool steels, maraging steels- cast irons; grey, white, malleable			
	and spheroidal cast irons- copper and			
	copper alloys; brass, bronze and cupro-			
	nickel; Aluminium and Al-Cu – Mg			
	alloys- Nickel based superalloys and			
	Titanium alloys			
	•		<u>l</u>	L

- 1. Willam Calliister, 2002, Materials Science and Engineering.
- 2. V. Raghavan, 1974, Materials Science and Engineering.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to identify the crystal structures of different materials and understand the defects in such structures.	1,4
2	Learn the different mechanical property measurement	3,4

	methods and evaluate their performances.	
3	Learn how to tailor the material properties of ferrous and non-ferrous alloys.	1,3
4	Learn to identify and understand different heat treatment processes and determine their specific application in different manufacturing processes.	1,3&4
5	Learn to evaluate the performance of alloying steels in manufacturing applications.	1,3&4

		SEMESTEI	R – IV							
Course Title		Instrume	ntation ar	nd Co	ntrol					
Course code	22BTME225R	22BTME225R Total credits: 4			P	S	R	O/F	C	,
		Total hours: 36T	3	0	2	0	0	0	4	
Pre-requisite	Nil	Co-requisite				Ni	il			
Programme	Bachelor of Techno	logy in Mechanical E	ngineerin	g						
Semester	Winter/ IV semester	r of second year of the	e progran	ıme						
Course	Equip student	ts with the knowledge	to criticall	y eva	luate th	e perfo	ormanc	e of vario	us	
Objectives	measurement	systems, focusing on l	key param	eters	such as	accura	acy, rai	nge, resolu	ition a	ınd
(Minimum 3)	potential erro	r sources.								
		ndamental principles o		-		_		_		op
	configuration	s and guide students th	nrough the	desig	gn of Bl	ock di	agrams	represent	ing	
	control proce	sses.								
	3. Provide hand	s- on experience in sel	ecting and	integ	grating a	actuato	rs (pne	eumatic, h	ydraul	ic,
	and electric)	for correction elements	s and in ch	oosin	g and t	uning o	control	methods (P, PI,	
	· ·	ve desired system perf								
CO1	The uses of Measurer	nent systems and perfo	ormance							
CO2	To generalization of t	he Instrumentation sys	stem eleme	ents						
CO3	Analysis of the Signa	processing and condi	tioning; co	orrect	ion elei	nents				
CO4	Outlining the Control	systems								
CO5	To learn the other Co	ntrolling methods								
Timit No	Con	40-4	Contact		Τ.	a ! . a	· O40		Di	T
Unit-No.	Cor	itent	Hour		Le	arning	g Outco	ome	Bl	L
I	Measurement	system and	3	Th	e uses	of Mea	sureme	ent system	s 2,	4
	performance-accura	acy, range,		and	d perfoi	mance				
	resolution, error sour	rces								
II	Instrumentation	system element-	8	То	ger	neraliza	ation	of th	e 2,3	3.
		nmon engineering			_			elements	4,:	
	measurement	8 8 8					<i>J</i>		,	
III	Signal processing	and conditioning	7	An	alvsis	of the	Signal	processin	g 2,4	 4.
	correction	element-actuators,		and		ndition		correctio		
	pneumatic, hydraulic	•			ments		O,			
IV	Control system		8		ıtlining	the Co	ntrol s	ystems	2,4	4,
	open/closed loop,				Č		•	,	5	
	diagram	8								
V	ŭ	P, PI,PID, when to	10	То	learn	the o	other (Controllin	g 2,4	4,
		ing of controllers,			thods.				5	
		ansfer function and								
	1 *	frequency response,								
	Nyquist diagram and									
	J-1st singram and	· · · · · · · · · · · · · · · · · · ·	j							

1. Instrumentation and control system by W. Bolton, 2nd edition, Newnes,200Bishnoi OP. 2007. Principles of Agricultural Meteorology. Oxford Book Co

- 2. Thomas G Beckwith, Roy D. Maragoni, JohnHLienhardV, Mechanical Measurements 6th edition, Pearson Education India 2007Bishnoi OP. 2007. Principles of Agricultural Meteorology. Oxford Book Co.
- 3. Gregory K. McMillan, Process/ Industrial Instruments and controls Handbook, 5th edition, McGrow-Hill: New York, 1999

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	The uses of Measurement systems and performance	1,2&3						
2	To generalization of the Instrumentation system elements	2,3&4						
3	Analysis of the Signal processing and conditioning; correction elements	3,4&5						
4	Outlining the Control systems	1,2&3						
5	To learn the other Controlling methods	1,2&3						

		SEMESTER	R – IV						
Course Title	ENVIRONMENTAL SCIENCE								
Course code	22BTME227R	Total credits: 2	L	T	P S	R	O/F	C	
		Total hours: 24T	2	0	0 0	0	0	2	
Pre-requisite	Nil	Co-requisite				Vil			
Programme		Bachelor of Technolog							
Semester		Fall/ IV semester of second year of the programme							
Course		lents for careers as lead			-		_		
Objectives		issues from a problem-				_			
(Minimum	-	orld population that is							
3)	-	roblems and which has		_					
		work individually and	collective	ely towa	rds solutio	ons of cu	irrent proble	ems	
	and prevention		:		1 N	- 4 1 D			
		l be made aware of our		_					
	Population.	d the importance of Soc	ciai issues	rerated	to environ	ment ar	ia fiuilian		
CO1	Students will acquire k	nowledge about differe	nt recourc	es and t	he Impact	of denle	etion of reso	uircec	
	Correlating the relation							ources.	
	Elaboration on food cha	*				ient.			
	Students will be able to		• .						
	Brief outline on Disaste		ony and no	Consci	vation				
C03	Differ outline on Disaste	management.	Contact					1	
Unit-No.	Con	tent	Hour		Learnin	g Outco	ome	BL	
I	Introduction To	Environment:	6	Stude	nts will ac	quire kı	nowledge	2,4	
	Definition and scop	•			different				
	environment, atmosp			Impac	ct of deple	tion of 1	resources.		
	lithosphere and bios	•							
	composition. Life								
	eukaryotic organiz								
	principles; types of	_							
II	Producers, consumers	gy and approach,	3	Commo	latina	+lh	alatianahin	2.4	
11	Ecology: Terminologecosystem, types of		3		U		relationship lation and	2,4,	
	and function, mineral	•			nvironmer		nanon and		
	and tropic chains.			the Li	n v in Ommer				
	evolution	20 (Cropment and							
III		ollution: Sources,	9	Elabo	ration on	food cl	hains, food	2,4,	
	causes, assessment, e	*			and ecolo		· · · · · · · · · · · · · · · · · · ·	5	
	control of water pol	_							
	noise and land pollution. Strategies of								
	management, concept of sustainability.								
	Energy, environment and their relationship								
	with human activitie	s. Water Resources							
1	and utilization, forest resources.								
IV	and utilization, forest		3				to illustrate		

	Human health, settlements, management		on Biodiversity	and its	5
	of rivers, lakes, forests, wild life and		conservation		
	catchments. Role of society, NGO and				
	Govt. agencies. Concept of urbanization				
	and green cities Global Warming, green				
	house causes and effects, carbon				
	Sequestration.				
V	International Agreements and	3	Brief outline	on Disaster	2,4,
	Protocols: National forest policy and		management.		5
	Environmental laws and act. EIA				

- 1. H.S. Peavy, D.R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill International.
- 2. J. G. Henry and G.H. Heinke, Environmental Science and Engineering, Prentice Hall International.
- 3. G.M. Masters, Introduction to Environmental Engineering and Science, Pearson Education.

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Students will acquire knowledge about different	7.12				
1	resources and the Impact of depletion of resources.	7,12				
2	Correlating the relationship between Human	7,12				
2	Population and the Environment.	7,12				
3	Elaboration on food chains, food webs and ecological	7,12				
3	pyramids.	7,12				
4	Students will be able to illustrate on Biodiversity and	7,12				
4	its conservation	1,12				
5	Brief outline on Disaster management.	7,12				

		SI	EMESTER -	- IV						
Course Title	Techno-Professional Skills-III									
Course code	22BTME226R	Total cred	its: 1	L	T	P	S	R	O/F	C
		Total hour	s: 20P	0	0	2	0	0	0	1
Pre-requisite	Nil	Co-re	quisite			•	N	il	1	
Programme		Bachelor o	f Technolog	y in M	lechan	ical Er	gineer	ring		
Semester		Fall/ IV se	mester of sec	cond y	ear of	the pr	ogram	me		
Course	1. To learn about	ut the differe	ent parts and	operati	ions of	Lathe	Machii	ne		
Objectives	2. To learn about	ut the operat	ions of drillir	ıg, sha	per an	d millir	ng oper	ations		
(Minimum 3)	3. To work on o	lifferent wor	k piece and j	obs us	ing dif	ferent i	nachin	es avail	lable in the	
	workshop									
CO1	Learn about the parts	and operation	on of a Lathe	Mach	ine					
CO2	Learn about the opera	ations to be p	performed in	Drillir	ng, Sha	per and	d Millin	ng Mac	hine	
CO3	Learn about different	tools that ar	e to be used	in wor	kshop.					
CO4	Learn about the safet	y measures t	o be taken w	hile pe	rformi	ng Job	S			
CO5	Perform different Job	s with differ	ent Work pie	eces						
Unit-No.	Content		Contact	Hour		Le	earning	g Outco	ome	BL
I	Tapping		4		Le	arn abo	out tapp	oing and	d its	2,4
					op	eration	S			
II	Drilling		5		Le	arn ab	out D	rilling	and Drill	2,4,
					Ma	achines	and its	s parts		5
III	Turning		3	3 Learn about the operation						2,4,
	turning in Lathe							5		
IV	Facing		4	Learn about Facing operation in						2,4,
					La	the				5
V	Knurling and Tappe	r turning	4		Learn about Knurling and Tapper					
					tur	ning	opera	tion	in Lathe	5
					ma	achine				

SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn about the parts and operation of a	1,2,3
	Lathe Machine	, ,
	Learn about the operations to be	
2	performed in Drilling, Shaper and	1,3,4
	Milling Machine	
3	Learn about different tools that are to be	3,4,5
3	used in workshop.	3,4,3
	Learn about the safety measures to be	
4	taken while performing Jobs	3,4,5

5			JODS	with	different	3,4,5	
	Work pie	eces					
SEMESTER – IV							

		SEMESTE	R – IV						
Course Title		Applied	Thermo	dyna	amics				
Course code	22BTME227R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite				N	il		
Programme		Bachelor of Technolo	ogy in M	echa	nical En	gineer	ring		
Semester		Fall/ IV semester of	second y	ear (of the pr	ogram	me		
Course	1. To understand the	application of 1st law a	and 2nd la	aw o	f thermo	dynam	ics		
Objectives	2. To understand the	conversion of available	e energy						
(Minimum 3)	3. To create a bridge	between theory and pra	actical ap	plica	tion of tl	nermoo	lynamic	es	
CO1	Learn to apply energ	y balance to systems ar	nd control	volu	ımes				
CO2	Learn to compute the	e changes in thermodyn	amic proj	ertie	es of sub	stances	S		
CO3	•	performance of energy							
CO4	<u> </u>	e between high grade ar							
CO5		ork and heat interaction				energy	betwee	en the syste	m and
	its surroundings							·	
Unit-No.	Co	ntent	Contac	t	Le	arning	g Outco	ome	BL
			Hour						
I	Availability: Avai	lable and unavailable		L	earn to a	apply e	nergy b	alance to	
	energy, Available	energy referred to a		S	ystems a	nd con	trol vol	umes	
	cycle, Availability	in non-flow or closed							2.4
	system (Non-cycl	ic), Availability of	8						2,4
	steady-flow system	ms, Helmohltz and							
	Gibb's functions, I	rreversibility and loss							
	in availability, Effe								
II	Boiler: Classific	eation of boilers,		L	earn to	compu	ite the	changes in	
	mountings, acces	ssories, evaporation			hermody		prop	erties of	2,4,
	capacity, equivaler	nt evaporation, boiler	4	S	ubstance	S			5
	efficiency, selectio	n of a boiler, boiler							
	feed water treatmen	t and boiler troubles.							
III	-	er cycles: Carnot and					_	erformance	2,4,
	· ·	odified Rankine cycle,	7	0	of energy	conve	rsion de	evices	5
	Regenerative and R	*							
IV	Steam nozzles: Exp				earn to			e between	
	through nozzles, ve	• •		h	igh grad	e and 1	ow-grac	de energies	
	variation in nozzles	•							2,4,
		e and maximum mass	10						5
	_	tation of heat drop in							
	nozzles in Mollier o	liagram, Nozzle							
	efficiency.								
V	Steam turbines							k and heat	2,4,
		w of steam through	14					balance of	5
	_	on turbines, Velocity					the syst	tem and its	
	diagrams, Reheating	ng, Bleeding, Reheat		S	urroundi	ngs			

factor, Compounding and governing of	f	
steam turbines, Back pressure turbines,	,	
Pass out turbines, Function of steam	1	
condenser, Elements of a condenser	r	
plant, vacuum production, Delton's law		
of partial pressure, Classification of	f	
condensers, Removal of air from the		
condensers, Vacuum efficiency and	1	
condenser efficiency, Determination of	f	
cooling water, Cooling towers and	1	
cooling ponds.		

- 1. Domkundwar, Kothendaraman, Khajuria, Arora, "A Course in Thermodynamics and Heat Engines", Dhanpat Rai and Sons.
- 2. Rajput, "Thermal Engineering", Laxmi Publications.
- 3. Patel, Karamchandani, "Elements of Heat Engines"

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to apply energy balance to systems and control volumes	1,3&7
2	Learn to compute the changes in thermodynamic properties of substances	1,2&4
3	Learn to classify the performance of energy conversion devices	1&7
4	Learn to differentiate between high grade and low- grade energies	7&12
5	Learn to associate work and heat interactions, and the balance of energy between the system and its surroundings	3&7

		SEMESTER – IV	7						
Course Title		CO-CURRICULA	AR A	CTI	VITI	ES			
Course code	22UBCC221	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 10P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme		B. Tech Mechan							
Semester		Fall/ IV semester of first							
Course		eeds of the students and c	overi	ing a	broad	d/wide	range	of their ab	ilities
Objectives	and talents.								
(Minimum		he interests in the student	s and	l pro	vide	equal (opportu	inities to a	ll the
3)	students to particip		. 4				•		
		ne learning experience of				_			
		nner skills such as leaders	ship q	lualit	ies, c	reative	or inn	iovative sk	1IIS
	etc.			1	La 41-	- ff - · ·			~ ~ ~
CO1	1	will be able to analyze as in relation to their acaden				епест	iveness	s of various	s co-
						vvo=1-~1	hone =	whihitiana	and
CO2	_	s will be able to organize t foster a deeper understand					_		and
		lents will be able to demo							lo by
CO3		ng in related tests and activ			prove	u son	SKIIIS	and apinud	е бу
	• 1 1	will develop the ability to			ntly r	ılan an	d imple	ement nrog	rame
CO4	_	xchange of ideas and inforr	_				u mpi	emem prog	lams
		s will evaluate the impact					ities o	n their ners	sonal
CO5		growth, particularly in te						_	
332	opportunities.	grower, pureroundry in to	11110	01 0.		1110110		.8	
4:		~	Co	ntac	t	_			
Unit-No.	(Content		Iour		Lear	ning O	utcome	BL
I	AdtU has include	d co-curricular activities		10	I	Engage	in mai	ndatory	1,2
	as an integral and	d mandatory part of the			c	o-curri	cular a	ctivities	,3,
	curriculum with a	n aim to encourage team			to	o foste	r teamv	vork and	4,5
	work and the spir	it of self-reliance among			S	elf-reli	ance, e	nhance	
		udents will plan and					anding		
		programs like Workshop,						d improve	
	_	n, Guest Lectures, Soft-			_		ance th	•	
	•	Test etc. These activities				•	ing and		
	_	ommon platform for the			_	_	_	various	
		ige ideas and information			p	rogran	ns and e	events.	
	_	of their interest e.g.							
		nployment / higher							
		tunities, emerging trends,							
	_	etc. Such activities will							
	enhance the ur								
	_	ation of students with							
	_	curriculum and help							
	mem perform be	etter from a 360 degree							

perspective.		

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze: Students will be able to analyze and evaluate the effectiveness of various co-curricular activities in relation to their academic curriculum.	1,3
2	Organize: Students will be able to organize and execute workshops, exhibitions, and guest lecturers that foster a deeper understanding of their academic subjects.	3,4,7
3	Demonstrate: Students will be able to demonstrate improved soft skills and aptitude by actively participating in related tests and activities.	6,8
4	Develop: Students will develop the ability to independently plan and implement programs that promote the exchange of ideas and information among peers.	4,6
5	Evaluate: Students will evaluate the impact of co- curricular activities on their personal and professional growth, particularly in terms of employment and higher education opportunities.	7,11

Course Title EXTRA-CURRICULAR ACTIVITIES									
Course Title	2211DEC221	EXTRA-CUR Total credits: 1			1	1	В	O/E	
Course code	22UBEC221	Total credits: 1 Total hours: 10P	1 L 0	T 0	P 0	S	R	O/F 0	<u>C</u>
Pre-requisite	Nil					4	U Nil	U	1
Programme	INII	Co-requisite B. Tech M	ochonic	ol Eng	ringarir		NII		
Semester		Fall/ IV semester (mo		
Course	To develop soft		л шѕі у	ear or	the pr	ogram	me		
Objectives	•	listic development of the	ne learne	re					
(Minimum 3)	_	earning experience in d			etc				
CO1		e engaged in different				er diffe	erent cl	uhe namely	dance
COI		, drama, literacy, etc	activitie	s neau	ica una	ci dilic	aciii ci	uos namery	uance,
CO2		articipate in regular clul	activiti	es like	works	hons c	omneti	tions as ner	their
CO2	interest and hobbies		o activiti	ics iikc	WOIKS.	порз, с	ompen	tions as per	tileii
CO3		e trained to represent A	dtII in v	arious	inter III	niversi	v state	and nation	al level
CO3	competitions.	tunned to represent 11	ate iii v	arrous	inter u	111 V C151	iy, state	and nation	ur icver
CO4	_	e given a platform to ea	rn from	invited	1 expert	ts in the	eir resp	ective fields	
CO5		et an exposure of 360							
	growth along with t	*	aegree	- Curiii	.g	1040102	,j com	raering the	overan
Unit-No.		ontent	Conta	act	Ī	earnir	g Outo	come	BL
			Hou		_		g out		
I	Different types	of activities outside	_		. AdtU	Jenco	urages	a range of	1,2,3
	regular curriculum						_	he regular	
								to meet	
				10	earner's	s intere	st. The	se activities	
				a	re aim	ed to	develop	the social	
							_	promote a	
				h	olistic	deve	lopmen	t of the	
				10	earners				
				2	. Kee	ping i	n min	d the 360	
				d	legree 1	learning	g metho	odology the	
				s	tudents	are er	igaged	in different	
				a	ctivitie	s head	ed und	er different	
				С	lubs	viz.	Dance	e, music,	
				p	hotogra	aphy, d	rama, 1	iterary etc.	
				3	3. The s	tudents	are en	couraged to	
				p	articipa	ate i	n reg	ular club	
				a	ctivitie	s,		workshops,	
				c	ompeti	tions a	s per tl	neir interest	
				a	nd hob	bies.			
				4	. The	studen	t mem	bers of the	
				c	lub are	e traine	ed repr	esent AdtU	
				i	n var	ious	inter	University	
				s	tudent	and	natio	nal level	
			i		ompeti				1

SEMESTER – IV

5. Renewed personalities are	
invited to conduct workshops	
that benefit the members and	
students by giving them the	
platform to learn from experts in	
the respective fields.	

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The students will be engaged in different activities headed under different clubs namely dance, music, photography, drama, literacy, etc	9,12
2	The students will participate in regular club activities like workshops, competitions as per their interest and hobbies.	9,10,12
3	The students will be trained to represent ADTU in various inter university, state and national level competitions.	9,10
4	The students will be given a platform to earn from invited experts in their respective fields.	9,10
5	The students will get an exposure of 360 degree learning methodology considering the overall growth along with the academics.	8,12

		SEMESTER	R – IV						
Course Title	BASIC ACCLIMATIZING SKILLS (BAS)								
Course code	22UULS201R	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite				N	il		
Programme		Bachelor of Technolo	ogy in M	lecha ı	nical Er	ngineer	ring		
Semester		Fall/ IV semester of	second y	ear o	f the pr	ogram	me		
Course	•	ge of the fundamentals	•	•		•	• •	cations.	
Objectives		le to familiarize with the		•	•	& Ute	nsils.		
(Minimum 3)		le to handle different n			vations.				
CO1	Students will have ba	sic knowledge of cook	ing meth	ods.					
CO2		knowledge of organiz				oms.			
CO3		to gain the travel mana	-		-				
CO4	Students will be able	to acquire the knowl	ledge of	basic	househ	olds' a	menitie	es for day-	to-day
	use.								
CO5		ork and heat interaction	ns, and th	he bal	ance of	energy	betwee	en the syste	m and
	its surroundings		T						1
Unit-No.	Cor	itent	Contac		Le	earning	g Outco	ome	BL
	T () (A 7 4*	Hour	<u> </u>	T	.1	, C1	11.	2.4
I	Introduction to	Accommodation	8				rt of hai	_	2,4
	Management Talanhana handling	taahniaya		telephone, organizing rooms, cleaning equipment and bed					
	Telephone handling Organizing of Room	-			Cleanin		king.	and bed	
	Cleaning agents.	.5.				ma	Kilig.		
	Cleaning agents. Cleaning equipment	and uses							
	Bed making Process								
II	Fundamentals of C		6		Learnin	ng the f	fundame	entals of	2,4,
		ookery –Aim &	· ·			_		cooking	5
	Objectives of cooking	<u> </u>				_	oment.	J	
	Use of basic Cookin	-							
	Personal Hygiene an	d Safety							
	Use of Fire & Fuels								
III	Methods of Cookin	g:	10		Under	standir	ng the d	ifferent	2,4,
	Different Cuts.						•	, cutting	5
	Use of Herbs and Sp	ices.		to			_	g the food	
	Basic Food and Bev	erage Preparation.			habits	s in diff	ferent re	egions.	
	Regional food Habit	s.							
IV	Forms & Format's	:	12		Learni	_		rms and	2,4,
	C –form					for	mats.		5
	Reservation form								
	Registration form								
	Passport Application								
	Legal Rent Agreeme	ent							

- 1. Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt. Ltd-New Delhi.
- 2. Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restaurateur, Guides.
- 3. Mohammed Zulfikar (2010) Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.
- 4. Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students will have basic knowledge of cooking methods.	9&12
2	Students will gain the knowledge of organizing & Cleaning of Rooms.	9&12
3	Students will be able to gain the travel management concept.	9&12
4	Students will be able to acquire the knowledge of basic households' amenities for day- to-day use.	9&12
5	Learn to associate work and heat interactions, and the balance of energy between the system and its surroundings	9&12

SEMESTER – IV											
Course Ti	itle	ENC	GLISH LANGUAGE P	PROFIC	IENC	CY FOI	R ENG	INEER	RS		
Course co	de	22UBPD224R	Total credits: 2	L	T	P	S	R	O/F	C	
			Total hours: 30P	0	0	4	0	0	0	2	
Pre-requis		Nil	Co-requisite				N	il			
Programn	ne	B. Tech Mechanical Engineering									
Semester		Fall/ IV semester of second year of the programme									
Course		1	udents' abilities in te			U, I					
Objectives			convey engineering								
(Minimun	n 3)	applications infrastructu	s in civil engineering	g for c	iesign	ing, c	onstru	cting,	and maini	aining	
			re: rafting professional re	eciimec	and a	rover 1	etters	tailored	l for engi	neering	
			proving students' chanc					tarioree	i ioi ciigii	nccring	
		_	eamwork abilities and		_			erviews	through p	ractical	
			d targeted training, enha								
CO1			and concise technical		nicatio	on in b	oth w	ritten a	and oral fo	rmats,	
~~~			ry-specific terminology.								
CO2			crafting resumes, cover	r letters,	and te	echnical	report	s to effe	ectively sho	wcase	
602		engineering qualifica			4 C-1	l	4-4:	4:1::			
CO3		acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to onvey engineering concepts to diverse audiences.									
CO4		ultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening,									
CO4		conflict resolution, and clear communication within engineering contexts.									
CO5		Prepare for engineering job interviews by articulating qualifications, experiences, and career									
000			th technical and behavio		_	•		сирен	mees, and	curcer	
Unit-		Conte		Contac				Qutco	me	BL	
No.				Hour				•			
I	Writ	ting Skills		7	D	evelop	profic	iency i	in various	1,2	
	Para	graph Writing & Nar	ratives				_	riting,	including		
	Lette	er Writing			pa	ıragrapl	1 8	and	narrative		
	Tech	nical Writing			co	nstructi	ion, le	tter wi	riting, and		
	_	and cistern			te	chnical	docum	entation	1.		
		duction of pipes and									
		ing different types of	•								
		ksheet1 and Workshe								1.0	
II		Management Skills		7			_	ncy in	_	1,2	
		OT Analysis	1 11		_				ed to pipes		
		Setting and Persona ture allegation and	• =		ar		sterns,	mixtı	ares and nd profit,		
		duction of basics	Clock			ss, ar		scounts	-		
		ing questions on mix	ture and allegation						orksheets.		
		ksheet1 and Worksho	-		la	. geneu p	, actice	ana w	ARBIICOLS.		
III Vocabulary Develo				7	E	nhance	perso	nal ef	fectiveness	1,2	
		• •	aspects of a word	,			_		ysis, goal	1,2	
		n as the use of say, te	-			_			g personal		
		ning strategies to dev				giene.			O 1		
Learn		3 8 40	r · · · · · · · · · · · · · · · · · · ·			٠٠					

	Contextual vocabulary learning			
	Use of phrasal verbs and idioms in a			
	conversation			
	Effectively using dictionary, thesaurus			
	Statement and Course of action			
	Revision of syllogism			
	Statement and conclusion			
	Course of action based on statement			
	Worksheet1 and Worksheet 2			
IV	Interview Skills & Dress Code Ethics	7	Improve vocabulary through	1,2
	Types of interview-		understanding word usage,	
	telephonic, virtual & face to face		contextual learning, and effective	
	online interview, personal interview, Panel		dictionary use, and strengthen	
	interview, Group interview		logical reasoning with practice in	
	Common interview questions and answering		syllogisms, statements,	
	strategies		conclusions, and courses of	
	Dress Code Ethics during Interviews		action.	
	Mock Interview Session			
	Sitting arrangement (puzzle)			
	Linear arrangement puzzle			
	Circular arrangement puzzle			
	Matrix			
	Worksheet1			
V	Grammar (Flipped Classroom)	7	Master interview techniques for	1,2
	Word-stress, Syllables		various formats, understand dress	
	Practice Session: Common Errors (testing the		code ethics, and improve	
	students' grammar already learnt)		performance through mock	
	Profit loss and discount		interviews and puzzle-solving	
	Introduction to basics		exercises in linear, circular, and	
	Introduction to discount		matrix arrangements.	
	Problems related on the topics			
	Worksheet1 and Worksheet 2			

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann. 2008.Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams

## **REFERENCE BOOKS:**

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

# RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioural questions confidently.	10

## MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME221R	Applied Thermodynamics	3	2	2		1		1	1				3
22BTME222R	Fluid Mechanics and Fluid Machines	3	3	1		2		1	1				2
22BTME223R	Strength of Materials	3	2	2		1		1	1				3
22BTME224R	Materials Engineering	3	3	1		2		1	1				3
22BTME225R	Instrumentation and Control	2	1	1		2		1	2				2
22UULS221R	Basic Acclimatizing Skills							2	2	2	1		2
22BTME227R	Environmental Science			2	2	1				2			2
22MOSY221R	English language proficiency for engineers		2	1	2	2		1	1	1			
22BTME226R	Techno-Professional Skills III	2	2	3	2	3							1
22UBCC221	Co-Curricular							2		2	1		1

22UBEC221 Extra-Curricular SEMESTER - V **Course Title Heat Transfer** Course code **22BTME311R Total credits: 2** L T S R O/F  $\mathbf{C}$ Total hours: 36T+ 0 0 3 0 20P Co-requisite Pre-requisite Nil Nil **Programme Bachelor of Technology in Mechanical Engineering** Semester Fall/ V semester of 3rd year of the programme Course 1. The aim of the course is to build a solid foundation in heat transfer exposing students to the **Objectives** three basic modes namely conduction, convection and radiation. (Minimum 2. Rigorous treatment of governing equations and solution procedures for the three modes will be provided, along with solution of practical problems using empirical correlations. 3) 3. The course will also briefly cover boiling and condensation heat transfer, and the analysis and design of heat exchangers. CO₁ Understand the basic modes of heat transfer. CO₂ Discuss conduction heat transfer for steady and unsteady flows. **CO3** Summarize the correlations for forced and free convection. **CO4** Explain the interaction of radiations with materials. CO₅ Solve numerical by applying gained theoretical knowledge. Unit-No. **Content** BL Contact **Learning Outcome** Hour I Introduction to three modes 12 Analyze the basic modes of heat 1.2 transfer, Derivation of heat balance transfer equation- Steady one dimensional solution for conduction heat transfer in Cartesian, cylindrical and spherical geometry, of conduction and film concept resistances, critical insulation thickness, lumped system approximation and Biot number, heat transfer through pin fins-Two dimensional conduction solutions for both steady and unsteady heat transferapproximate solution to unsteady conduction heat transfer by the use of Haussler charts II Heat convection, basic equations, 8 Analyze different of 3.4 types layersboundary Forced convection methods convection, external and internal flows- Natural convective heat transfer- Dimensionless parameters for forced and free convection heat transfer-Correlations for forced and free convection- Approximate solutions to laminar boundary layer equations (momentum and energy) for both internal and external flow- Estimating heat transfer

	rates in laminar and turbulent flow situations using appropriate correlations for free and forced convection.			
III	Interaction of radiation with materials, definitions of radioactive properties, Stefan Boltzmann's law, Black and gray body radiation, Calculation of radiation heat transfer between surfaces using radioactive properties, view factors and the grandiosity method.	6	Explain the interaction of radiations with materials.	3,4
IV	Types of heat exchangers, Analysis and design of heat exchangers using both LMTD and $\epsilon$ -NTU methods.	6	Design devices such as heat exchangers and also estimate the insulation needed to reduce heat losses where necessary.	5,6
V	Boiling and Condensation heat transfer, Pool boiling curve. Introduction mass transfer, Similarity between heat and mass transfer.	4	Students will learn to understand boiling and condensation phenomenon	5,6
Practical	Emissivity measurement     Heat transfer through composite wall     Natural convection and forced convection	20	Study to find out the emissivity of Black body and grey body, Study to find out the heat transfer coefficient of composite wall, Study to find out the convection coefficient.	

- 1. Bejan, Heat Transfer John Wiley, 1993
- 2. J.P.Holman, Heat Transfer, Eighth Edition, McGraw Hill, 1997.
- 3. F.P.Incropera, and D.P. Dewitt, Fundamentals of Heat and Mass Transfer, John Wiley, Sixth Edition, 2007.

## **REFERENCE BOOKS:**

- 1. MassoudKaviany, Principles of Heat Transfer, John Wiley, 2002
- 2. Yunus A Cengel, Heat Transfer: A Practical Approach, McGraw Hill, 2002

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the basic modes of heat transfer.	1&2					
2	Discuss conduction heat transfer for steady and unsteady flows.	1,2,3					
3	Summarize the correlations for forced and free convection.	1,2,3,4					
4	Explain the interaction of radiations with materials.	1&2					
5	Solve numerical by applying gained theoretical knowledge.	1,2,3					

		SEMESTEI	R - V						
Course Title Solid Mechanics									
Course code	22BTME312R	Total credits: 3	L T P S R O/F						С
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite			•	N	il		
Programme	Bachelor of Technology in Mechanical Engineering								
Semester		Fall/ V semester o	f 3rd yea	r of t	he pro	gramn	1e		
Course	1. To understand th	e theories of design							
Objectives	2. To calculate the	pressure in any pressure	evessel						
(Minimum 3)	3. To understand th	e materials behaviour u	nder diff	erent l	load co	ndition	S		
CO1	Compute the multic	limensional stress probl	lems						
CO2	Interpret the bound	ary value problems in st	tressed be	ody					
CO3	Illustrate the analys	is of the n-Dimensional	l forces a	cting	on an a	rticle			
CO4		on various type of cylin							
CO5	Transform the conc	epts of solid mechanics	into diff	erent	real-tin	ne mod	els		
Unit-No.	Co	ontent	Contac	t	Le	arning	g Outco	ome	BL
			Hour				,		
I	Introduction to	Cartesian tensors,	5	Co	mpute	the mu	ltidime	nsional	2,4
	Strains: Concept of	of strain, derivation of			ess pro				
	small strain tensor			•					
	Stress: Derivation								
	and equilibriun	n and symmetry							
	equations, princ	ipal stresses and							
	directions								
II	Constitutive equ	ations: Generalized	5	Int	terpret	the	bounda	ary value	2,4,
	Hooke's law, Line	ear elasticity, Material		pre	oblems	in stres	ssed bo	dy	5
	symmetry; Bound	ary Value Problems:							
	concepts of	uniqueness and							
	superposition.								
III	Plane stress and p	lane strain problems,	7	Ill	ustrate	the ar	nalysis	of the n-	2,4,
	introduction to go	overning equations in		Di	mensio	nal for	ces act	ting on an	5
	cylindrical and s	pherical coordinates,		art	ticle				
	axisymmetric prob	olems.							
IV	Application to thic	ck cylinders, rotating	10	As	ssess t	he stre	esses c	n various	2,4,
	discs, torsion of no	on-circular cross-		tyı	pe of cy	linders	\$		5
	sections, stress con	ncentration problems,			-				
		2-d contact problems.							
V		potentials. Energy	9	Tr	ansforn	n the	concept	s of solid	2,4,
	methods. Introduc						_	t real-time	5
		•		mo	odels				

- 1. G. T. Mase, R. E. Smelser and G. E. Mase, Continuum Mechanics for Engineers, Third
  - Edition, CRC Press, 2004.
- 2. Y. C. Fung, Foundations of Solid Mechanics, Prentice Hall International, 1965.
- 3. Lawrence. E. Malvern, Introduction to Mechanics of a Continuous Medium, Prentice Hall International, 1969.

	CO PO Mapping	
SN	Course Outcome (CO)	<b>Mapped Program Outcome</b>
1	Compute the multidimensional stress problems	1,2,3,4
2	Interpret the boundary value problems in stressed body	1,2,3,4
3	Illustrate the analysis of the n-Dimensional forces acting on an article	1,2,3
4	Assess the stresses on various type of cylinders	1&2
5	Transform the concepts of solid mechanics into different real-time models	1&2

SEMESTER – V										
Course Title		Manuf	acturing	Proc	cesses					
Course code	22BTME313R	<b>Total credits: 3</b>	L	T	P	S	R	O/F	C	
		Total hours: 36	3	0	0	0	0	0	3	
Pre-requisite	Nil	Co-requisite				Ni	il	l	I	
Programme		Bachelor of Technol	logy in N	<b>Iecha</b>	nical E	nginee	ring			
Semester	Fall/ V semester of 3rd year of the programme									
Course	1. To motivate	and challenge student	s to unde	erstan	d and de	evelop a	an appr	eciation of	the	
Objectives	processes in	correlation with mate	rial prop	erties	which c	hange	the shap	e, size and	form	
(Minimum 3)	of the raw r	naterials into the desira	ıble prod	uct by	y convei	ntional	or unco	nventional		
	manufactur	ing methods.								
	2. Understand	the application of mac	hining p	roces	ses					
	3. Application	of the non-convention	al machi	ning	processe	es.				
CO1	Understand differen	t casting processes and	their ap	plicat	ion for p	produci	ng diffe	erent produ	cts	
CO2	Analyze the differen	nt forming processes ar	nd their a	pplic	ation					
CO3	Understand the med	hanism of metal cuttin	g proces	ses ar	d their a	applicat	ion in o	lifferent		
	machining operation	ıs								
CO4	Understand the add	tive manufacturing and	d the wel	ding	principle	es, desi	gn and	application		
CO5	Distinguish between	n different non-conv	entional	man	ufacturi	ng pro	cesses	and study	their	
	working principle, i	nechanism of metal rea	noval an	d the	effect o	f variou	is proce	ess paramet	ers	
Unit-No.	Co	ntent	Contac Hour		Le	earning	Outco	ome	BL	
I	Casting and mou	lding: Metal casting	5	L	Learn the different process of 1,					
	processes and equ	ipment, Heat transfer		c	casting, moulding and forming					
	and solidification	n, shrinkage, riser								
	design, casting of	lefects and residual								
	stresses.									
II	Introduction to b	alk and sheet metal	4	L	earn t	he di	fferent	forming	3,4	
		eformation and yield		p	rocesses	and the	eir appl	ication		
		tals of hot and cold								
	0 1	; load estimation for								
	bulk forming									
		g) and sheet forming								
	(shearing, deep	drawing, bending)								
	principles									
TTT	of powder metallu		0	т.		. ما <b>د</b> ام	1-		2.4	
III		ngle and multi-point	8					nanism of	3,4	
		nal cutting, various s: Chip formation,		l II	etal cut	ung pro	cesses			
	_	ol life, Surface finish								
		achinability, Cutting								
		tting fluids, Coating;								
		Milling and finishing								
	processes,									
	Processes,									

	Introduction to CNC machining			
IV	Additive manufacturing: Rapid prototyping and rapid tooling, Joining/fastening processes: Physics of welding, brazing and soldering; design considerations in welding, Solid and liquid state joining processes; Adhesive bonding	7	Learn the application of additive manufacturing, and different joining processes	5,6
V	Unconventional Machining Processes: Abrasive Jet Machining, Water Jet Machining, Abrasive Water Jet Machining, Ultrasonic Machining, principles and process parameters, Electrical Discharge Machining, principle and processes parameters, MRR, surface finish, tool wear, dielectric, power and control circuits, wire EDM; Electro-chemical machining (ECM), etchant & masking, process parameters, MRR and surface finish, Laser Beam Machining (LBM), Plasma Arc Machining (PAM) and Electron Beam Machining	12	Application of non-conventional machining processes	5,6

- 1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014
- 2. Mikell P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes, and Systems

## **REFERENCE BOOKS:**

1. Degarmo, BLack & Kohser, Materials and Processes in Manufacturing

	CO PO Mapping	
SN	Course Outcome (CO)	<b>Mapped Program Outcome</b>
1	Understand different casting processes and their application for producing different products	1,2&3
2	Analyze the different forming processes and their application	1,2,3,4
3	Understand the mechanism of metal cutting processes and their application in different machining operations	1,2,3

4	Understand the additive manufacturing and the welding principles, design and application	1,2&3
5	Distinguish between different non-conventional manufacturing processes and study their working principle, mechanism of metal removal and the effect of various process parameters	1 2 8-2

				SEMESTE	R – V							
Course Ti	tle			Kinematics a	nd Theo	ry of	Machin	nes				
Course co	de	22B	TME314R	Total credits: 3	L	T	P	S	R	O/F	С	
				Total hours: 36	3	0	0	0	0	0	3	
Pre-requis	site		Nil	Co-requisite	Nil							
Programn	ne	Bache	lor of Techno	logy in Mechanical E	ngineeri	ng						
Semester		Fall/ V	semester of	3rd year of the progr	amme							
Course		1.	To understan	d the kinematics and ri	gid- bod	y dyna	amics of	f cinen	natically	y driven mad	chine	
Objectives	S		components.									
(Minimun	n 3)	2.	To understan	d the motion of linked	mechani	sms ir	terms o	of the o	displace	ement, veloc	eity	
			and accelerat	ion at any point in a rig	gid link.							
		3.	To be able to	design some linkage n	nechanis	ms an	d cam s	ystems	to gene	erate specifi	ed	
			output motion	1.								
		4.	To understan	d the kinematics of gea	ar trains.							
CO1		Ability	to conduct sta	tic and dynamic force	analysis	and ed	quilibriu	ım of f	orces fo	or mechanic	al	
		system										
CO2		Apply	basic principle	s of mechanisms in me	echanical	syste	ms.					
CO3		Perform balancing of rotating and reciprocating masses.										
CO4		Illustrate gear operation										
CO5		Know	the various lin	k mechanism								
Unit-			Conte	nt	Contac	et	Le	earning	g Outco	ome	BL	
No.					Hour							
I	Clas	sification	on of mechani	sms- Basic kinematic	5	A	bility 1	to co	nduct	static and	1,2	
	conc	epts ar	and definitions- Degree of freedom, dynamic force analysis and						lysis and			
	mob	ility- G	rashof's law,	Kinematic inversions		ec	equilibrium of forces for					
				er crank chains-Limit		m	echanic	al syst	ems.			
	posit			vantage Transmission								
	angle		escription o									
				n mechanism, straight								
		_		rsal Joint- Rocker								
		nanism										
II	•	laceme	•	and acceleration	10		pply	basic	_	ciples of	1,2	
	-		•	chanisms, graphical			echanis	ms	in 1	mechanical	3,4	
		-		nstantaneous centres,		sy	stems.					
		-		analysis using loop								
		_		tic analysis of simple								
		nanism:		crank mechanism								
	•	mics	Coincident	points- Carioles								
				on- introduction to								
				position graphical								
				eath generation.	40	-	<u> </u>	1 .			2.4	
III		sificatio			10				-	otating and	3,4	
		_		tions- Displacement		re	ciproca	ting ma	asses.			
	diag	rams-U	niiorm veloci	ty, parabolic, simple								

	harmonic and cyclical motions- derivatives of follower motions- specified contour cams- circular and tangent cams- pressure angle and undercutting, sizing of cams, graphical and analytical disc cam profile synthesis for roller			
	and flat face followers.			
IV	Involutes and cyclical gear profiles, gear parameters, fundamental law of gearing and conjugate action, spur gear contact ratio and interference/undercutting- helical, bevel, worm, rack & pinion gears, epicyclical and regular gear train kinematics.	6	Illustrate gear operation	3,4 5,6
V	Surface contacts- sliding and rolling friction- friction drives- bearings and lubrication, friction clutches- belt and rope drives- friction in brakes.	5	Know the various link mechanism	3,4, 5,6

- 1. Thomas Bevan, Theory of Machines, 3rd edition, CBS Publishers & Distributors, 2005.
- 2. Cleghorn W.L., Mechanisms of Machines, Oxford University Press, 2005.

## **REFERENCE BOOKS:**

- 1. Robert L. Norton, Kinematics and Dynamics of Machinery, Tata McGrawHill, 2009.
- 2. Ghosh A. and Mallick A.K., Theory of Mechanisms and Machines, Affiliated East- West Pvt. Ltd, New Delhi, 1988.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Ability to conduct static and dynamic force analysis and equilibrium of forces for mechanical systems.	1,2&3				
2	Apply basic principles of mechanisms in mechanical systems.	1,2&4				
3	Perform balancing of rotating and reciprocating masses.	1,2&4				
4	Illustrate gear operation	1,2&4				
5	Know the various link mechanism	1,2&4				

		SEMESTER	. – V						
<b>Course Title</b>	COMPETENT ENG	LISH FOR ENGINER	ERS (C	ommui	nicative	Englis	sh &		
	Soft Skills)								
Course code	22UBPD314R	<b>Total credits: 2</b>	L	T	P	S	R	O/F	C
		Total hours: 30	0	0	4	0	0	0	2
Pre-requisite	Nil	Co-requisite				N	il		
Programme	Bachelor of Techno	logy in Mechanical En	gineeri	ng					
Semester		Brd year of the prograi							
Course		ove the comprehension							
Objectives		anding key concepts and					-		
(Minimum 3)		confidence with the cha	nce to 1	eflect	on their	r non-v	erbal ar	nd verbal	
	communication								
CO1		e learning and practicing							
CO2		arning and effective prac			nt type	s of wi	iting.		
CO3	-	w to answer difficult qu	uestions	<b>\</b>					
CO4	Develop interview str	•							
CO5	Improve communicat	on skills, and reduce yo	our stres	s before	re an ac	ctual jo	b interv	iew	
Unit-No.	Cor	tent	Contac Hour		Le	arning	g Outco	me	BL
I	Grammar		5	Co	urse w	ill ado	d to the	e learning	1,2
	Forming Who-Ques	ions		and	d pra	acticing	g of	English	
	Comprehension skill	s		gra	grammar lessons.				
II	Writing Skills		5	Co	Course will add to learning and 1			1,2	
	Project Proposal wri	ting			effective practice in different				
	Report writing				es of w	-			
	Notice writing								
III	Email Etiquette		10	It v	vill hel	p to lea	arn how	to answer	3,4
	Effective Email Con	nmunication		dif	ficult q	uestior	ıs		
	What does a custome	er expect,							
	Understanding Emai	l writing,							
	Email Response								
	Magic Words &Wor	der Phrases,							
	Email Code of Ethic	s,							
	Improvement Areas,								
	General Feedback,								
	Mock Session and F								
IV	Common interview	Questions	5	De	velop i	ntervie	w strate	egies	3,4
	Practical session								
V	Mock Interview		5		•		unicati		3,4
	Practical Mock Inter					-		before an	
	Feedback- Receiving	g Feedback,		act	ual job	intervi	lew		
	Giving Feedback,								
	Advantages of Effec								
	How to deal with ne	gative feedback.							

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann. 2008. Cracking the Coding Interview (Indian Edition).

## **Reference Books:**

- Sharma, R C., Mohan, Krishna. Nirban, Virendra Singh. (2020) Business Correspondence and Report Writing - A Practical Approach to Business and Technical Communication, McGraw Hill
- 2. Vas, Prem. (2020) How to Sharpen Your Interview Skills Be a Rockstar @ Interviews. A must read from an Intern to a CEO, Guru cool Publishers

## **Other Learning Resources:**

- 1. https://slite.com/learn/how-to-write-project-proposal
- 2. https://www.mailmodo.com/guides/email-etiquette/

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The course adds to the learning and practicing of	6,8&10
	English grammar lessons.	
2	The course adds to learning and effective practice in	6,8&10
	different types of writing.	
3	It will help to learn how to answer difficult	6,8&10
	questions	
4	Develop interview strategies	6,8&10
5	Improve communication skills, and reduce your	6,8&10
	stress before an actual job interview	

		SEMESTE	R - V						
<b>Course Title</b>		Extra-cui		Activ	ities				
Course code	22UBEC311	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 15P	0	0	0	4	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite		D. Taak Maa	hamiaal	E					
Programme Semester		B. Tech Med Fall/ V semester of t				romm	0		
Course		ran v semester or t	iii u yez	ii Oi t	ne prog	1 allilli	<u> </u>		
Objectives	1. Equip students	with effective time ma	nagemer	nt and	prioritiz	zation s	skills, fo	ostering lea	dership
(Minimum 3)	qualities and a commitm		-		•		·	C	•
	<ol> <li>Encourage exploration of interests beyond academics and participation in co-curricular activities, cultivating well-rounded individuals capable of making meaningful community contributions.</li> <li>Enhance students' abilities to express ideas clearly and engage in in-depth evaluation and analysis, while integrating learning experiences to practice transferable skills across various activities.</li> </ol>								
CO1	Learn to a plan so the manage their time and p	priorities.							
CO2	Transform passionate academics.	students who demons	strate le	adersh	np and	pursue	e intere	ests beyond	their
CO3	Learn to participate in development.	various co-curricular	activiti	es lea	nding to	their	multifa	aceted perso	onality
CO4	Express their ideas, view	ws, In-depth evaluation	and ana	lysis (	clearly in	n the to	pic of t	their interes	t.
CO5	Demonstrate and praction transferable skills.	ces different activities,	by Integ	rating	g learnin	g expe	riences	by demons	trating
Unit-	Conte	nt	Conta		Le	earning	g Outco	ome	BL
No.			Hour						
	AdtU encourages a range the regular curriculum learner's interest, These addevelop the social and soft holistic development of the in mind the 360 degree learner the students are engaged in the headed under different clul photography, drama, literal are encouraged to particulativities, workshops, committerest and hobbies, The the club are trained representations, Renewed per to conduct workshops that and students by giving the learn from experts in the results.	intended to meet ctivities are aimed to skills and promote a me learners, Keeping carning methodology in different activities as viz. Dance, music, ry etc., The students pate in regular club petitions as per their student members of sent AdtU in various and national level resonalities are invited benefit the members nem the platform to	15	to ac ga	develop chieve ho	social a listic de ure thro	and soft evelopm ough wo	ent, and rkshops and	1,2

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7				
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8				
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10				
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12				
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10				

		SEMESTI							
Course Title		CO-CURRI	CULAR	ACTI	VITIE	ES			
Course	22UBCC221	Total credits: 1	L	T	P	S	R	O/F	C
code		Total hours: 15F	0	0	0	4	0	0	1
Pre- requisit	Nil	Co-requisite				N	lil		
Program		B. Tech Me	chanical	Engi	neerin	g			
me									
Semeste	er l	Fall/ V semester of	Third ye	ar of	the pro	ogram	me		
Course Objectiv		needs of the studen	ts and co	vering	g a broa	ad/wid	e range	of their al	oilities
es	and talents.								
(Minim) m 3)	2.To stimula	te the interests in th nts to participate	e studen	ts and	provid	le equa	al oppo	ortunities to	all
	developi	e the learning expering their inner ski we skills etc.					_		
CO1	Apply foundational ac and situations.	eclimatization princi	iples to a	adapt	effectiv	vely ir	diver	se environ	ments
CO2	Analyze environmenta understanding of adapt		g acclim	g acclimatization, demonstrating a comprehensive					
CO3	Evaluate personal ada acclimatization challer	ptability through pra	actical ex	ercise	s, fost	ering a	proac	tive approa	ach to
CO4	Synthesize acclimatiz flexibility in response.		varying	cont	exts, o	demon	strating	g creativity	and
CO5	Demonstrate mastery	in acclimatization	techniqu	es, ut	ilizing	critic	al thin	king to ac	ldress
	unforeseen challenges.								
Unit- No.	Conten	t	Contac Hour		Le	earnin	g Outc	ome	BL
I	AdtU has included co-curri	cular activities as	Hour						
	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better					work and riculum, be through ting in	1,2		

from a 360 degree perspective.

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5,7			
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8			
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7,9,10			
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12			
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10			

		SEMESTER	1 – <b>V</b>						
Course Ti	tle	Competent Er		or Eng	ineers				
Course co		Total credits: 2	L	T	P	S	R	O/F	С
		Total hours: 30P	0	0	4	0	0	0	2
Pre-	Nil	Co-requisite					:1		
requisite	NII	Co-requisite				11	l <b>i</b>		
Programn	ne	B. Tech Mech	anical	Engin	eering				
Semester		all/V semester of Th				gramm	e		
Course									
Objectives	_			_	_			•	-
(Minimun					applica	tions	in civi	l engineeri	ng fo
3)	designing, constructing, a	nd maintaining infrast	ructure.	•					
	2 F	- C : 1	. 1	1 . 44	4-11	1 6		·	
	2. Focus on crafting pro			er ieu	ers tan	orea 10	or engi	meering pos	sitions,
	improving students' chanc	es of securing employ	ment.						
	3. Strengthen teamwork a	bilities and prepare st	udents	for iol	b interv	iews th	rough	practical ex	ercises
	and targeted training, enhance			-				r	
CO1	Demonstrate clear and		ommuni	cation	in bo	oth wr	itten a	and oral for	rmats,
002	incorporating industry-spe			1 .	1 1 1			1 1	
CO2	Develop expertise in crafe engineering qualifications		etters, a	ind tec	chnical	reports	to eff	ectively sho	wcase
CO3			o imna	ectful	present	ations	ntilizi	no visual a	ids to
Acquire proficiency in creating and delivering impactful presentation convey engineering concepts to diverse audiences.				ations,	GUIIZI	115 113001 0	103 10		
CO4	Cultivate effective interp			ve tea	mwork	, emph	asizing	g active list	ening,
		inflict resolution, and clear communication within engineering contexts.							
CO5	Prepare for engineering jo					, exper	iences,	and career	goals,
Unit-	addressing both technical  Content					ownine	Outo	0 <b>m</b> 0	DI
No.	Content		Contac Hour		Lt	earning	Guice	ome	BL
I	Writing Skills		11041		evelop	profici	ency	in various	
	i. Paragraph Writing & Nar	ratives						including	
	ii. Letter Writing				ragraph		and	narrative	
	iii. Technical Writing							riting, and	
			6	lec	chnical	uocum	:111at10	11.	1,2
	Pipe and cistern	aiata							
	<ul><li>i. Introduction of pipes and</li><li>ii. Solving different types of</li></ul>								
	iii. Worksheet1 and Worksh	•							
II	Self-Management Skills			G	ain co	mpeter	ncy i	n solving	
	i. SWOT Analysis			_		_		ted to pipes	
	ii. Goal Setting and Persona	1 Hygiene		an		sterns,	mixt		
	Mixture allegation and Cle		_		iegation ss, ar		cks, a scounts	and profit, through	1.2
	<u> </u>	UCK	6					orksheets.	1,2
	i. Introduction of basics				•				
	ii. Solving questions on mix	ture and allegation.							
1	iii.Worksheet1 and Worksho	eet 2							

			T	
***				
III	Vocabulary Development			
	i. Understanding different aspects of a word			
	(such as the use of say, tell, speak).			
	ii. Learning strategies to develop vocabulary			
	iii Contextual vocabulary learning		Enhance personal effectiveness	
	iv. Use of phrasal verbs and idioms in a	6	through SWOT analysis, goal	1,2
	conversation	U	setting, and maintaining personal	1,2
	v. Effectively using dictionary, thesaurus		hygiene.	
	Statement and Course of action			
	<ul><li>i. Revision of syllogism</li><li>ii. Statement and conclusion</li></ul>			
	iii. Course of action based on statement			
	iv. Worksheet1 and Worksheet 2			
IV	Interview Skills & Dress Code Ethics			
	i. Types of interview-			
	telephonic, virtual & face to face			
	online interview, personal interview, Panel			
	interview, Group interview		Language vocahulam thusuah	
	ii. Common interview questions and answering		Improve vocabulary through understanding word usage,	
	strategies		contextual learning, and effective	
	iii. Dress Code Ethics during Interviews	6	dictionary use, and strengthen	1,2
	iv. Mock Interview Session		logical reasoning with practice in	
	THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY OF THE PROPERTY O		syllogisms, statements,	
	Sitting arrangement (puzzle)		conclusions, and courses of	
	i. Linear arrangement puzzle		action.	
	ii. Circular arrangement puzzle			
	iii. Matrix			
V	Iv. Worksheet1			
₹	Grammar (Flipped Classroom)		Master interview techniques for	
	i. Word-stress, Syllables		various formats, understand dress	
	Practice Session: Common Errors (testing the	6	code ethics, and improve	
	students' grammar already learnt)		performance through mock	1.0
	Profit loss and discount	0	interviews and puzzle-solving	1,2
	i. Introduction to basics		exercises in linear, circular, and	
	ii. Introduction to discount		matrix arrangements.	
	iii. Problems related on the topics			
	iv. Worksheet1 and Worksheet 2			

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensable Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

## **Reference Books:**

- 5. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 6. Fast track Objective mathematics for Competitive exam by Arihant
- 7. General Mental Ability & Logical Reasoning Compendium by R.S. Agarwala

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7				
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8				
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7, 9&10				
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12				
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10				

## MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME311R	Heat Transfer	3	3	3	2	1		1	1	1	3		
22BTME312R	Solid Mechanics	3	1	3	2			2	2	2	2	1	1
22BTME313R	Manufacturing Process	3	3	3	3		1	2		1			
22BTME314R	Kinetics and Theory of Machines	3	2	3	2		1	1					
22UBPD314R	Competent English for Engineers		2	1	2	2		1	1	1			
22UBCC311	Co-curricular							2		2	1		1
22UBEC311	Extra-curricular	2	1	2	1								1

SEMESTER – VI										
Course Title	Ma	anufactu	uring	ςT	ech	nol	ogy	7		
Course code	22BTME321R	Tota	· -	L	T	P	S	R	O/F	C
		credits		3	0	0	0	0	0	3
		Tota								
		hours								
D 11	<b>3.701</b>	36T								
Pre-requisite	Nil	Co-					•	Nil		
Programme	Bachelor of Te	requis		М	ach	oni	പ	Fne	ningar	ina
Semester	Fall/ VI seme									
Course Objectives	1. To provi									
(Minimum 3)		or manuf								
(2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/2/	2. To underst									
		ystem in								
	3. To identif									rance
	of the pro	ducts and	d the	op	tim	alit	y o	f the	e proce	ess in
	terms	of resou	urces	an	d ti	me	ma	nag	ement	
CO1	Enable to the to									
222	dimensional a									
CO2	Understand th									
CO3	Understand the					niza	itio	n m	ethods	in
20.4			nufac							
CO4	To analyze th									
CO5	Understanding Po							ne ai	nd Kaj	olan
Unit-No.	Content	bines, w	Cont			_		rniı	207	BL
Cint-ivo.	Content	'	Hot		L			con	_	DL
	Tooling for		1100				Jui	COII		
	conventional a									
	non-convention									
	machining					_			.4	
	processes:								the	
	Mould and die de	sign,				t00.		_	eded	
	Press tools, Cut					ma		or	ıring	
I	tools; Holding to		7		١,				ional	1,2
•	Jigs and fixture	es,	/						and	1 -,2
	principles,						•			
	applications ar					tolerances of products				
	design; press too					J	r-0			
	configuration, de									
	of die and pund									
	principles of for	ging								
	die design.									

		1		
	Metrology:			
	Dimensions, forms			
	and surface			
	measurements,			
	Limits, fits and			
	tolerances; linear and			
	angular			
	measurements;			
	comparators; gauge			
	design;		Introduction to	
	interferometry;		Metrology and	
	Metrology in tool			
	wear and part quality	_	its various uses	
II	including surface	7	in linear and	2,3
	integrity, alignment		angular	
	and testing methods;		measurements	
	tolerance analysis in			
	manufacturing and			
	assemBLy. Process			
	metrology for			
	emerging machining			
	processes such as micro-scale			
	machining, Inspection			
	and workpiece			
	quality.			
	Assembly practices:		Understand the assembly of different	
	Manufacturing and			
III	assembly, process	7		3,4
	planning, selective			
	assembly, Material		components	
	handling and devices. <b>Linear</b>			-
	programming:			
	Objective function		Introduction to	
	and constraints,		linear	
	graphical method,		programming	
	Simplex and duplex		and its	
	algorithms,		applications,	
	transportation		Simplex and	
IV	assignment, Traveling	8	Duplex	4,5
•	Salesman problem;		algorithms,	,-
	Network models:		Transportation,	
	shortest route,		Network	
	minimal spanning		models and	
	tree, maximum flow		Project	
	model- Project		networks	
	networks: CPM and			
	PERT, critical path			
	scheduling			<u> </u>
	Production		To analyze the	
	planning& control:	_	flow in water	
	Forecasting models,	7		4,5
${f V}$	<u> </u>		pumps and	.,.
V	aggregate production		pumps and turbines.	.,0

planning, materials		
requirement planning.		
Inventory Models:		
Economic Order		
Quantity, quantity		
discount models,		
stochastic inventory		
models, practical		
inventory control		
models, JIT. Simple		
queuing theory		
models		

- 1. Kalpakjian and Schmid, Manufacturing processes for engineering materials (5th Edition)- Pearson India, 2014.V. Mote, S. Paul, G. Gupta (2004), Managerial Economics, Tata McGraw Hill
- 2. Taha H. A., Operations Research, 6th Edition, Prentice Hall of India, 2003.

## **Reference Books:**

**1.** Shenoy G.V. and Shrivastava U.K., Operations Research for Management, Wiley Eastern, 1994.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Enable to the tooling needed for manufacturing the dimensional accuracy and tolerances of products	1,3&5
2	Understand the assembly of different components	1,2&4
3	Understand the application of optimization methods in manufacturing	1,2&5
4	To analyze the flow in water pumps and turbines.	3&5
5	Understanding Pelton wheel, Francis turbine and Kaplan turbines, working principles	3,4

	SEMESTER	R – VI						
Course Title	D	esign of M	ach	ine	El	emer	ts	
Course code	<b>22BTME322R</b>	Total	L	T	P	SF	R O/F	С
		credits: 4	2	1	2	0 (	0	4
		Total						
		hours:						
		36T						
Pre-requisite	Nil	Co-				]	Nil	
		requisite						
Programme	Bachelor of T							
Semester	Fall/ VI sem							
Course Objectives		backgrou						
(Minimum 3)		ilure crite						e safety-
		esign of ma				-		
		erstanding				_		
		lity of emp			des	ıgn p	rıncıpl	es, based
	-	considerat					1	
	3. An over						as an	a aesign
		s for differ					-4::	لمسم سمئه
	4. An appr		Гр	arai	пеі	er o	pumiza	mon and
	design ite		£.	tha.	***	latio	achina	hatryaan
	5. An appr						-	
	_	nt level esign and p		_			veran	macinie
	system u	esign and p	CII	JI 111	anc			
CO1	Upon completi	on of this	CO	nrs	e (	stude	nts wi	11 oet an
601	overview of th							
	the design of v							oyeu ioi
CO2	Understand the							tatic and
	fatigue loadings	*****						
CO3	Understand bear	ings, its typ	es	and	the	e desi	gn asp	ects
CO4	Understanding g							
	etc.							
CO5	Analysis of Join	ts, Screws,	Bra	ikes	an	d Co	uplings	}
Unit-No.	Content	Con	tac	t	I	Learr	ing	BL
		Ho				Outco	_	
	Design							
	consideration	s -				_		
	limits, fits ar	ıd					anding	
I	standardizatio					he de	_	
	Review of failure theories for static static limits, fits and							1,2
	theories for sta	atic						
	and dynami	e		5	star	idard	ization	
	loading (includ	ling						
	fatigue failur	e)						

II	Design of shafts under static and fatigue loadings	9	Designing of shafts under static and fatigue loadings	2,3,4,5
III	Analysis and design of sliding and rolling contact bearings	6	Understand bearings, its types and the design aspects	2,3,4,5
IV	Design of transmission elements: spur, helical, bevel and worm gears; belt and chain drives, Design of springs: helical compression, tension, torsional and leaf springs	6	Understanding gears, gear transmission, drives, springs etc.	4,5
V	Design of joints: threaded fasteners, pre-loaded bolts and welded joints, Analysis and applications of power screws and couplings, Analysis of clutches and brakes	6	Analysis of Joints, Screws, Brakes and Couplings.	2,3,4,5

- 1. Shigley, J.E. and Mischke, C.R., Mechanical Engineering Design, Fifth Edition, McGraw-Hill International; 1989.
- 2. Deutschman, D., Michels, W.J. and Wilson, C.E., Machine Design Theory and Practice, Macmillan, 1992.

## **Reference Books:**

- 1. Juvinal, R.C., Fundamentals of Machine Component Design, John Wiley, 1994.
- 2. Spottes, M.F., Design of Machine elements, Prentice-Hall India, 1994.
- 3. R. L. Norton, Mechanical Design An Integrated Approach, Prentice Hall, 1998.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Upon completion of this course, students will get an overview of the design methodologies employed for the design of various machine components	1,2,3
2	Understand the designing of shafts under static and fatigue loadings	1,2,3
3	Understand bearings, its types and the design aspects	2,3
4	Understanding gears, gear transmission, drives, springs etc	1,2,4
5	Analysis of Joints, Screws, Brakes and Couplings	2,3,4

	SEM	IESTER -	-VI							
Course Title		Mechatro	onic sy	ster	ns					
Course code		Total cred		<b>L</b> 3	T 0	P 0	S 0	R 0	O/F 0	C 3
_	3	Total hour 36T						<b>.</b>		
Pre- requisite	Nil	Co-requi	quisite Nil							
Programme	Bachelor of Te						_		_	
Semester	Fall/ VI seme					_				
Course	1. To understand the s		micro	pro	cess	sors	and	their	r applic	ations
Objectives	in mechanical device		. ,	,•					1	,•
(Minimum	2. To understand the p									notion
3)	control systems, wit	-								one in
	3. To understand the various fields.	use of III	110-86	-11SC	лѕ	anu	uie	ıı af	pricatio	7115 III
CO1	Enable to understand an	overview	of me	cha	itro	nics	ap	plica	itions	
CO2	Enable to understand the us									
CO3	Enable to understand the	interdisc	iplinar	y c	onc	epts	of	Me	chanica	l and
	Electronics Engineering									
CO4	Enable to understand Smar									ics
CO5	Enable to understand		and a	ctu	ator	s,	emł	edd	ed sys	stems,
<b>T</b> T • ( <b>N</b> T	programmable logic device	es	<u> </u>							DI
Unit-No.	Content		Cont Hou		1	∠ear	nın	g Ou	itcome	BL
I	Introduction: Definition of Mechanical Systems, Philo and approach; Systems and Design: Mechatronic appr Integrated Product Design Modelling, Analysis and Simulation, Man-Machine Interface	osophy d roach,	6			n	over nech	stanc view atror catio	nics	2
II	Sensors and transducers: classification, Development in Transducer technology, Optoelectronics-Shaft encoders, CD Sensors, Vision System, etc.				Enable to understand the use of micro-sensors and microprocessors					
III	Drives and Actuators: He and Pneumatic drives, I Actuators such as servo in Stepper motor, Drive open and closed loop Embedded Systems: He Structure, Software Des	Electrical notor and circuits, control;	6			Emb	driv actu eddo	-	nd	2

	Communication, Programmable Logic Devices, Automatic Control and Real Time Control Systems		devices	
IV	Smart materials: Shape Memory Alloy, Piezoelectric and Magnetostrictive Actuators: Materials, Static and dynamic characteristics, illustrative examples for positioning, vibration isolation, etc.	8	Understanding Smart materials, Static and Dynamic characteristics	2
V	Micromechatronic systems: Microsensors, Microactuators; Micro-fabrication techniques LIGA Process: Lithography, etching, Micro-joining etc. Application examples; Case studies Examples of Mechatronic Systems from Robotics Manufacturing, Machine Diagnostics, Road vehicles and Medical Technology	10	Enable to understand the interdisciplinary concepts of Mechanical and Electronics Engineering.	2

- 1. Mechatronics System Design, Devdas Shetty & Richard A. Kolk, PWS Publishing Company (Thomson Learning Inc.)
- 2. A Textbook of Mechatronics, R. K. Rajput, S. Chand & Company Private Limited

## **Reference Books:**

- 1. Mechatronics: A Multidisciplinary Approach, William Bolton, Pearson Education
- 2. Mechatronics: Electronic Control Systems in Mechanical and Electrical Engineering, William Bolton, Prentice Hall

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Enable to understand an overview of mechatronics applications	2&3					
2	Enable to understand the use of micro-sensors and microprocessors	1,2&4					
3	Enable to understand the interdisciplinary concepts of Mechanical and Electronics Engineering	2,3					
4	Enable to understand Smart materials, Smart and Dynamic Characteristics	2&3					
5	Enable to understand drives and actuators, embedded systems, programmable logic devices	2&3					

SEMESTER -VI											
<b>Course Title</b>		<b>Internal Con</b>	busti	ion E	Engir	ıes					
Course code	<b>22BTME326E</b>	Total credits		_	P	S	R	O/F	C		
		3	3	0	0	0	0	0	3		
		Total hours:									
		36T									
Pre-	Nil	Co-requisit	e				Nil				
requisite											
Programme		Bachelor of Technology in Mechanical Engineering									
Semester		emester of th									
Course	1. To familiarize							IC eng	ines. To		
Objectives	understand the					nalys	sis.				
(Minimum	2. To understand		_								
3)	3. To understand					aran	neter	s and v	ariables		
	affecting it in v										
	4. To learn about					ngin	es an	d the ty	pe of IC		
	engine required						_				
CO1	Students will have a	Students will have a good understanding of the basics of IC engines									
CO2	Understanding how characteristics of IC E		rame	ters	infl	ueno	ce t	he op	erational		
CO3	To obtain the velocity flows	y and pressure	vari	ation	s in	vari	ous	types o	f simple		
CO4	To analyze the flow in										
CO5	Understanding Pelton	wheel, Franci	s turb	ine a	and F	Kapl	an tu	rbines,	working		
	principles										
Unit-No.	Content		ontac Hour	8					BL		
I	Review of ideal cy Details of fuel-air o		Knowledge o cycles and de fuel-air cy				tails of 1.2				
п	Combustion in SI a engines, Combustion Combustion chambed Abnormal combu	stages, ers and	8	,	work SI a	ing p and (	CI en	ding iples of gines stion	1,2		

III	Fuel supply systems in SI and CI engines, carburettors, Port fuel injection	8	Understanding fuel supply systems in SI and CI engines.	3,4
IV	Direct injection and Common rail injection. Ignition system, Lubrication system and Cooling system	6	Understanding the various systems used in ALCO engines	3,4
V	Testing of IC engines. Engine emissions and control. Advanced IC Engine concepts	6	Testing of IC engines, emissions and control.	1,2,4

- 1. Obert E. F, "Internal Combustion Engines and Air Pollution", Harper and Row Publication Inc. NY, 1973.
- 2. Heisler H, "Advanced Engine Technology", Edward Arnold, 1995.

## **Reference Books:**

- 1. Heywood J. B, "Internal Combustion Engine Fundamentals", McGraw Hill Book Co. NY, 1989
- 2. Heldt P. M, "High Speed Combustion Engines", Oxford & IBH publishing Co. India, 1985.
- 3. Stockel M W, Stockel T S and Johanson C, "Auto Fundamentals", The Goodheart, Wilcox Co. Inc., Illinois, 1996

CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome		
1	Students will have a good understanding of the basics of IC engines	2,3&4		
2	Understanding how different parameters influence the operational characteristics of IC Engines	1,2&3		
3	To obtain the velocity and pressure variations in various types of simple flows	2,3&4		

4	To analyze the flow in water pumps and turbines.	1,3&4
5	Understanding Pelton wheel, Francis turbine and Kaplan turbines, working principles	1,2&4

		SEMESTER -	- VI						
Course Ti									
Course co	de 22UBPD324R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	4	0	0	0	2
Pre-	Nil	Co-requisite				N	il		
requisite		<u> </u>							
Programn	ne	B. Tech Mecha							
Semester		Fall/ VI semester of thi	rd yea	er of t	he prog	gramm	ie		
Course	1 Davidon students' ob	ilitias in tachnical syriting	T (200	leina	and nr	scantati	one to	offootivoly.	aantiati
Objectives (Minimum	_	ilities in technical writing	_	-	_			-	-
<b>3</b> )		and solutions. Analyze			арриса	uions	111 C1V1	i engineeri	ing for
3)	designing, constructing	, and maintaining infrastro	acture.						
	2 Fooys on anofting	munifossional massumas and	1	1.44	ama tail	amad f			aitiona
		professional resumes and		er ieu	ers tan	orea 1	or engi	meering po	sitions,
	improving students' cha	nces of securing employn	nent.						
	2 Steamathan taamyyad	r abilities and muonaus str	donta	for io	h intom	.i.a.ra +1	amay ah	mmostical ar	
		c abilities and prepare stu					irougn	practical ex	Refuses
	and targeted training, en	nhancing their readiness for	or engi	meern	ig caree	ers.			
CO1	Demonstrate clear and	d concise technical cor	nmuni	cation	in bo	oth wr	itten a	nd oral fo	ormats
COI	incorporating industry-s		111110111	Cation	in oc	)tii vvi	itteii a	ina orar re	mais,
CO2	, <u> </u>	<u> </u>	ters, a	nd ted	chnical	reports	to effe	ectively sho	wcase
Develop expertise in crafting resumes, cover letters, and technical reports to effective engineering qualifications.									
CO3		creating and delivering	impa	ctful	present	ations,	utilizi	ng visual a	aids to
	convey engineering con	cepts to diverse audience	S.		•				
CO4		erpersonal skills for colla				_	nasizing	g active list	tening,
		clear communication with							
CO5		job interviews by articular	_	_		s, expe	riences,	and career	goals,
		al and behavioral question							1
Unit-	Conte		Contac		Le	earning	g Outco	ome	BL
No. I	Writing Skills		Hour		arval am	mmofio	ionori	in voniona	
1	•	T4'			rms (	_	riting,	in various including	
	i. Paragraph Writing & N	arratives						narrative	
	ii. Letter Writing							riting, and	
	iii. Technical Writing				chnical				
	Ding and sistana		7						1,2
	<b>Pipe and cistern</b> ii. Introduction of pipes a	nd cistern							
	iii. Solving different types								
	iv. Worksheet1 and Worl	_							
II	Self-Management Skills			Ga	ain co	mpete	ncy i	n solving	1
11									
11	i. SWOT Analysis		7	pr	actical	problei	•	ted to pipes	

	ii. Goal Setting and Personal Hygiene  Mixture allegation and Clock  i. Introduction of basics  ii. Solving questions on mixture and allegationion.  iii.Worksheet1 and Worksheet 2		allegations, clocks, and profit, loss, and discounts through targeted practice and worksheets.	
III	Vocabulary Development  i. Understanding different aspects of a word (such as the use of say, tell, speak).  ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i. Revision of syllogism ii. Statement and conclusion Iii. Course of action based on statement Iv. Worksheet1 and Worksheet 2	7	Enhance personal effectiveness through SWOT analysis, goal setting, and maintaining personal hygiene.	1,2
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session  Sitting arrangement (puzzle) i. Linear arrangement puzzle ii. Circular arrangement puzzle iii. Matrix Iv. Worksheet1	7	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom)  i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt)  Profit loss and discount  i. Introduction to basics  ii. Introduction to discount  iii. Problems related on the topics  Iv. Worksheet1 and Worksheet 2	7	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving exercises in linear, circular, and matrix arrangements.	1,2

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensable Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

## **Reference Books:**

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7			
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8			

3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

	SEMESTER – VI												
Course		CO-CURRICUL	AR AC	TIVIT	TIES								
Title				1	1		1 1						
Course	22UBCC321	Total credits: 1	L	T	P	S	R	<b>O</b> /	C				
code		Total hours: 30P		0	0	4	•	<u>F</u>	1				
Pre-	Nil	Co magnisita	0	0	0	4 Nil	0	0	<b>1</b> s				
requisite		Co-requisite				INII							
Program	1	B. Tech Mechan	ical En	gineer	inσ								
e		D. Teen Weenun	icui Di	Sincer	₅								
Semester	r Fa	ll/ VI semester of thir	d year o	of the j	progra	mme							
Course													
Objectiv	e 1. 1. Meeting the r	1. Meeting the needs of the students and covering a broad/wide range of their abilities											
S	and talents.												
(Minimu		4	1 ,			1		•,•	. 11				
m 3)		the interests in the stu	aents ai	nd prov	vide eq	ual opj	portu	ınıtıes	to all				
	the studen	ts to participate											
	3.To enhance	the learning experience	of the	student	s and h	elp in	reco	gnizir	g and				
	developing	g their inner skills s	such as	leade	ership	qualiti	es,	creati	ve or				
	innovative												
CO1	Apply foundational acc	limatization principles	to adap	ot effec	ctively	in dive	erse	enviro	onments				
	and situations.				-								
CO2	Analyze environmental	•	limatiz	ation, o	demons	trating	a c	ompre	hensive				
602	understanding of adapta		1 .		, .				1 .				
CO3	Evaluate personal adapt acclimatization challeng		u exerc	ises, to	stering	a proa	activ	e appı	oach to				
CO4	Synthesize acclimatizat		ving co	ntexte	demo	nstrati	no c	reativ	rity and				
	flexibility in response.	ion suucestos for var	Jing CC	,IIIOAIS,	, acmo	munan	.15	ı catı v	ny ana				
CO5	Demonstrate mastery is	n acclimatization tech	niques,	utilizii	ng crit	ical th	inkir	ng to	address				
	unforeseen challenges.												
Unit-	Content		ontact	]	Learni	ng Ou	tcon	ıe	BL				
No.	A 1.77 1 1 1 1 1		Hour	-		•			1.0				
Ι	AdtU has included c			_	nge in n		•		1, 2				
	activities as an integral and	•			cular ac work ar								
	part of the curriculum with				nce und								
	encourage team work and	•			culum,		_						
	self-reliance among the				rmance								
	Students will plan and	•		_	nizing a	-	-	ating					
	various programs like	-		in vai	rious pi	ogram	s and	d					
		Project Exhibition, Guest Lectures, 30 events.											
	Soft-skill and Aptitude												
	These activities will	•											
	common platform for the												
	exchange ideas and inform												
	topics of their interest e.g.												
	employment / higher												
	opportunities, emerging t	rends, new											

development etc. Such activities	es will	
enhance the understanding a	and the	
degree of association of s	students	
with their prescribed curriculu	um and	
help them perform better f	from a	
360 degree perspective.		

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5,7					
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8					
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7.9,10					
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12					
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10					

		SEMESTER	R – VI						
Course Ti	tle	Extra-cur	ricular A	Activ	vities				
Course co	de 22UBEC321	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	<b>1</b> s
Pre-	Nil	Co-requisite				N	il		
requisite									
Programn	ne	B. Tech Mec							
Semester		Fall/ VI semester of t	hird yea	r of	the pro	gramm	e		
Course									
Objectives		with effective time man	nagemen	t and	prioriti	zation s	skills, fo	ostering lea	adership
(Minimun	<ul><li>qualities and a commitm</li></ul>	nent to their endeavours	S.						
3)									
	2. Encourage exp	loration of interests b	eyond a	cade	mics ar	id parti	cipatio	n in co-ci	urricular
	activities, cultivating	well-rounded individ	uals cap	pable	e of n	naking	meani	ngful cor	nmunity
	contributions.								
	3. Enhance studer	nts' abilities to express	ideas cl	early	and en	gage ir	in-de	oth evalua	tion and
	analysis, while integra	ating learning experie	nces to	prac	ctice tra	nsferat	ole skil	lls across	various
	activities.			•					
CO1	Learn to a plan so tha	nt they can make mea	ningful	contr	ibutions	s, main	tain a	commitme	nt, and
	manage their time and p	•	C						,
CO2	Transform passionate		trate lea	dersl	hip and	pursue	intere	ests beyon	d their
	academics.				•	•		•	
CO3	Learn to participate in	various co-curricular	activitie	s lea	ading to	their	multifa	ceted pers	sonality
	development.								
CO4	Express their ideas, view	ws, In-depth evaluation	and anal	ysis	clearly i	n the to	pic of t	their intere	st.
CO5	Demonstrate and practic	ces different activities,	by Integr	rating	g learnir	ng expe	riences	by demon	strating
	transferable skills.								
Unit-	Conte	nt	Contac	t	$\mathbf{L}$	earning	g Outco	ome	BL
No.			Hour						
I	AdtU encourages a rang		30		articipa				1,2
	the regular curriculum				ctivities		•		
	learner's interest, These a				oft skills				
	develop the social and so	_						exposure	
	a holistic development of				hrough y		•		
	in mind the 360 degree l			C	ompetit	ions led	by exp	erts.	
	the students are engaged								
	headed under different	· ·							
	music, photography, drain								
	students are encourage	^ ^							
	e	rities, workshops,							
	competitions as per their								
	The student members of								
	represent AdtU in varie	-							
	student and national	_							
	Renewed personalities as workshops that benefit								
	students by giving them								
	students by giving them	me pianoriii to leafii							

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7					
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8					
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10					
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12					
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10					

		SEMESTER –	VII							
Course Titl		<b>Process Planning</b>	and C						_	
Course cod		tal credits: 3	L	T	P	S	R	O/F		C
		tal hours: 36T	3	0	0	0	0	0		3
Pre-requisi		Co-requisite				Ni	il			
Programme	e Ba	achelor of Technology		nanica.	l Engin	eering				
Semester Course	1 T 1		VII							
Objectives	1. To understand the difference of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of the control of t		_							
(Minimum	2. To understand the cost									
	5. To understand the differ			1.	C 1	•				
CO1	Upon completion the studer	its will get a clear ui	naersta	naing	or pian	ning				
CO2	Enable to understand the p									
CO3	Learn and develop skills for op	<u> </u>								
CO4	Enable to understand the set	<u> </u>	У							
CO5	Demonstrate layout of industry									
Unit-No.	Content		Contact		Le	arning	Outco	me		BL
I	Introduction of Process Pla	nning methods	Hour	ا ا ا	n con	anlo+i	n tha	studen	tc	
1	of process planning, drawin	_		-		-				
	material evaluation, step		will get a clear under planning					tanding of		1,2
	selection, production equipm		,	piai	nning					1,2
	selection, production equipmed selection.	ment and tooming								
II		vities- process		Ena	hlo i	<u> </u>	ınderst	and th	20	
	parameter calculation for va	-						and th	ie	
	processes, selection of jig	*		pro	cess va	iriatio	ris			
	selection of quality assu		8							2,3
	documents for process plant									
	of process planning, case stud									
III	Introduction to cost estimat			Lear	rn and	4 40	velop	skills fo	or	
111	of costing and estimation				rating p		-	381113	01	
	costing, elements of cost esti			Opc	. a ti B P	· Ojeet	,			
	estimates, estimating proced	* * *	8							3,4
	of labor cost, material cos		O							۶,∓
	overhead charges, calculation									
	cost	ii oi depreciation								
IV	Machining time estimation-	- importance of		Fna	hle to	under	stand t	he settir	ıσ	
	machine time calculation,				of an in			inc settii	'δ	
	for different lathe operatio	•		ap (	or un ill	austi	'			
	boring time calculations,	_	6							4,5
	calculation for Milling, Sh									
	and Grinding	mp.1115, 1 1411111115								
V	Production costs- different	ent production		Den	nonstrat	te lavo	ut of ind	lustrv.		
'	processes for different jobs					,0	51 1110			
	forging cost, estimation of		7							4,5
	estimation of foundry cost	_	•							.,5
	machining cost	., 551111411011 01								

### **MAPPING TABLE:**

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME321R	Manufacturing Technology	3	3	2	2	1				1			1
22BTME322R	Design of Machine Elements	3	3	2	2	1				1			1
22BTME325E	Mechatronics System	3	2	3	2	2				1			1
22BTME326E	Internal Combustion Engines	3	2	2	2	2	1			2			1
22UBPD324R	Corporate Proficiency for Engineers								1	1	1	1	
22UBCC321	Co-curricular									1	1		1
22UBEC321	Extra-curricular									1	1		1

### **TEXT BOOKS:**

- 1. Peter Scalon, Process Planning, Design/ Manufacture Interface, Elsevier Sci.&Tech. 2002.
- 2. Ostwaal P.F. and Munez J., Manufacturing Processes and Systems, 9th ed., John Wiley 1998.

### **REFERENCE BOOKS:**

1. Chitale A.V. and Gupta R.C., Product Design and Manufacturing, 2nd ed., Prentice Hall 2002.

### OTHER LEARNING RESOURCES:

1. https://www.sciencedirect.com/science/article/pii/S2666449624000045

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Upon completion the students will get a clear understanding of planning	1,2, 4					
2	Enable to understand the process variations	2,4,5					
3	Learn and develop skills for operating projects	8,9,10					
4	Enable to understand the setting up of an industry	5,8,9					
5	Demonstrate layout of industry.	8,9,10					

		SEMESTER	– VII								
<b>Course Titl</b>	e	Power Pla	ant Engi	neeri	ng						
Course cod	e 22BTME417E	Total credits: 3	L	T	P	S	R	O/F	C		
		Total hours: 36T	3	0	0	0	0	0	3		
Pre-requisi		Co-requisite				N					
Programme	e	Bachelor of Technolog									
Semester Course	1 To marrido on orrami	Fall/ VII semester of									
Objectives	<ol> <li>To provide an overvi</li> <li>To understand the co</li> </ol>							11.			
(Minimum	3) 3. To understand basics		leigy for	susta	шаые	develo	pmem				
CO1	Upon completion of the	•	ts con 11	ndore	tand t	ha nrin	ciples	of operati	on for		
	different power plants a		its can u	nucis	tana ti	ne prii	cipics	or operan	011 101		
CO2	the students can unders		nomics								
CO3	Learn and develop skills fo										
CO4	Enable to understand the		industry								
CO5	Demonstrate power genera										
Unit-No.	Conten	t	Contact		L	earning	Outco	me	BL		
	00		Hour		_		, 0 4000				
I	Coal based thermal po	ower plants, basic		Up	on co	mpletio	on of th	ne course,			
	Rankine cycle and its m			the	stuc	dents	can u	nderstand			
	of modern coal power j		the	e princ	ciples	of ope	ration for				
		poilers, FBC boilers, turbines, condensers,					different power plants and their				
	steam and heating rat		6	eco	onomi	cs.			1,2		
	thermal power plants, fue										
	draught system, feed wat	•									
II	cycles and cogeneration s			م ما ا							
п	Gas turbine and comb plants, Brayton cycl						nderstand				
	optimization, componen			po	wei þi	ants et	onomi	LS			
			7						1,2		
		power plants, combined cycle power plants, integrated Gasifier based Combined Cycle									
	(IGCC) systems.	,									
III	Basics of nuclear energy	conversion, Layout		Lea	rn a	nd de	velop	skills for			
	and subsystems of nuc	lear power plants,		оре	erating	boiler					
	Boiling Water Reactor (	* "									
	Water Reactor (PWR),		9						1,2		
	Pressurized Heavy Water	,	-						,-		
	Fast Breeder Reactors (Fl	,									
	liquid metal cooled reactor	ors, safety measures									
IV	for nuclear power plants.  Hydroelectric power pl	ants classification		En	ahla ta	unda	ctand +	he setting			
"	typical layout and compo						stand t ndustry	iie settiiig			
	wind, tidal, solar PV		8	l up	OI all I	JOHEI II	idustiy		1,2		
	geothermal, biogas and	*	Ū						1,2		
	systems	po51									
V	Energy, economic and er	vironmental issues,		Der	nonstr	ate pov	wer ger	neration in			
	power tariffs, load distr			wer pla		-					
	load curve, capital and	-	6						1,2		
	different power plants,	_									
	technologies including	waste disposal									
<u> </u>	<i>5</i> 8	F							1		

options for coal and nuclear plants.		

- 1. Nag P.K., Power Plant Engineering, 3rd ed., Tata McGraw Hill, 2008.
- 2. El Wakil M.M., Power Plant Technology, Tata McGraw Hill, 2010.

### **REFERENCE BOOKS:**

1. Elliot T.C., Chen K and Swanekamp R.C., Power Plant Engineering, 2nd ed., McGraw Hill, 1998Tripathy PC & Reddy PN, Principles of Management, Tata McGraw Hill, 1999

### OTHER LEARNING RESOURCES:

1. https://www.sciencedirect.com/science/article/abs/pii/S0360319923006523

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Upon completion of the course, the students can understand the principles of operation for different power plants and their economics.	1,2, 3,4					
2	the students can understand power plants economics	5, 6, 7					
3	Learn and develop skills for operating boiler	3,4,5					
4	Enable to understand the setting up of an boiler industry	1,2,3					
5	Demonstrate power generation in power plants.	1,2,3					

Course code	00DED (E. (10E		o Nano						
		Total credits: 3	L	T	P S		O/F		C
		Total hours: 36T	3	0	0 (		0		3
Pre-requisit		Co-requisite	<u> </u>			Nil			
Programme		Bachelor of Technology							
Semester Course	1 The chiestive of the ec	Fall/ VII semester of 3					Nonotoch	mala	~**
Objectives	1. The objective of the co		dents to	the ra	iscinating v	voria oi	Nanotecn	пого	gy,
(Minimum 3	2. The objectives include		proport	ios of	nonmotori	al thair s	vnthocic (	and	
,	2. The objectives include	a minoduction to nover	propert	168 01	11011111atC11a	ıı, men s	ynunesis a	ana	
	applications.								
	3. Application of nanom	naterial in practical life							
CO1	Learn about the basics of		,						
	Dearn about the busies of	Tunoteennology							
CO2	Understand the concepts	of extraordinary proper	ties exh	ibit at	nanoscale				
CO3	Learn different synthesis.	/ fabrication techniques	of nano	mater	ials.				
CO4	Learn about different cha	•							
CO5	Learn the software used t	for analysis of character	rized da	ta.					
Unit-No.	Conten	t	Contact	:	Leari	ing Outo	come		BL
I	D C. M 4 1 1 .	T	Hour	Ta	l	4 41	le o si o o	~ <b>C</b>	
	Basics of Nanotechnolo			Lea	arn abou notechnolo		basics	of	
	9.	tory of Nano-		INA	notecimon	gy			
	Technology, Properties								
	Difference between	Bulk and							
	Nanomaterial, Molecula		8						1,2
	for nanostructure system								
	atoms and molecules - I	•							
	boundaries – strong Inte								
	<ul> <li>Electrostatic and Var</li> </ul>	ider Waals forces							
	between surfaces								
	Physics of nanomateria				derstand		oncepts	of	
	structure of nanopart				raordinary 10scale.	properti	es exhibit	t at	
	nanowires, nanodots et			nai	ioscaie.				
	optical characteristic pro	*							
	dots, quantum wires an	-							
	concept of quantum con								
	and 2D nanostructures	*	10						2,3,
	Fraction of Surface A	-	_~						4
	Surface Energy and								
	Nanofluidics,	Nanophotonics,							
	Nanothermodynamics,	Plasmonics –							
	plasmons and surface	-							
	Core-shell quantum dots	and quantum-dot-							
	quantum wells.								
	Synthesis/fabrication	techniques of		Lea		ferent	synthes		
	-	down approach,	6		rication	techni	iques	of	2,3,
	Lithography – electron b		U	nar	nomaterials	S.			4
	techniques, Etching - we	et and dry etching,							

SEMESTER – VII

	Bottom up approach - Solvent based and template based synthesis, other important synthesis methods like CVD, PVD etc.; Doping, Nucleation, Growth and Stability of colloidal nanoparticles, concept of selfassembly.			
IV	Characterization methods: Transmission electron microscopy (TEM), Scanning electron microscopy (SEM), Atomic force microscopy (AFM) and X-ray diffraction Spectroscopy (XRD).	6	Learn about different characterization methods of nanomaterials.	2,3, 4
V	Applications: Nanosensors and nanoelectronics, Micro & Nano electromechanical systems, Photonic crystals, Nano pizotronics, Nanomedicine.	6	Learn the software used for analysis of characterized data.	2,3,

### **Text Books:**

- 1. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanoscience, CRC Press.
- 2. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanotechnology, CRC Press.

### **Reference Books:**

- 1. T. Pradeep, Nano: The essentials, McGraw Hill.
- 2. D. Maclurcan & N. Radywyl (Eds.), Nanotechnology and global sustainability, CRC Press.
- 3. E. Lichtfouse, J. Shwarzbauer, D. Robert, Environmental chemistry for sustainaBLe world, vol.2, Springer verlag.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Learn about the basics of Nanotechnology	1,2,3,4					
2	Understand the concepts of extraordinary properties exhibit at nanoscale.	3,4,5					
3	Learn different synthesis/ fabrication techniques of nanomaterials.	2,3,4					
4	Learn about different characterization methods of nanomaterials.	1,2,3,4					
5	Learn the software used for analysis of characterized data.	5,6,7					

SEMESTER – VII									
Course Tit		Automation	in Mar		uring				
Course cod	le 22BTME411R	Total credits: 3	L	<u>T</u>	P	S	R	O/F	C
Due me amini	Man Nil	Total hours: 36T	3	0	0	0	0	0	3
Pre-requisi		Co-requisite Bachelor of Technolog	w in Ma	ahania	al Engir	N			
Programm Semester	e	Fall/ VII semester of	•						
Course	1. To understand the im						ool base	d manufa	cturing
Objectives	2. To get the knowledge								
(Minimum	sensors, pneumatics, hy		<i>31 1114114</i>	iuciai	ing aa	omati	)II	12, 01 11,1,	
	3. To understand the ba		n and t	he rol	e of m	anufac	turing	automati	on.
CO1	The students will get a c								
	operations.		•						J
CO2	The students will be ab	le to learn and evalua	ate and	will g	et accu	ıstome	d to va	arious aut	omated
	techniques that are used			_					
CO3	The students will be a	-						and also	about
	techniques related to op	_			-				
CO4	The students will be able	to get an idea of auto	matic sy	/stem					
CO5	The students will be able	to generate prototype	e by usir	ng the	concep	t of au	tomatio	on	
Unit-No.	Conten	t	Contac	t	L	earnin	g Outco	me	BL
			Hour						
I	•	tomation, Current		Th		udents		O	3
	trends, CAD, CAM, CIM	_		mpreh		•	ture o		
	Part handling, Machin		5		•			mation o	f 1,2
	automation: Computer of Tools and Machining Cer		manufacturing operations.					ins.	
II	NC and NC part pro			Th	o stude	nts wi	ll he ah	le to lear	,
		itomated Material		an		aluate	and	will ge	
	handling. Assembly, Flex			_	custom		to	variou	s
	, , , , , , , , , , , , , , , , , , ,	8	5					that are	1 1 2 1
								automated	
							, ndustrie		
III	Computer Aided Design	: Fundamentals of						ble to ge	t
	CAD - Hardware in			an	idea r	egardi	ng mod	delling and	t
	Graphics Software a	and Data Base,			nulatio				
	Geometric modelling	for downstream	10	te	chnique	es	relate	ed to	1,2
	applications and analysis		10	ор	timizat	ion.			1,2
	Aided Manufacturing:								
	PLC, Micro-controllers	, CNC Adaptive							
***	Control.								
IV	Low cost automation: Mo							ble to ge	t
	mechanical Systems,	Pneumatics and	8	an	idea o	auton	natic sy	stem	1,2
	Hydraulics, Illustrative 1	Examples and case							
V	studies.	og and Simulation		TL	0 0+111	lonto	ما اانس	2 2 blo ±	+
•	Introduction to Modellin Product design, process							e able to using the	
	Optimization techniques	0.	8	_	ncept c	-		using till	1,2
	industrial applications.	, case studies &		"	ποσρι (	n auto	παιισπ		
	maasirar applications.								

- 1. Mikell P. Groover, Automation, Production Systems, and Computer-integrated Manufacturing, prentice Hall.
- 2. Serope Kalpakjian and Steven R. Schmid, Manufacturing Engineering and Technology, 7th edition, Pearson.

### **REFERENCE BOOKS:**

- 1. YoramKoren, Computer control of manufacturing system, 1st edition.
- 2. Ibrahim Zeid, CAD/CAM: Theory & Practice, 2nd edition.

### **OTHER LEARNING RESOURCES:**

1. https://www.sciencedirect.com/science/article/pii/S187705092400245X

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM

### **OUTCOMES**

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	The students will get a comprehensive picture of computer based automation of manufacturing operations.	1,3,4
2	The students will be able to learn and evaluate and will get accustomed to various automated techniques that are used now-a-days in automated manufacturing industries.	5,6
3	The students will be able to get an idea regarding modelling and simulation and also about techniques related to optimization.	1,3&4
4	The students will be able to get an idea of automatic system	1,2,3,4
5	The students will be able to generate prototype by using the concept of automation	1,2,3,4

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTME411R	Automation in Manufacturing	3	3	2	2	1				1			1
22BTME416E	Process Planning and Cost Estimation	3	3	2	2	1				1			1
22BTME417E	Power Plant Engineering	3	2	3	2	2				1			1
22BTME418E	Introduction to Nano Technology	3	2	2	2	2	1			2			1

		SEMESTE	R – VI	II						
Course Tit	le	Princip	le of N	Manag	emen	ıt				
Course cod	le 22BTME422E	Total credits: 3		L	T	P	S	R	O/F	C
		Total hours: 36T		3	0	0	0	0	0	3
Pre-requisi		Co-requisite					Nil			
Programm	e	Bachelor of Technol								
Semester	1 TD 1 1 1 1	Fall/ VIII semester			f the j	prograi	mme			
Course Objectives	1.To understand the pr		•							
(Minimum	2. To apply the manag		_	anızat	ion					
`	5. To understand the co				1.01					
CO1	Explain the managerial	approach to implem	ent in	practic	al fie	ld				
CO2	Recognise the nature an		-							
CO3	Integrate the manageme	nt theories to organi	ise for	mal or	infor	mal ins	stitution	ıs		
CO4	Develop the leadership	quality to socio-eco	nomic	benefi	ts					
CO5	Justify the management	functions in an orga	anisati	on						
Unit-No.	Content			ntact		Lea	arning (	Outcom	e	BL
I	Definition of manageme		H	our		plain	the		nagerial	
	manager vs entreprent managers managerial r Evolution of manager human relations, system approaches; Types Organizations, sole partnership, company, pu enterprises; Organization environment; Current tree management	roles and skills; ment- scientific, and contingency of Business proprietorship, aBLic and private on culture and ends and issues in		5	pra	ectical	field	-	ent in	1,2
II	Nature and purpose of P Planning, objectives, se policies, Strategic Mana, Tools and Techniques, steps & processes	etting objectives, gement, Planning		5		-	e the of plann		e and	2,3,
Ш	Nature and purpose of O and informal organization structure, types, line and departmentalization, authority, centralidecentralization, job resource management, Recruitment selection, Development, Performant Career planning and Management and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Management, Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Particular and Part	don, organization d staff authority, delegation of zation and design, human HR planning, Training & nce Management,		10	the		the to orga instituti	nise for	gement rmal or	
IV	Directing, individual and motivation, motivat	d group behavior,		8		•		dership ic bene	quality fits	3,4,

	motivational techniques, job satisfaction, job enrichment, leadership, types & theories of leadership, effective communication			
V	Controlling, system and process of controlling, budgetary and non-budgetary control techniques, use of computers and IT in management control, productivity problems and management, control and performance, direct and preventive control, reporting	8	Justify the management functions in an organisation	2,3,

- 1. Robins S.P. and Couiter M., Management, Prentice Hall India, 10th ed., 2009
- 2. Stoner JAF, Freeman RE and Gilbert DR, Management,  $6 \mbox{\tiny th}\,\mbox{ed.},$  Pearson Education, 2004

### **REFERENCE BOOKS:**

1. Tripathy PC & Reddy PN, Principles of Management, Tata McGraw Hill, 1999

### OTHER LEARNING RESOURCES:

1. https://www.sciencedirect.com/science/article/pii/S2589004224006941

### RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM

### **OUTCOMES**

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Explain the managerial approach to implement in practical field	<b>1, 6</b> ,9,10,11					
2	Recognise the nature and purpose of planning	<b>6,</b> 9,10,11					
3	Integrate the management theories to organise formal or informal institutions	<b>6</b> ,9,10,11					
4	Develop the leadership quality to socio-economic benefits	<b>1, 6</b> ,9,10,11					
5	Justify the management functions in an organisation	<b>1, 6</b> ,9,10,11					

Course code   22BTME423E   Total credits: 3	C   3
Pre-requisite Nil Co-requisite Nil Co-requisite Nil Programme Bachelor of Technology in Mechanical Engineering Semester Fall/ VIII semester of 3rd year of the programme  Course Objectives (Minimum 3) CO1 Understand the basics of Economics in Engineering 3. To understand the Industrial Laws CO1 Understand the principles of economics  CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
Pre-requisite Nil Co-requisite Nil Programme Bachelor of Technology in Mechanical Engineering Semester Fall/ VIII semester of 3rd year of the programme Course Objectives (Minimum 3) 2. To Apply the concepts of Economics in Engineering 3. To understand the Industrial Laws CO1 Understand the principles of economics  CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
Programme         Bachelor of Technology in Mechanical Engineering           Semester         Fall/ VIII semester of 3rd year of the programme           Course         1. To understand the basics of Economics           Objectives (Minimum 3)         2. To Apply the concepts of Economics in Engineering           3. To understand the Industrial Laws           CO1         Understand the principles of economics           CO2         Apply the concepts of Economics in Engineering problems           CO3         Explain the rights to comprehend the working hour and over duty           CO4         Illustrate the ways to mitigate the hurdles to Indian Economy	
Course	
Course Objectives (Minimum 3)  1. To understand the basics of Economics 2. To Apply the concepts of Economics in Engineering 3. To understand the Industrial Laws  CO1 Understand the principles of economics  CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty  CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
Objectives (Minimum 3)  2. To Apply the concepts of Economics in Engineering 3. To understand the Industrial Laws  CO1 Understand the principles of economics  CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty  CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
(Minimum 3) 3. To understand the Industrial Laws  CO1 Understand the principles of economics  CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty  CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO1 Understand the industrial Laws  CO2 Understand the principles of economics  CO3 Explain the rights to comprehend the working hour and over duty  CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO2 Apply the concepts of Economics in Engineering problems  CO3 Explain the rights to comprehend the working hour and over duty  CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO4 Illustrate the ways to mitigate the hurdles to Indian Economy	
CO5 Appraise the financial aspects of projects	
ripprinte the infinite aspects of projects	
Unit-No. Content Contact Learning Outcome	BL
Hour	
I Introductory Macroeconomics: What is Understand the principles of	
Macroeconomics, Basic concepts in economics	
macroeconomics: significance of economics,	1.0
LPG meaning, demand and supply. Law of	1,2
demand, law of supply. Difference of	
macroeconomics and microeconomics	
II Economic Indexes: Aggregates related to Apply the concepts of	
National Income: Gross National Product Economics in Engineering	
(GNP), Net National Product (NNP), Gross problems	
Domestic Product (GDP) and Net Domestic	
Product (NDP). Fixed, Variable, Marginal &	3,4
Average Costs, Recurring and Nonrecurring	
Costs, Break Even Analysis, ROI, Payback	
period	
III Industrial Statistics: Measures of central Explain the rights to	
tendency, Relation between mean, median and comprehend the working hour	
mode, Measure of dispersion, moments, and over duty	
skewness, Kurtosis, Probability distribution,	
Binomial distribution, Poisson distribution,	
Test of hypothesis Chi-square distribution	١
application of chi square test, ANOVA test,	4,5
Level of confidence, Regression model,	
Simple linear regression analysis, coefficient	
of correlation, correlation coefficient, Mean	
absolute deviation (MAD), Mean squared	
error(MSE)	
IV Industrial laws: Laws related to Industrial Illustrate the ways to mitigate	
8	3,4,
Relations and Industrial Disputes: Industrial 8   the hurdles to Indian Economy	_
Relations and Industrial Disputes: Industrial disputes act, 1947: definition and authorities,	5

SEMESTER – VIII

	awards, settlement, strike lockouts, lay off, retrenchment and closure. The Trade Union Act, 1926, Laws related to health, safety and welfare: The Workmen's Compensation Act, 1923 Provisions, and Social Legislation: Employee State Insurance Act 1948: Definition, employees' provident fund. Miscellaneous Provision Act 1948: Schemes, Administration and determination of dues, Laws related to compensation management: The payment of Wages Act 1948: Objectives, Definition, and Authorised Deductions.			
V	Challenges in Indian Economy: Poverty-Main programmes for poverty alleviation, Human Capital Formation: How people become resource; Role of human capital in economic development; alternative farming organic farming Employment: Growth and changes in work force participation rate in formal and informal sectors; Energy and Health: Sustainable Economic Development: Meaning, Effects of Economic Development on Resources and Environment, including global warming.	8	Appraise the financial aspects of projects	2,3, 4,5

- 1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
- 2. V. Mote, S. Paul, G. Gupta (2004), Managerial Economics, Tata McGraw Hill

### **REFERENCE BOOKS:**

1. M Chakravarty, Estimating, Costing Specifications & Valuation

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Understand the principles of economics	1, 10, 11				
2	Apply the concepts of Economics in Engineering problems	1, 2, 3				
3	Explain the rights to comprehend the working hour and over duty	2,6,9,10,11				
4	Illustrate the ways to mitigate the hurdles to Indian Economy	2,4,9,10,11				

5	Appraise the financial aspects of projects	10,11,12

	SEMESTER –	VIII					
Course Titl	le Total Quali	ity Manag	gement				
Course cod	220111121212	L	T P	S	R	O/F	C
	Total hours: 36T	3	0 0	0	0	0	3
Pre-requisi	te Nil Co-requisite			Nil			
Programm							
Semester	Fall/ VIII semester of						
Course	1. To facilitate the understanding of total qua	•		iciples	and pr	ocesses.	
Objectives	2. To facilitate the understanding of TQM to		chniques.				
(Minimum	p. 10 facilitate the understanding of Quanty						
CO1	To understand the basic components of total qu	uality man	agement				
CO2			•	4			
CO2	To discuss about quality and the processes of o	continuous	improveme	nt			
CO3	To summarize the concept of six sigma						
CO4	To understand the various tools and techniques	of TOM					
CO4	To distinguish different ISO systems	S OF T QIVI					
	·	~					
Unit-No.	Content	Contact Hour	Lea	rning (	Outcom	e	BL
I	Introduction need for quality avalution of	nour	To und	erstand	the	basic	
1	<b>Introduction</b> , need for quality, evolution of		componer				
	quality; Definitions of quality, product		managem		wai	quanty	
	quality and service quality; Basic concepts of		managem	CIIt			
	TQM, TQM framework, contributions of	_					1.2
	Deming, Juran and Crosby. Barriers to	5					1,2
	TQM; Quality statements, customer focus,						
	customer orientation & satisfaction,						
	customer complaints, customer retention;						
TT	costs to quality.		TD 1'	1	. 1	·, 1	
II	TQM principles; leadership, strategic		To discuss about qualithe processes of con-				
	quality planning; Quality councils- employee				or con	tinuous	
	involvement, motivation; Empowerment;		improven	ient			
	Team and Teamwork; Quality circles,	_					2,3,
	recognition and reward, performance	5					4
	appraisal; Continuous process improvement;						
	PDCE cycle, 5S, Kaizen; Supplier						
	partnership, Partnering, Supplier rating &						
***	selection.		_				
III	TQM tools and techniques I, the seven		To summ	arıze t	he con	cept of	
	traditional tools of quality; New		six sigma				
	management tools; Six sigma- concepts,	10					5,6
	methodology, applications to manufacturing,						- ,~
	service sector including IT, Bench marking						
	process; FMEA- stages, types.		1				
IV	TQM tools and techniques II, control	8		erstand		various	1,2,
	charts, process capability, concepts of six	U	tools and	technic	ues of	TQM	5,6

	sigma, Quality Function Development (QFD), Taguchi quality loss function; TPM-concepts, improvement needs, performance measures.			
V	Quality systems, need for ISO 9000, ISO 9001-9008; Quality system- elements, documentation; Quality auditing, QS 9000, ISO 14000- concepts, requirements and benefits; TQM implementation in manufacturing and service sectors.	8	To distinguish different ISO systems	1,2, 3,4

- 1. Besterfield D.H. et al., Total qualityManagement, 3rd ed., Pearson Education Asia, 2006.
- 2. Evans J.R. and Lindsay W.M., The management and Control of Quality, 8th ed., first Indian edition, Cengage Learning, 2012.

### **REFERENCE BOOKS:**

1. Janakiraman B. and Gopal R.K., Total Quality Management, Prentice Hall India, 2006.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	To understand the basic components of total quality management	2,9,10				
2	To discuss about quality and the processes of continuous improvement	3,6,8,9				
3	To summarize the concept of six sigma	9,10,11				
4	To understand the various tools and techniques of TQM	2,5,11				
5	To distinguish different ISO systems	9,10,11				

Course cod	le History of Scier	ngineering							
	de 22BTME425E Total credits: 3	L	T P	S R	O/F				
	Total hours: 36T	3	0 0	0 0	0	3			
Pre-requisi	_			Nil					
Programm									
Semester	Fall/ VIII semester of								
Course	1. Develop a culture of critical reflection, intell	lectual curi	losity, tolera	ance of ambig	uity, sch	olarly			
Objectives	0.00								
(Minimum	2. Identify and understand tools to inquire into		and philos	ophy of engin	eering				
	education, and develop skills for using these to								
	3. Make use of these tools to problematize					ize			
	perspectives to form arguments for both on		others abo	ut the nature	of				
	engineering, education, and engineering ed	lucation							
CO1	Students will understand the Beginning and De	evelopmen	t in differen	t field of scier	nce in an	cient,			
	medieval, and in modern period								
CO2	Students will study the biography of different s		te Baudhaya	an, Aryabhtatt	a, Brahr	ngupta			
	Bhaskaracharya, Varahamihira, Nagarjuna etc.								
CO3		udent will study the various research organization like DRDO, CSIR, IRC, ISRO etc.							
CO4	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga)								
CO5	It explores how science and technology have b	een used to	make sens	e of the world	, and to	contro			
Unit-No.	μt.	Comtost	Tan		_	DI			
Unit-No.	Content	Contact Hour	Lea	rning Outcome	2	BL			
I	Historical Perspective: The nature of science		Students	will understar	nd the				
	and technology, Roots of science and		Beginning	g and Develo	pment				
	technology in India, Science and society,	5	in differen	nt field of scie	ence in	1,2			
	Scientists and society, Science and Faith and		ancient,	medieval, ai	nd in				
	the rise of applied sciences.		modern p	eriod					
II	Science and Technology- The Beginning:		Students	will study	the				
	Development in different branches of Science		biography	of dif	fferent				
	in Ancient India: Astronomy, Mathematics,		scientist		hayan,	1,2,3,			
		5			gupta,	4			
				•					
			Varahami	hira, Nagarjui	na etc.				
			0 1		-				
				•					
III		1	various re	search organi	79f10n				
III	Medieval India: 1. Scientific and			_					
Ш	Technological Developments in Medieval	10	like DR	DO, CSIR,		2.4			
III	Technological Developments in Medieval India; Influence of the Islamic world and	10		DO, CSIR,		3,4			
III	Technological Developments in Medieval India; Influence of the Islamic world and Europe; The role of maktabs, madrasas and	10	like DR	DO, CSIR,		3,4			
ш	Technological Developments in Medieval India; Influence of the Islamic world and	10	like DR	DO, CSIR,		3,4			
II	technology in India, Science and society, Scientists and society, Science and Faith and the rise of applied sciences.  Science and Technology- The Beginning: Development in different branches of Science in Ancient India: Astronomy, Mathematics, Engineering and Medicine 2. Developments in metallurgy: Use of Copper, Bronze and Iron in Ancient India. 3. Development of Geography: Geography in Ancient Indian Literature  Developments in Science and Technology in		in differer ancient, modern p Students biography scientist Aryabhta Bhaskara	nt field of scie medieval, areriod will study of did like Baudlata, Brahmacharya, hira, Nagarjur will study	the fferent hayan, gupta, na etc.	1,			

SEMESTER – VIII

	Medicine. 3. Innovations in the field of agriculture - new crops introduced new techniques of irrigation etc.			
IV	Developments in Science and Technology in Colonial India: 1. Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company's Service. 2. Indian Response to new Scientific Knowledge, Science and Technology in Modern India 3. Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.	8	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga)	3,4
V	Prominent scientist of India since beginning and their achievement: 1. Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna 2. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali 3. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabhai.	8	It explores how science and technology have been used to make sense of the world, and to control it.	4,5

- 1. Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi 58
- 2. Srinivasan, M., Management of Science and Technology (Problems & Prospects), East-West Press (P) Ltd., New Delhi.

### **REFERENCE BOOKS:**

1. Ramasamy, K.A., and Seshagiri Rao, K., (Eds), Science, Technology and education for Developlemnt, K., Nayudamma Memorial Science Foundation, Chennai -8

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Students will understand the Beginning and	8,9					
	Development in different field of science in ancient,						
	medieval, and in modern period						
2	Students will study the biography of different	8,9,10					
	scientist like Baudhayan, Aryabhtatta, Brahmgupta,						
	Bhaskaracharya, Varahamihira, Nagarjuna etc.						
3	Student will study the various research organization	9,10,11					
	like DRDO, CSIR, IRC, ISRO etc.						

4	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga)	8,9,10
5	It explores how science and technology have been used to make sense of the world, and to control it.	5,8,9,10

### MAPPING TABLE

Subject	Course	PO	PO	PO	PO	PO	PO	PO	PO	PO	PO1	PO1	PO1
Code	Name	1	2	3	4	5	6	7	8	9	0	1	2
22BTME4 22E	Principles of Managem ent	2	2	1		2	2	2	2	2	2	2	
22BTME4 23E	Economic s for Engineers											2	1
22BTME4 24E	Total Quality Managem ent	2	2	1		2	2	2	2	3	2	2	
22BTME4 25E	History of Science & Engineeri ng		1										2



# **Curriculum and Syllabus**

# Bachelor of Technology in Civil Engineering

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 2.0

# FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

### Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson

Board of Studies

Member Secretary Academic Council

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### Vision

To become a Globally Recognized University from North Eastern Region of India, Dedicated to the Holistic Development of Students and Making Society Better

### Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators.
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

### **Programme Details**

The professional practise of designing and developing infrastructure projects is known as civil engineering. This can be done on a large scale, such as the construction of national transportation systems or water supply networks, or on a smaller scale, such as the construction of individual roads or buildings.

# I. Specific Features of the Curriculum (To be derived from PSOs. Not more than 100 words)

The Program Specific Outcomes (PSOs) for Civil Engineering graduates focus on three main areas. First, graduates should excel in research and reasoning, capable of identifying, formulating, reviewing literature, and analyzing complex Civil Engineering problems using logical and critical thinking and scientific principles. Second, they should demonstrate techno-professional efficiency by applying multidisciplinary concepts and interdisciplinary approaches to serve mankind. Lastly, graduates should exhibit global competency by addressing interdisciplinary Civil Engineering issues and enhancing their expertise through international certification courses.

II. **Eligibility Criteria:** Minimum 45% in 10+2 with Physics, Chemistry& Mathematics. 5% relaxation for SC/ST, EWS, and Specially abled candidates.

### **III.** Program Educational Objectives (PEOs):

**PEO-1:** To understand and incorporate the ability to apply, update, extend, and build deep knowledge through a flexible, research-intensive programme tailored to suit current academic and industry demands.

**PEO-2:** Establish professional integrity and an ethical attitude while being aware of global and national competencies, and consider the social implications of their job, particularly its impact on safety, health, and the environment for long-term growth.

**PEO-3:** Participate in individual and team-oriented, open-ended activities promoting productive thinking to provide opportunities for students to manage and work on multidisciplinary projects through interaction with their peers in the industry

### **IV.** Program Specific Outcomes (PSOs):

**PSO1: Research and Reasoning:** Identify, formulate, review literature, and analyze complex Civil Engineering problems reaching substantial conclusions using logical and critical thinking, and scientific principles.

**PSO2:Techno-Professional Efficiency:** Apply the understanding of multidisciplinary concepts of Civil Engineering with interdisciplinary approaches in the service of mankind.

**PSO3:** Global Competency: Demonstrate global competency in addressing interdisciplinary Civil Engineering issues through international certification courses.

### V. Program Outcome: (8-12)

**PO1:** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:**Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:**Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:**The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:**Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:**Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:**Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### VI. Total Credits to be Earned:185

### VII. Career Prospects:

When it comes to graduate programmes in India, civil engineering remains at the top of the list because of its flexibility and capacity to adapt to changing requirements, as well as providing students with the required information and skills for a successful career.

Some of the opportunities for civil engineering graduates are:

- Construction manager
- Geotechnical engineer
- Environmental engineer
- Public Health engineer
- Transportation engineer
- Urban planning engineer.

### **EVALUATION METHODS**

The student performance shall be evaluated through In-semester (Sessional) and semester-end examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

### A. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting in-semester (sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks
		Allotted
1.	In-Sem Exam – I (ISE-I) (Written Examination)*	30
2.	In-Sem Exam – II (ISE-II) (Written Examination)*	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

### **INSTRUCTION**

- 1. If a student fails to appear in the any of the component without any valid reason he/she shall be marked zero in that component. However, the course teacher at his discretion may arrange for the missed test on an alternate date for the absentee students after determining ground with genuine/valid reasons for the absent.
- 2. The report of evaluation of an activity towards the in-semester (sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.
- 3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

### **B. SEMESTER END EXAMINATION:**

Time table for end semester examination is published at least 25 days prior to the start of Examination.

### I. Pre-Examination:

### Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

### II. Admit Card:

Admit card for the examination may be downloaded through ERP where the system will generate a Unique ID Cards through online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

### **III. Pattern of Question Papers**:

The question paper shall follow the principles of Bloom's Taxonomy. Table

S. N.	Level	Questions /verbs for test					
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.					
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.					
3	Apply	Predict, apply, solve, illustrate, determine, examine, modify					
4	Analyze	Classify, outline, categorize, analyze, diagrams, illustrate, infer, etc.					
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.					
6	Create	Design, Formulate, Modify, Develop, integrate, etc.					

Note: No course is to be evaluated on basis of all 6 knowledge levels.

The format of the question paper across all the program follow a unique pattern and the total marks is 60

**Table 1: Question paper pattern for End semester examination** 

Sl no	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

### **IV. Examination Duration:**

Each paper of 60 marks shall ordinarily be of two hours duration.

### V. Practical Examinations, Viva-Voce etc.:

- i) Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

### VI. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the center may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the exam with new answer sheet or may expel the student from appearing the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribe expulsion form. The student may not be allowed to write that examination.

### VII. Instruction to the Students:

- (i) The students shall not bring to the Examination Hall, any electronic gadget used as a means of communication or record except electronic calculator, if required.
- (ii) The students shall not receive any book or printed or hand written or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during course of examination.

- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.
- (iv)The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi)The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix)The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

### **VIII. Provision for an Amanuensis (writer):**

- (i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by Medical Certificate from a competent Medical Officer.
- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.
- (iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

### C. Credit Point:

It is the product of grade point and number of credits for a course, thus,  $CP = GP \times CR$ 

### i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

### ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

### iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

- (i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.
- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in Table 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

**Table 2: Letter Grades and Grade Points** 

Letter Grade	Grade Points	Description
0	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
C	5	Average

P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

### iv. Grade Point Average:

### a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

$$(1.1)$$

The SGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

### **b.** CGPA (Cumulative Grade Point Average)

- (i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrollment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrollment.
- (ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit

Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and Ci is the Credit (weight)of that Course.

CGPA = 
$$\frac{\sum_{i=1}^{N} C_{i}G_{i}}{\sum_{i=1}^{N} C_{i}}$$
 (1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

# **D.** Post-Examination

# i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

#### ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

- (i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.
- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a University appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or

- viva voce and wish to appear again may apply to be evaluated can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of Vice Chancellor.
- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.
- (ix) If as a result of revaluation of the candidate attracts the provision of condonation of deficiency, the same may be applied to his/her only for fresh attempt.

# INSTRUCTION TO TEACHERS AND STUDENTS

(Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric

methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

### 1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centric classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- **a. Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programme the student has to undergo project-based learning at least 4 months duration. This approach will help the student to think critically, evaluate, analyze, make decisions, collaborate, and more.
- **b. Inquiry-Based Learning:** The teacher/ students are supposed to list at least five questions in each contact hour and student solve these question or search for answer which becomes the home work for the students "question-driven" learning approach. The teacher may look for the correctness of the solution or the best possible answer and discuss in the successive class. This will help in the preparation for various competitive examination and develop a habit for search for solutions.
- c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watchvideo or lecture prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time in-classroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are

more passive to an approach where students are active participants. As a result, this approach is also a student-centric teaching method.

**d. Cooperative Learning:** The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

### The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence of	
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

### Inquiry-based approach has to be followed in all of the classes

The teacher has to distribute the topics to be considered for teaching by the above-mentioned approaches and prepare a lesson plan for execution and maintain a file.

# **Curriculum Framework**

# **Breakdown of Credits(for 2022-23 Syllabus)**

Sl. No	Category	<b>Total number of Credits</b>
1	University Core(UC)	47
2	University Elective (UE)	21
3	Program Core(PC)	68
4	Program Elective (PE)	42
5	Faculty Elective (FE)	7
	Total number of credit	185

# Breakdown bycategory of courses (for 2022-23 Syllabus)

Sl.	Category	Credits	Percentage %
No			
1	Engineering	150	81.08%
2	Science	22	11.98%
3	Computer Technology	4	2.1%
4	Humanities	8	4.3%
5	Commerce and Management	1	0.54%
	Total number of credits	185	100%

# SEMESTER WISE COURSE DISTRIBUTION

	S. N.	Course Code	Course Title	Course		En	gag	gem	ent	t		Maxi	mum M	Iarks	
	110			Category	L	T	P	S	R	o	C	IA*	SEE*	PE*	Total
Semester I	1	22BTCE111R	Engineering Mathematics I	UC	3	1	0	0	0	0	4	40	60	0	100
	2	22BTCE112R	Introduction to Basic Mathematics, Logic and Coding	UC	2	1	2	0	0	0	4	40	60	100	200
	3	22BTCE113R	Engineering Physics	UC	2	1	2	0	0	0	4	40	60	100	200
	4	22BTCE114R	Basic Electrical Engineering	PE	2	1	2	0	0	0	4	40	60	100	200
	5	22BTCE115R	Workshop/Manufact uring Practices	PE	1	0	4	0	0	0	3	40	60	100	200
	6	22UBPD114R	Introductory English	UE	0	0	4	0	0	0	2	0	0	100	100

			for Engineers												
	7	22UBEC111	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	Total			10	4	14	4	0	0	22	200	300	600	1100	

	S.	Course Code	Course Title	Course		Er	ıgaş	gen	nen	t		Maxim	um Ma	rks for	
	No.	course coue	Course Title	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCE121R	Engineering Mathematics II	UC	3	1	0	0	0	0	4	40	60	0	100
	2	22BTCE122R	Engineering Chemistry	UC	2	1	2	0	0	0	4	40	60	100	200
	3	22BTCE123R	Programming for Problem Solving	PE	3	0	2	0	0	0	4	40	60	100	200
	4	22BTCE124R	Engineering Graphics and Design	PC	1	0	4	0	0	0	3	40	60	100	200
Semester II	5	22UBPD12R	Effective English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	6	MOOCSCECE1	MOOCS I	FE	0	0	0	0	0	0	2	0	0	100	100
	7	22UBCC121	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	8	22UBEC121	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22BTCE125R	Techno- Professional Skills I	PC	0	0	2	0	0	0	1	0	0	100	100
	10	22UUHV102R	Universal Human Values (UHV) + Professional Ethics	UC	1	0	2	0	0	0	2	40	60	100	200
	11	22UUDL103R	Computational Systems and Digital World	UC	0	0	2	0	0	0	1	0	0	100	100
		Tota			10	2	18	8	0	0	25	200	300	1000	1500

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maxim	um Ma	rks for	
	No.	Categor					P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCE211R	Engineering Mechanics	PC	2	1	0	0	0	0	3	40	60	0	100
	2	22BTCE212R	Engineering Geology	PC	1	0	2	0	0	0	2	40	60	100	200
	3	22BTCE213R	Biology for Engineers	FC	2	1	0	0	0	0	3	40	60	0	100
	4	22BTCE214R	Computer Aided Design (CAD)	PC	0	0	4	0	0	0	2	0	0	100	100
	5	22BTCE215R	Introduction to Civil Engineering	PC	2	0	0	0	0	0	2	40	60	0	100
er III	6	22BTCE216R	PDE and transform mathematics	PC	2	1	0	0	0	0	3	40	60	0	100
Semester III	7	22BTCE217R	Techno- Professional Skills II	PC	0	0	2	0	0	0	1	0	0	100	100
Semo	8	22BTCE218R	Material Testing and Evaluation	PC	1	1	2	0	0	0	3	40	60	100	200
	9	22UBPD213R	English for Employabilityfor Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	10	22UBCC211	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	11	22UBEC211	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	12	22UULS212R	Basic Life Saving Skills	UC	0	0	2	0	0	0	1	0	0	100	100
	13	22UUFL213R	Personal Financial Planning	UC	0	0	2	0	0	0	1	0	0	100	100
	14	22MOCE211R	MOOCS II	FE	0	0	0	0	0	0	2	0	0	0	100
	Total		İ		10	4	18	8	0	0	27	240	360	900	1600

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maxim	um Ma	rks for	
	N.	course coue	Course Time	Category	L	Т	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCE221R	Solid Mechanics	PC	3	0	0	0	0	0	3	40	60	0	100
	2	22BTCE222R	Introduction to Fluid mechanics	PC	2	0	2	0	0	0	4	40	60	100	200
	3	22BTCE223R	Surveying and Geomatics	PC	3	0	2	0	0	0	4	40	60	100	200
	4	22BTCE224R	Geotechnical Engineering	PC	3	0	2	0	0	0	4	40	60	100	200
Semester IV	5	22BTCE225R	Basic Electronics for Civil Engineering Application	PC	2	0	2	0	0	0	3	40	60	100	200
	6	22BTCE226R	Environmental Science	UC	2	0	0	0	0	0	2	40	60	0	100
	7	22UBPD223R	English Language Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	8	22UBCC221	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22UBEC221	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22BTCE227R	Techno- Professional Skills III	PC	0	0	2	0	0	0	1	0	0	100	100
	12	22MOCE221R	MOOCS III	FE	0	0	0	0	0	0	1	0	0	100	100
	14	22UULS221R	Basic Acclimatizing Skills (BAS)	UC	0	0	2	0	0	0	1	0	0	100	100
		Total	<u> </u>	_	15	0	16	8	0	0	27	240	360	1100	1600

	S. No.	Course Code	Course Title	Course		Er	ıga	gen	nen	ıt		Max	imum N for	Marks	
	140.			Category	L	T	P	S	R	O	C	IA*	SEE*	PE*	Total
	1	22BTCE311R	Environmental Engineering	PC	2	0	2	0	0	0	3	40	60	100	200
	2	22BTCE312R	Mechanics of Materials	PC	3	0	0	0	0	0	3	40	60	0	100
	3	22BTCE313R	Structural Analysis I	PC	2	1	0	0	0	0	3	40	60	0	100
	4	22BTCE314R	Transportation Engineering	PC	2	0	2	0	0	0	3	40	60	100	200
<b>&gt;</b>	5	22BTCE315R	Hydrology and Water Resource Engineering	PC	2	1	0	0	0	0	3	40	60	0	100
Semester V	6	22BTCE316R	Construction Engineering& Management	PC	3	0	0	0	0	0	3	40	60	0	100
	7	22BTCE317R	Hydraulics Engineering	PC	2	0	0	0	0	0	2	40	60	0	100
	8	22UBPD314R	Competent English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	9	22UBCC311	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22UBEC311	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	11	22BTCE317R	Techno- Professional Skills IV	PC	0	0	2	0	0	0	1	0	0	100	100
		MOOCSCECE4	MOOCS IV	FE	0	0	0	0	0	0	1	0	0	0	100
		Total	1		16	2	10	8	0	0	26	280	420	600	1400

ster	S. No.	Course Code	Course Title	Course Category	Engagement		Maximum Marks for	
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				L	T	P	S	R	o	C	IA*	SEE*	PE*	Total
1	22BTCE321R	Design of RC Structure	PC	2	1	0	0	0	0	3	40	60	0	100
2	22BTCE322R	Estimation and Costing	PC	2	0	2	0	0	0	3	40	60	100	200
3	22BTCE324R	Structural Analysis II	PC	3	0	0	0	0	0	3	40	60	0	100
4	22BTCE324E	Professional Elective I	PE	3	0	0	0	0	0	3	40	60	0	100
5	22BTCE325E	Professional Elective II	PE	3	0	0	0	0	0	3	40	60	0	100
6	22BTCE326E	Professional Elective III	PE	3	0	0	0	0	0	3	40	60	0	100
7	22BTCE327E	Generic (Open) Elective I	UE	2	0	0	0	0	0	2	40	60	0	100
8	22UBPD324R	Corporate Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
9	22UBCC321	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
10	22UBEC321	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
11	22BTCE323R	Techno- Professional Skills V	PC	0	0	2	0	0	0	1	0	0	100	100
12	MOOCSCECE5	MOOCS V	FE	0	0	0	0	0	0	1	0	0	100	100
	Total		15	1	8	8	0	0	26	240	360	600	1200	

lest	S.	Course Code	Course Title	Course	E	nga	gen	nen	ıt		Maxim	um Ma	rks for	
Sem	er			Category	LI	Р	S	R	0	C	IA*	SEE*	PE*	Total

1	22BTCE411R	Design of Steel Structure	PC	2	0	0	0	0	0	2	40	60	0	100
2	22BTCE415E	Professional Elective IV	PE	3	0	0	0	3	3	3	40	60	0	100
3	22BTCE414E	Generic Elective II	UE	3	0	0	0	3	3	3	40	60	0	100
4	22BTCE412R	Project I	PC	0	0	12	0	6	6	6	0	0	100	100
5	22BTCE413R	Industrial Mock Viva	PC	0	0	0	0	0	0	0	0	0	100	100
6	22BTCE414R	Techno-Professional Skills VI	PC	0	0	2	0	1	1	1	0	0	100	100
7	22UBCC411	Co-curricular	UC	0	0	0	4	1	1	1	0	0	100	100
Total			8	0	14	4	14	14	16	120	180	400	700	

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maximum Marks for					
	N.			Category	L	T	P	S	R	0	С	IA*	SEE*	PE*	Total		
Semester VIII	1.	22BTCE423R	Railway and Airport Engineering	PC	3	0	0	0	0	0	3	40	60	0	100		
	2	22BTCE422E	Professional Elective V	PE	3	0	0	0	0	0	3	40	60	0	100		
eme	3	22BTCE424E	Generic Elective III	UE	2	0	0	0	0	0	2	40	60	100	200		
Š	4	22BTCE425E	Generic Elective IV	UE	2	0	0	0	0	0	2	40	60	100	200		
	5	22BTCE422R	Project II	PC	0	0	12	0	0	0	6	0	0	100	100		
	Total				10	0	12	0	0	0	16	160	240	300	700		

	SE	MESTER	I - I										
Course	Eng	gineering	Math	emati	cs I								
Title													
Course			L	T	P	S	R	O/F	C				
code	Total hours:		3	1	0	0	0	0	4				
Pre-	Nil Co-requisite		Nil										
requisit		<b></b>	<u> </u>	<u> </u>		•							
Prograi me	n Bachelor of	Technolo	gy in (	Civil	Engin	eering							
Semeste	er Fall: Winter/ I se	semester of first year of the programme											
Course	1. To make understand to evaluate								se some				
Objecti								om me	e some				
es	2. To provide the application of diff												
(Minim				_			nd se	ries					
m 3)					1-								
CO1 Enabling solving skills of definite and improper integrals.													
CO2	Understand the concept of calculus an												
CO3	Understand the application of differen												
CO4	Evaluate functions of multiple var			heore	ms o	f vecto	or ca	alculus,	and solve				
005	optimization problems using Lagrange multipliers.												
CO5	Analyze complex functions, perform complex integration, and apply convergence tests and series												
Unit-	Content	representations.  Conta Learning Outcome K											
No.	Content	ct	Leai	ınıng	Outco	JIIIC			KL				
1,00		Hour											
I	Unit 1:Techniques of integration: Integration by parts, trigonometric integrals, and hyperbolic functions; Application of integration to solve differential equations: Separable and exact equations; Improper integrals and their convergence criteria; Numerical methods for integration: Trapezoidal rule, Simpson's rule, and Romberg integration; Applications of integration in physics and engineering: Center of mass, moments of inertia, and fluid pressure.	5	Upon will techn integ integ They meth diffe evaludeter Addi skills techn rule, integ stude pract problem and fi	ng ng ric ns. on act nd nd ia. ire on dal erg ps in ng he									
II	<b>UNIT 2:</b> Unit 2. Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.	10	Stude unde theor Theo Theo	ents rstancems i brem	will ling n calc and as w	gain of culus, in the vell as	cludi Mea Tay	thoroundamening Rollun Valer's a	tal 3, 4 e's ue nd				

			They will learn to handle	
			indeterminate forms using L'Hospital's rule and develop the ability to find the maxima and minima of functions. This unit strengthens the students' grasp of the theoretical underpinnings of calculus and enhances their problem-solving skills in optimization.	
III	UNIT 3: Complex numbers and functions: Analyticity and Cauchy-Riemann equations; Complex integration: Cauchy's theorem and Cauchy's integral formula; Power series and Laurent series; Classification of singularities: Poles and essential singularities; Residue theorem and applications to evaluating complex integrals; Convergence tests for series: Ratio test, root test, and comparison test; Representation of functions using series: Taylor and Laurent series	5	In this unit, students will explore the realm of complex numbers and functions, focusing on concepts such as analyticity and the Cauchy-Riemann equations. They will delve into complex integration through Cauchy's theorem and Cauchy's integral formula. The unit covers power series and Laurent series, classification of singularities, and the residue theorem, providing students with the tools to evaluate complex integrals. Furthermore, students will learn various convergence tests for series and how to represent functions using Taylor and Laurent series, equipping them with a solid foundation in complex analysis.	1, 2, 3, 4, 5
IV	UNIT 4: Limit, continuity, and partial derivatives; directional derivatives, total derivative, tangent plane and normal line, Maxima, minima, and saddle points, Method of Lagrange multipliers, Gradient, curl, and divergence, Multiple integrals and their applications (double and triple integrals), Line integrals and surface integrals, Green's theorem, Stokes' theorem, and the Divergence theorem	5	Students will become adept at handling functions of multiple variables, learning about limits, continuity, and partial derivatives. They will understand directional derivatives, total derivatives, and the geometric interpretations of the tangent plane and normal line. The unit covers methods for finding maxima, minima, and saddle points, and introduces the method of Lagrange multipliers for constrained optimization. Students will also study vector calculus concepts, including the gradient, curl, and divergence, and apply multiple integrals in various contexts. The unit concludes with an exploration of line and surface integrals, and key theorems such as Green's, Stokes', and the Divergence theorem.	2, 3, 4
V	UNIT 5: Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation	5	This unit equips students with a comprehensive understanding of linear algebra concepts, focusing on the inverse and rank of a matrix, and the rank-nullity theorem. Students will learn to solve systems of linear equations and explore properties of symmetric, skew-symmetric, and	2, 3, 4, 5

orthogonal matrices. The unit covers determinants, eigenvalues, and eigenvectors, and teaches students how to diagonalize matrices and apply the Cayley-Hamilton theorem.  Additionally, students will learn about
Additionally, students will learn about
orthogonal transformations, gaining
skills crucial for various applications
in mathematics and related fields.

- 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- 2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 3.Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

### **REFERENCE BOOKS:**

- 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

CO	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome	m								
1	Enabling solving skills of definite and improper integrals.	1,2									
2	Understand the concept of calculus and linear algebra.	3,5									
3	Understand the application of differential and integral calculus.	6,9,10									
4	Evaluate functions of multiple variables, apply theorems of vector calculus, and solve optimization problems using Lagrange multipliers.	5,9									
5	Analyze complex functions, perform complex integration, and apply convergence tests and series representations.	4,1,11									

SENIE	BIEN	. – 1											
Course	9	Introduction to Basic	Mathemati	ics, Logic	and Co	odin	ıg						
Title Course		AADE CELLAD	- I	70. 4	1.		-				10.75		
Course code Pre-		22BTCE112R	Total cro				T	P	S	R	O/F	C	
		N121		urs: 60T		<u>z</u> Nil	1	2	0	0	0	4	
	ito	Nil	Co-requ	isite	ľ	NII							
requisi Progra		Bachelor of Technolog	ry in Civil l	Enginoori	ina								
Semest		Fall: Winter/ I semest				romr	mo						
Course		ran. whitei/ i semest	er or mist y	ear or the	e progr	allii	ille						
Object		1. To understand a	ind be able t	to use the language, symbols and notation of mathema									CS
(Minin		2. To develop the										7111111	Co
3)		3. To become con										nalyz	ze and solv
- /		problems in rea		-	,	, 0	,		U		C	,	
CO1		1. The students will	be able	to demo	onstrate	e the	e ab	ility	to ur	nderst	and th	ne c	oncepts of
		mathematics, logic, reasoning and coding											
CO2			Students will be able to apply of applications of concepts in other disciplines such as										
		engineering, compute											
CO3		3. Solve and devise so	olutions to	a range of	of elem	nenta	ıry re	al-wo	rld pr	oblen	ns in n	nathe	matics and
~~4		programming			.1 . 1 .		1 .		1.1				
CO4		4. Explore and apply ke	<u> </u>										٠
CO5		5. Enable students to	critically a	naiyze in	ıormatı	ion 1	ın oro	uer to	evali	iate e	viaenc	e an	u construct
Unit-	Cont	reasoned arguments		Conta	Learn	ina	Outo	om o					KL
No.	Com	ent		ct	Learn	ıınıg	Out	come					KL
110.				Hour									
I	Rasio	cs of Set Theory and Fu	Hour	Studer	nts	will	σa	in a	fııı	ndamen	ıtal	1, 2	
•		Basic definitions, cardi								includi		1, 2	
		principle of exclus		basic			ions,		dinali		ınd		
		sion, combination of se			operat	tions	on	set			s unio	on,	
	inters	section, difference, co		interse	ectio	n, di	fferen	ce, an	d cor	npleme	nt.		
		De Morgan laws, Venn								exclusi			
		esian Products and R							_		, and h		
		Definitions, binary rela									diagrar		
		omposition and invers	-							_	icts, ba		
		on on a set : pro	_								perties		
		xive, irreflexive, symmo metric, transitive, ed								eflexivi ymmet			
	-	ons, partial order relation	•								ons, a		
		ctions: Basic definition		5							ditional		
		co-domain, image ar									asics		
		ity function, one-to-one									codoma		
		ions, bijections, cha						_			injecti		
	funct	ion, composition of	functions,		surject	tive,	ar	nd	bijecti	ve	functio	ns,	
		rse of a function, open			charac	cteris	stic f	unctio	ons, co	ompos	sition a	ınd	
		unary operators - ide								_	ations		
		ry operators – ass	ociativity,		sets in	ıvolv	ving u	ınary	and bi	nary o	perato	rs.	
		nutativity	_										
		ber systems: Natural											
	⊢whol	e numbers, integers,											
	numl	pers, real numbers, ope										l	
	numl numl		ibtraction,										

SEMESTER – I

II	Introduction to Mathematical Logic and Induction:  Mathematical Logic: Truth values of mathematical statements, formulas in mathematical logic, logical operators - AND, OR, NOT etc, De Morgan Laws, Truth values of formulas, Truth tables Propositional Logic: Constants, variables, assignment of variables in a formula, tautology, contradiction and satisfiability, truth table of a formula, equivalence of formulas, proving formulas and equivalences by truth table method  Mathematical Induction: Principle of mathematical induction — induction basis and induction step, examples	10	This unit introduces students to various number systems such as natural numbers, whole numbers, integers, rational numbers, and real numbers, along with their basic operations: addition, subtraction, multiplication, and division. In the realm of mathematical logic, students will learn about truth values, logical operators (AND, OR, NOT), De Morgan's laws, and how to construct and interpret truth tables. The unit covers propositional logic, including constants, variables, tautology, contradiction, satisfiability, and equivalence of formulas. Students will also learn to prove formulas and equivalences using truth tables.	1, 2, 3, 4
Ш	Introduction to Logic and Reasoning: Alphanumeric series, Direction, Logical Reasoning, Data Sufficiency, Ranking and order, Puzzle, Blood Relations, Analogy, Cube and Dice, Coding-Decoding	5	Students will understand the principle of mathematical induction, learning to identify the induction basis and perform the induction step, with various examples to illustrate these concepts. The unit also introduces basic logic and reasoning skills, including alphanumeric series, directional reasoning, logical reasoning, data sufficiency, ranking and ordering, puzzles, blood relations, analogy, and coding-decoding. These topics will develop students' problem-solving abilities and logical thinking skills.	1, 2, 3, 4, 5
IV	Introduction to Coding: C Programming constructs: Types of Programming Languages, Evolution of 'C' Language, Structure of a 'C' Program, Executing and Debugging a 'C' Program, 'C' Tokens: Keywords and Identifiers, Operators, Constants, Variables, Data Types, Precedence of Operators, Scope and Lifetime of Variables, Arithmetic Expressions, Evaluation of Expressions. Control Statements: Decision Making using if statement, Types of ifelse block, Switch case Block, GOTO statement. Looping: Concept of Loop, For loop, While loop, Do- while loop, jumping in Loop, break and continue statement	5	This unit introduces students to the fundamentals of C programming, covering the types of programming languages and the evolution of the C language. Students will learn the structure of a C program, and how to execute and debug it. The unit covers C tokens such as keywords, identifiers, operators, constants, variables, data types, and operator precedence. Students will understand the scope and lifetime of variables, arithmetic expressions, and their evaluation. Control statements will be covered, including decision-making using if statements, types of ifelse blocks, switch case blocks, and the GOTO statement.	2, 3, 4
V	Introduction to Arrays, Strings and Functions	_	Students will delve deeper into C programming, focusing on control	2, 3, 4, 5
	Arrays: One Dimensional Arrays, Two-Dimensional Arrays,	5	structures such as loops (for, while, do- while) and how to manage loop execution using break and continue statements. The	

Multidimensional Arrays, Dynamic	unit introduces arrays, covering one-
Arrays.	dimensional, two-dimensional,
Strings:	multidimensional, and dynamic arrays.
Implementing String Variables,	Students will also learn about strings,
String handling Functions.	including how to implement string
<b>Functions:</b>	variables and use string handling
Concept of Functions, user-defined	functions. The concept of functions is
Functions, System-defined Functions,	explored, differentiating between user-
passing in Functions.	defined and system-defined functions, and
	understanding how to pass parameters to
	functions. This unit provides a
	comprehensive understanding of essential
	programming constructs and prepares
	students for more advanced coding tasks.

- 1. Schaum's Outline of Programming with C by Byron Gottfried, Third Edition
- 2. Programming in ANSI C by E. Balaguruswamy, Eight Edition
- 3. Discrete Mathematics by Lipschutz, Lipsonand and Patil, Revised Third Edition
- 4. A Textbook on Discrete Mathematics by Sastry and Nayak

#### **REFERENCE BOOKS:**

- 1. A Modern Approach To Verbal & Non Verbal Reasoning by R S Agarwal, Revised Edition
- 2. Analytical and Logical Reasoning by Sijwali B S, Revised Edition
- 3. The C Programming Language, by Brian W. Kernighan and Dennis M. Ritchie, Second Edition
- 4. 2000 Solved Problems in Discrete Mathematics by Lipschutz and Lipson

#### OTHER LEARNING RESOURCES:

https://www.javatpoint.com/discrete-mathematics-tutorial

 $\underline{https://www.khanacademy.org/test-prep/lsat/lsat-lessons/logical-reasoning/a/logical-reasoning-article--getting-started}$ 

https://www.javatpoint.com/c-programming-language-tutorial

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	1. The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding	1,8	
2	2. Students will be able to apply of applications of concepts in other disciplines such as engineering, computer science, physics, etc.	3,7	
3	3. Solve and devise solutions to a range of elementary real-world problems in mathematics and programming	6,9,10	
4	4. Explore and apply key concepts in logical thinking to business problems.	5,9	

5	5. Ena	ble st	udents to cr	itically analy	yze info	ormation in	7,1,12
	order	to	evaluate	evidence	and	construct	
	reas	soned	arguments				

SEMEST	ER – I										
Course			Engine	ering	g Phys	sics					
Title				-		,	1	1			
Course		tal cred			L	T	P	S	R	O/F	C
code			rs: 60T		2 Nil	1	2	0	0	0	4
Pre-	Nil Co-	-requis	site								
requisite											
Program	Bachelor of Technology in Ci	vil En	gineering	5							
me Someston	Falls Winter/I generates of fix	********	n of the n								
Semester Course	Fall: Winter/ I semester of fir	rst year	r or the p	rogr	amm	e					
Objectiv	1. To understand the theories of physics										
es	2. To apply the concepts in practical problems										
(Minimu	3. To understand the physical states of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the state of the	ics of a	ny proce	SS							
m 3)											
	Develop a foundational underst	tanding	of the v	ector	s and	scala	r repre	esentat	ion o	f forces	s and nature
	of forces.										
CO2	Illustrate conservative and non-	conser	vative for	ces,	angula	ar mo	mentu	m and	energ	gy equa	tions
CO3	llustrate conservative and non-conservative forces, angular momentum and energy equation Explain basics of non-inertial frames and acceleration and its application in engineering fiel										field
CO4	Comprehend on oscillations and										
CO5	Understand the three dimension	al rigic	•					e mom	ent o	f inerti	_
Unit-	Content		Conta	Lea	arning	g Out	come				KL
No.			ct								
I			Hour	D	41	1 4	C 41. '	!4		ts will	1, 2
	Unit I: Electrostatics in Vacua Coulomb's law, electric intensity, Gauss's law and applications, electric potential potential energy, conductor electrostatic equilibric capacitors and capacitors calculations.	field d its l and rs in rium,	10	den und rail evo rail be diff pro will and suc deta den adv varithe eml Addider und prir	nonstralerstar ways blution way table to be clearly characteristics. I identify a sities was table to be constructed by the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the construction of the co	rate inding in of track to exp gauge of co tify an acteri rails thei Th es a ypes of irement ally, con d rai s be	a of the India perm composition the suscending and description of the structure of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the students of the student	cone deve , inc. anents he sign d in In wheel cribe th f key oers, a es, sp vill a disadva ast and or sul cts will rail o, and	nprehelopm ludin way The nificandia a ls. Sine functions and pacing antage under ogradionstre be a expl	nensive ment of g the y and ey will unce of and the tudents nections bonents ballast, g, and he es of erstand de and uction. The able to defects, ain the	
П	Unit II: Magnetostatics Biot-Savart law, Ampère's law applications, magnetic v potential, magnetic propertie materials (diamagne	rector es of	10	Upo geo stud des inco	on co metri	omple c des will rail ating	eting to sign o be abloway granger	f raily e to a track adients	way analy S,	on the tracks, ze and layouts grade rations	

	naramagnatism famous an ations		for aurus and minaintee of according	
	paramagnetism, ferromagnetism).		for curves, and principles of super elevation to enhance safety and efficiency. They will understand the concepts of cant deficiency and negative super elevation, applying them appropriately to track design. Furthermore, students will gain proficiency in designing and implementing various track layouts including switches, crossings (such as diamond and scissors crossings), and turnouts (including double turnouts). They will comprehend the operational requirements and design considerations for railway stations and yards, including traction and track resistance, stress analysis on track components (rails, sleepers, ballast), and the equipment necessary in yards. Additionally, students will grasp the fundamentals of signaling and control systems, their objectives, classifications, and the principles of interlocking signals and points to	
III	Unit III: Faraday's Law Electromagnetic induction, Faraday's law (integral and differential forms), magnetic flux, induced electromotive force (emf), practical applications.	10	ensure safe railway operations.  The learning outcome of the unit on air transport and airport planning encompasses a comprehensive understanding of the historical evolution, regulatory frameworks, and operational aspects of air transport systems worldwide. Students will gain knowledge of aircraft types and their characteristics, aerodrome classifications, and the roles of air transport authorities. They will develop proficiency in airport planning principles according to international standards (ICAO and FAA), covering regional planning concepts, airport master planning, site selection criteria, zoning laws, and the design and classification of airport elements such as airfields and terminals. Additionally, students will learn to assess airport and runway capacities, estimate future air traffic demands, and apply principles for developing new airports, culminating in the ability to conceptualize ideal airport layouts.	1, 2, 3, 4, 5
IV	Unit IV: Displacement Current and Maxwell's Equations Displacement current, magnetic field due to time-dependent electric field, Maxwell's equations in integral and differential forms,	10	Upon completion of this unit on Airfield Design and Planning, students will be able to demonstrate comprehensive knowledge and skills in various critical aspects of airfield infrastructure. They will understand	2, 3, 4

	boundary conditions for		the principles of runway design,	
	electromagnetic fields.		including the influence of wind	
			orientation and coverage on runway	
			orientation and length requirements, as	
			well as factors affecting runway length	
			determination and geometric	
			configurations. Students will be	
			proficient in designing taxiways,	
			considering geometric elements,	
			layout, and exit strategies, as well as	
			planning apron locations, sizes, and	
			configurations for efficient aircraft	
			parking and turnaround operations.	
			Additionally, they will grasp the	
			essentials of pavement design using	
			the LCN system, comprehend common	
			airfield pavement failures, and	
			formulate strategies for maintenance	
			and rehabilitation. This unit will equip	
			students with the necessary expertise	
			to contribute effectively to the	
			planning, design, and operational	
			efficiency of airfield facilities.	
V			By the end of this unit, learners will	2, 3, 4, 5
			demonstrate a comprehensive	
			understanding of terminal area	
			planning and design within an airport	
	Unit V: Electromagnetic Waves		context. They will be able to analyze	
	Wave equation for electromagnetic		and apply the fundamental elements	
	fields, propagation of		and requirements of terminal	
	electromagnetic waves in free		buildings, including functional spaces	
	space and in materials, energy and	5	and spatial requirements. Students will	
	momentum of electromagnetic		also grasp essential concepts in vehicular parking area design and	
	waves, reflection and refraction,		circulation networks, incorporating	
	polarization, electromagnetic wave		considerations for efficient operations	
	applications		and user experience. Furthermore, they	
			will comprehend the significance of	
			airport grading and drainage systems,	
			understanding their roles in ensuring	
			operational safety and efficiency.	

 $1. Introduction\ to\ Electrodynamics.\ David\ Griffiths.\ Prentice\ Hall,\ Upper\ Saddle\ River,\ New\ Jersey,\ 07458$ 

2.Basic Laws of Electromagnetism. IE IRODOV

# **REFERENCE BOOKS:**

1. Principles of physics. Halliday Resnick

# OTHER LEARNING RESOURCES:

# 1. https://www.sciencedirect.com/science/article/pii/S0951832022005142

CO	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop a foundational understanding of the vectors and scalar representation of forces and nature of forces.	1,2
2	Illustrate conservative and non-conservative forces, angular momentum and energy equations	3,5
3	Explain basics of non-inertial frames and acceleration and its application in engineering field	6,9,10
4	Comprehend on oscillations and its application in the field of engineering kinematics	5,9
5	Understand the three dimensional rigid body motion and determine the moment of inertia.	4,1,11

SEME	STER – I										
Course	Basic Electrical Engir	neering									
Title											
Course	22BTCE114R	Total credi	its: 4	L	T	P	S	R	O/F	C	
code		Total hour	s: 60T	2	1	2	0	0	0	4	
Pre-	Nil	Co-requisi	te	Nil		•			•		
requisi	te	-									
Progra	mme Bachelor of Technolog	gy in Civil	Engineer	ing							
Semest					amm	e					
Course			v								
Object	ives 1. Explain operation	ve principle	e of transf	ormer w	ith ba	ckgrou	ind of	magn	netic cir	cuits.	
(Minimum 2. Classify and compare different types of Electrical machines.											
(3) 3.											
CO1	Understand the concept	and theore	ems of bas	sic elect	ric an	d magı	netic c	ircuit	s for ar	nalyzi	ing and
	designing electrical syst									•	
CO2	Analyze the working p		single-pl	hase ac	circui	ts, thre	e phas	se bal	lanced	circui	its, star
	and delta connection etc	•	- *				-				
CO3	Identify the magnetic	compone	nts and	efficien	cy of	fauto	-transf	orme	r and	three	e-phase
	transformer connections				_						
CO4	Explain the working pri	ciples of co	ommon el	ectrica in	nstrun	nents a	nd the	ir cha	racteris	stics.	
CO5	Acquire skills in DC-D	C converte	rs, voltag	e source	inve	rters, a	nd LT	Swit	chgear	comp	onents
	and and elementary cald										
Unit-	Content		Conta	Learn	ing O	utcom	e				KL
No.			ct								
			Hour								
I	DC Circuits: Electrical	circuit		Studen	ıts wi	ll und	erstanc	the	proper	ties	1, 2
	elements (R,L,C), volta	ige and		of elec	ctrical	circui	t elen	nents	(R, L,	(C)	
	current source, Ki	rchoff's		and the	e beh	avior o	of volt	age a	and cur	rent	
	current and voltage law,	analysis		source	s.						
		nevenin,	10								
	Norton and	, , , , , , , , , , , , , , , , , , , ,									
	Notion and										
	Superposition theorem										
TT	Superposition theorem	odion - C		Ctr. da	+0	:11	_1.		nnoc=+-	c C	2, 3,
II	AC Circuit: Representa								oncepts		
	sinusoidal waveforms, po			and	idai y RMS		rms, lues,	anciu	ding p	asor	4
	rms values,	phasor		represe			iucs,	anc	ı pıra	u501	
	representation, real	power,		represe	manc	<i>7</i> 11.					
	reactive power, apparent	-									
	power factor, Analysis o	-	10								
	phase ac circuits consis	sting of	10								
	R,L,C.RL,RC,RLC										
	combination(series and p	oarallel),									
	voltage and current rela										
	in	1									
	star and delta connection										
III		gnetic		Studen	ıts wi	11 11nde	erstand	1 the	proper	ties	1, 2,
111	materials, ideal and p				nagne		nateria		and	the	3, 4
		-			_				fideal		٠, ١
	transformer, equivalent		10	practic				J11 UI	i ideai	and	
	losses in transformer, re	_		Practic	uu		-10.				
	and efficiency,	auto									
	transformer,										

IV	three phase transformer connection  Electrical Machines:  Generation of rotating magnetic fields, construction and working of three phase induction motor, torque-slip characteristics, losses and efficiency, Single phase induction motor, working of synchronous	10	Students will understand the generation of rotating magnetic fields and the construction and working principles of three-phase induction motors.	1, 2
V	generator  Power converter and electrical installation: DC-DC buck and boost converter, single phase and three phase voltage source inverter, Fuse, MCB, ELCB, MCCB, Earthing, wires and cables, types of batteries	5	Students will apply the principles of DC-DC buck and boost converters, and single-phase and three-phase voltage source inverters.	2, 3, 4, 5

1. D. P. Kothari and I. J.Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2010

# REFERENCE BOOKS:

- 1.D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill ,2009
- 2.E. Hughes, "Electrical and Electronics Technology", Pearson, 2010

# OTHER LEARNING RESOURCES:

https://nptel.ac.in

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Pro Outcome	gram
1	Understand the concept and theorems of basic electric and magnetic circuits for analyzing and designing electrical systems	1,2	
2	Analyze the working principles of single-phase ac circuits, three phase balanced circuits, star and delta connection etc.	3,10	
3	Identify the magnetic components and efficiency of autotransformer and three-phase transformer connections.	6,9,12	
4	Explain the working priciples of common electrica instruments and their characteristics.	5,9	
5	Acquire skills in DC-DC converters, voltage source inverters, and LT Switchgear components and and elementary calculations for energy consumption	4,1,7	

<b>SEME</b>	CSTER – I										
Course		Intro	ductory I	English	for E	nginee	ers				
Title											
Cours	e 22UBPD114R	Total credi	its: 2	L	T	P	S	R	O/F	C	
code		Total hour	s: 30T	0	0	4	0	0	0	2	
Pre-	Nil	Co-requisit	te	Nil							
requis											
Progra											
Semes		ter of first	year of th	e progr	amm	e					
Cours					Dagi	. En ali	.a.l		_		
Object				•		-	_				
(Minir			communic	cate con	maeni	iy wit	n a 100	cus oi	n iistenii	ng	
3)	and speaking sk 3. With the help		ios of Dha	onatios	tha c	tudont	c will	ho ol	blo to		
	pronounce work			metics,	uie s	tuuciit	S WIII	De ai	DIE 10		
	4. To interact succ			corum							
CC					ments	. inclu	ıding	parts	of speed	h. articl	es.
	auxiliary verbs, determ	•	•						•		
	sentences.				_						
CC	1 7			_	mpre	hensio	n exe	cises.	, demon	strating	an
	understanding of senten										
CC				_					_		_
	identify factors affecting										
CC	1 1										
	pronunciation through for self-reflection.	phonetics,	denvering	extemp	ore s	peecn	es, and	usin	g video	recordin	igs
CC		nentals of a	communic	ation in	ncludi	no its	types	nurr	noses h	arriers a	and
	importance, and apply					-					
	and informal contexts.	tillo itilo wi	cuge to in	inprove			amoun	on on	ins in c	0111 10111	1141
Unit-	Content		Conta	Learni	ng O	utcom	e			KL	,
No.			ct								
			Hour								
I			nour								
1			Hour						master 1		2
			Hour	founda	tional	eleme	ents of	gram	ımar. Th	ey	2
			Hour	founda will 6	tional explor	eleme e the	ents of e par	gram ts o	mar. Th	ey ch,	2
	Module 1 - Grammar		nour	founda will e includi	tional explor ng	eleme e the nouns	ents of e par , pro	gram ts o	nmar. The f speed s, ver	ey ch, bs,	2
			noui	founda will e includi adjectiv	tional explor ng ves,	eleme e the nouns adv	ents of e par , pro erbs,	gram ts o onoun pr	mar. The speed s, ver reposition	ey ch, bs, ns,	2
	i. Parts of Speech		Hour	founda will e includi adjectiv conjune	tional explor ng ves, ctions	elemente the nouns adv	ents of e par , pro erbs, and	gram ts of pnoun pr int	mar. The speed s, ver eposition terjection	ey ch, bs, ns,	2
	i. Parts of Speech i. Articles			founda will e includi adjectiv conjune Unders	tional exploring ves, ctions	elemente the nouns adv	ents of e par property, property, and eticles	gram ts o onoun pr int (def	nmar. The speed s, ver eposition terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and terjection and ter	ey ch, bs, ns, ns.	2
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III	Module 3 - Listening Skills  i. What is listening? i. The Process of Listening i. Factors that adversely affect Listening v. Difference between Listening and Hearing, v. Purpose and Importance of Effective Listening i. How to Improve Listening Process.	10	and superlative) will be explored. The module will also include comprehension exercises designed to enhance students' ability to understand and interpret written texts effectively  Students will be introduced to the fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	1, 2, 3, 4
IV	Module 4 - Speaking Skills  i. Introducing yourself i. Self-discovery i. Basics of Phonetics, pronunciation v. Extempore speech v. Video Recording for Self reflection	10	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	Module 5- Communication Skills  i. Introduction to Communication, i. Importance of Communication Skills, i. Purpose of Communication, v. Types of Communication, v. Formal and informal communication i. Importance of Communication, i. Barriers to Communication, i. Barriers to Communication, i. How to improve/ tips to improve Communication skills. c. Responding to different questions in various situations (formal/informal)	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of communication, distinguishing between formal and informal contexts. Students will learn about the importance of communication skills and the barriers that can impede effective communication. Tips and strategies to improve communication skills will be provided. The module will also include exercises on responding to different questions in various situations, enhancing students' adaptability and effectiveness in both formal and informal interactions.	2, 3, 4, 5

### Text Books:

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011. Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first edition,
- S. Chand & Delhi. New Delhi.

# Reference Books:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2.Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Klett

Other Learning Resources:

https://youtu.be/bEB8-SWMYhI

https://youtu.be/-zZau dttRY

CO	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and correctly use various grammar elements, including parts of speech, articles, auxiliary verbs, determiners, and degrees of comparison, to construct different types of sentences.	1,2
2	Analyze and comprehend written texts through comprehension exercises, demonstrating an understanding of sentence construction and types.	3,5
3	Understand the process and purpose of listening, differentiate between listening and hearing, identify factors affecting listening, and implement strategies to improve their listening skills.	6,9,10
4	Develop speaking skills by introducing themselves, practicing self-discovery, improving pronunciation through phonetics, delivering extempore speeches, and using video recordings for self-reflection.	5,9
5	Understand the fundamentals of communication, including its types, purposes, barriers, and importance, and apply this knowledge to improve their communication skills in both formal and informal contexts.	4,1,11

SEMESTER	. – I								
Course Title	Workshop/Manuf	Workshop/Manufacturing Practices							
Course	22BTCE115R	Total credits: 4	L	T	P	S	R	O/F	C
code		Total hours: 45T	1	0	4	0	0	0	3
Pre- requisite	Nil	Co-requisite	Nil						
Programme	Bachelor of Techn	ology in Civil Engineer	ing						
Semester	Fall: Winter/ I ser	nester of first year of th	e prog	ramm	ie				
Course	1.Learning th	nis course will lead you	ı to ur	ndersta	and ba	asic co	ncept	s of w	orkshop and

Objectives (Minimum		manufacturing			
(Minin 3)	num	2. Apply fundamental knowle	edge of w	orkshop and manufacturing in day-to-day lif	e.
		3.Recognize components usi	ing differe	ent materials.	
CO1		Infer about various manufacturing	methods 1	like casting, forming, machining etc	
CO2		Apply fitting oparation and power	tools in m	nanufacturing works	
CO3		Demonstrate to Carpentry & fitting	g operatio	ns and its application in industries	
CO4					c.
CO5		Critique the different types of weld	ling, meta	l cassting and its field of application.	
Unit-	Cont	ent	Conta	Learning Outcome	KL
No.			ct Hour		
I	Ma	nufacturing Methods	11001	Students will gain a comprehensive	1, 2
	Casti	ng, forming, machining, joining, nced manufacturing methods	10	understanding of traditional manufacturing methods, including casting, forming, machining, and joining processes. They will explore the fundamentals of each method, learning about the materials and techniques used to shape and assemble components. The unit also introduces advanced manufacturing methods, focusing on CNC (Computer Numerical Control) machining and additive manufacturing. Students will gain an overview of the CNC machining process, including the programming, setup, and operation of CNC machines. They will also learn about additive manufacturing, covering its principles, technologies, and applications in modern manufacturing	
II	Ma Over overv	C machining, Additive nufacturing view of CNC machining process, view of additive manufacturing	10	This unit covers essential skills and knowledge in carpentry and fitting operations. Students will become familiar with various carpentry tools and their uses, as well as common carpentry operations such as cutting, shaping, and assembling wooden components. The unit also includes fitting tools and operations, teaching students how to measure, mark, cut, and assemble metal components with precision. These skills are fundamental for producing and maintaining high-quality mechanical systems and structures.	2, 3, 4
III	Carp	entry tools, carpentry operations, fitting tools, fitting ations	10	Students will delve into machining operations, focusing on turning and milling processes. They will learn the principles and techniques involved in turning, such as setting up the lathe, selecting cutting tools, and executing turning operations to produce cylindrical parts. The unit also covers milling processes, including the setup and	1, 2, 3, 4

IV	Machining operations Turning, milling, turning processes, milling processes	10	operation of milling machines, and the selection of appropriate milling tools. Students will gain practical skills in producing components with complex shapes and precise dimensions.  In this unit, students will explore various welding techniques, with a focus on arc welding and gas welding. They will learn about the equipment, materials, and safety procedures involved in these welding methods. The unit also covers brazing, teaching students the principles and techniques for joining metals using a filler material that melts at a lower temperature than the base materials. Through hands-on practice, students will develop the skills needed to create	1, 2
			strong, durable welds for a variety of applications.	
V	Welding Arc welding & gas welding, brazing	5	Students will gain an in-depth understanding of advanced manufacturing technologies, particularly CNC machining and additive manufacturing. The unit provides an overview of the CNC machining process, highlighting its precision, flexibility, and automation capabilities. Students will learn about the various types of CNC machines, programming techniques, and practical applications in industry. The unit also covers additive manufacturing, discussing its revolutionary impact on product design and production. Students will explore different additive manufacturing technologies, materials, and the wide range of applications, from prototyping to production of complex, custom parts.	2, 3, 4, 5

1. Elements of Workshop Technology, Vol. I 2008 and Vol. II 2010

2.Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K Media promoters and publishers private limited, Mumbai.

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Infer about various manufacturing methods like casting, forming, machining etc	1,3	3,5

2	Apply fitting oparation and power tools in manufacturing works	2,4
3	Demonstrate to Carpentry & fitting operations and its application in industries	6,8
4	Enhance skills in machining operations like material cutting and preparation of mould etc.	7,10,12
5	Critique the different types of welding, metal cassting and its field of application.	8,9

# MAPPING TABLE

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE111R	Engineering Mathematics	3	3	1	1	1		1					1
22BTCE112R	Introduction to Basic Mathematics, Logic and Coding	2	3	2	1	1	1	1					1
22BTCE113R	Engineering Physics	3	3	1	1	1		1					1
22BTCE114R	Basic Electrical Engineering	3	2	2	3	2	1				1		
22BTCE115R	Workshop/Manufacturing Practices			2	1	1	2	1	2	1			2
22UBPD114R	Introductory English for Engineers						1		1	2	3	2	2

		SEMESTE	R – II								
Cours e Title		Engineering	Mather	natics	II						
Cours e code	22BTCE121R	Total credits: 4 Total hours: 30T+30P	1 3	T 1	P 0	S 0	R 0	O/F 0	C 4		
Pre- requisi te	Nil										
Progr amme	B.Tech Civil Emgineering										
Semes ter	]	Fall/ II semester of fir	st year	of the	progra	mme					
Cours e Object	Describe the concept of understanding comple.	x problems.	_								
ives (Mini mum 3)	<ol> <li>Apply the concept ofordinary differential equations of higher orders.</li> <li>Analyze: To develop students' skills in basic probability and statistics, including the analysis of probability distributions, measures of central tendency, and statistical parameters, and to apply these concepts to real-world data and hypothesis testing.</li> </ol>										
CO1	Apply complex variable ar	nd its differentiation in	solving	variou	s comp	lex pro	blems.				
CO2 CO3 CO4	Understand the basic principles of probability and apply them in solving different complex problems.  Apply the concepts of basic and applied Statistics. Apply complex variable differentiation techniques Calculate basic probability measures within probability spaces, including conditional probability, independence, and the behaviour of discrete random variables.  Evaluate statistical parameters such as moments, skewness, and kurtosis for binomial, Poisson, and normal distributions.										
Unit- No.	Conte	nt	Conta ct Hour		Lea	arning	Outco	me	KL		
I	First order ordinary differential equations:  Exact, linear and Bernoulli's equations, Euler's equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.  Thour  First-order ordinary differential equations include understanding and solving exact, linear, and Bernoulli equations, as well as Euler's equations for rigid body dynamics. Students will also learn to handle equations not of the first degree, including those solvable for pp, yy, or xx, and Clairaut's type equations. These outcomes focus on enhancing analytical and problemsolving skills in differential equations.										
II	Ordinary differential equal orders: Second order linear differ variable coefficients, met parameters, Cauchy-Euler	ential equations with chod of variation of	9	Met Stud solv whice	hod of lents w e the ch is a	rill alse Cauch specifi	o unde y-Euler c type	parameters. erstand and equation, of second- l equation	1,2		

			useful in various applications.	
III	Complex variable-Differentiation:  Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions(exponential, trigonometric, logarithm) and their properties.	8	Gaining proficiency in solving second-order linear differential equations with variable coefficients using techniques like the variation of parameters. Additionally, students will learn to solve the Cauchy-Euler equation, a particular type of second-order differential equation, and comprehend its applications and solution methods. This expertise prepares students to tackle complex differential	1,2
IV	Basic probability:  Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution.	8	equations found in various scientific and engineering contexts  Understanding the foundational concepts of probability spaces and the ability to calculate conditional probability and determine the independence of events. Students will also learn about discrete random variables and how to analyze distributions involving independent random variables. Additionally, they will gain proficiency in working with the multinomial distribution and applying the Poisson approximation to the binomial distribution, equipping them with essential tools for solving a variety of probabilistic problems.	1,2
V	Basic and applied Statistics:  Basic: Measures of central tendency: Moments, skewness and Kurtosis- Probability distributions: Binomial, Poisson and Normal- evaluation of statistical parameters for these three distributions, Correlation and regression.  Applied: Test of significance: Large sample test for single proportion. Difference of proportions, single mean, difference of means and difference of standard deviations.	8	Understanding and calculating measures of central tendency such as mean, median, and mode. Students will also learn to compute moments, and analyze skewness and kurtosis to describe data distribution shapes. Additionally, they will gain proficiency in working with key probability distributions (Binomial, Poisson, and Normal), including evaluating their statistical parameters. Furthermore, students will develop skills in correlation and regression analysis to examine relationships between variables.	1,2

1. Erwin Kreyszig, Advanced Engineering Mathematics,  $9^{\rm th}$  Edition, John Wiley & Sons, 2006.

2. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

# **REFERENCE BOOKS:**

- 1. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- S. L. Ross, Differential Equations, 3rd Ed. Wiley India, 1984.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Apply complex variable and its differentiation in solving various complex problems.	1,2							
2	Understand the basic principles of probability and apply them in solving different complex problems.	3,4,8							
3	Apply the concepts of basic and applied Statistics. Apply complex variable differentiation techniques	6,8,10							
4	Calculate basic probability measures within probability spaces, including conditional probability, independence, and the behaviour of discrete random variables.	4,6							
5	Evaluate statistical parameters such as moments, skewness, and kurtosis for binomial, Poisson, and normal distributions.	7,11,12							

SEMESTER – II											
Course		Engi	neering	Chem	istry						
Title				1		1		1			
Course	22BTCE122	Total credits: 5.5	L	T	P	S	R	O/F	C		
code	R	Total hours: 30T	2	1	2	0	0	0	4		
Pre-	Nil	Co-requisite				N	il				
requisite											
Program	B.Tech Civil Emgineering										
me Semester	Fall/ II semester of first year of the programme										
Course		ran/ 11 semester	oi iirsi y	ear or	tne pr	ogran	ıme				
Objective	1. To develor	a deep understanding	of ato	mic an	ıd mole	ecular	structui	res includi	no the		
S	_	of quantum mechanics	-					es, meraar	ing the		
(Minimu	аррисаціон	or quantum meenumes	10 3011	comp	ick pro	oicins.					
m 3)	2. To apply the	heoretical concepts to	real-wo	rld sco	enarios.	such	as pred	dicting mol	ecular		
ĺ		and understanding spec				,	r				
	F-0P011100	Spec	pr		7						
	3. To foster of	critical thinking and a	analytica	l skill	s neces	ssary f	or inte	rpreting co	mplex		
	chemical pl	•	-			•			-		
CO1	Apply the Schrö	dinger equation to pre	dict the	particl	e in a b	ox sol	utions	and analyze	their		
		conjugated molecules						·			
CO2	Evaluate the sp	oatial variations of h	ydrogen	atom	wave	funct	ions th	rough grap	hical		
	representations a	nd interpret their signi	ficance i	n atom	nic struc	cture.					
CO3	•	lar orbitals of diatomic					orbital	s using qua	ıntum		
		tions and visualize the									
CO4		cept of aromaticity and		t the p	i-molec	cular o	rbitals	of butadien	e and		
		olecular orbital theory									
CO5		ergy level diagrams for	r transıtı	on me	tal 10ns	using	crystal	field theor	y and		
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Unit-No.		ontent	Contac Hour		Lŧ	earning	g Outco	ome	KL		
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	Energy level diagrams of diatomic.  Pi-molecular orbitals of butadiene										
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		ansition metal ions									
	-	etic properties. Band									
		ids and the role of									
	doping on band s										
	aoping on band s	on actures									

П	Spectroscopic techniques and applications Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.	6	Analyze spectroscopic data to deduce molecular structures and dynamics.	2
III	Use of free energy in chemical equilibria Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.	6	Evaluate the impact of intermolecular forces on the physical and chemical properties of substances.	3
IV	Intermolecular forces and potential energy surfaces Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces. Periodic properties Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.	6	Apply thermodynamic principles to chemical equilibria and electrochemical systems.	4
V	Stereochemistry Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds Organic reactions and synthesis of a drug molecule Introduction to reactions involving substitution, addition, elimination,	6	Interpret periodic trends and their implications on chemical behavior and reactivity.	5

oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule		
-------------------------------------------------------------------------------------------------	--	--

- 1. University chemistry, by B. H. Mahan
- 2. Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- 3. Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- 4. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

### **Reference Books:**

- 1. Physical Chemistry, by P. W. Atkins
- 2. Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Apply the Schrödinger equation to predict the particle in a box solutions and analyze their implications for conjugated molecules and nanoparticles.	1,3				
2	Evaluate the spatial variations of hydrogen atom wave functions through graphical representations and interpret their significance in atomic structure.	3,4,7				
3	Analyze molecular orbitals of diatomic molecules and multicenter orbitals using quantum mechanical equations and visualize these orbitals through plots.	6,8,12				
4	Explain the concept of aromaticity and predict the pi-molecular orbitals of butadiene and benzene using molecular orbital theory.	4,6				
5	Illustrate the energy level diagrams for transition metal ions using crystal field theory and analyze their magnetic properties	7,11,12				

	SEMESTER – II								
Course Title		Programming	g for Pr	oblem	Solvin	g			
Course	22BTCE123R	Total credits: 4	L	T	P	S	R	O/F	C
code		Total hours:	3	0	2	0	0	0	4

	45T+	-30P																						
Pre-	Nil C	Co-requisite		Nil																				
requisite																								
Programm	B.Tech Civil Emgineering																							
e	E 11/	Fall/ II semester of first year of the programme																						
Semester Course	1.To learn the fundamentals		irst year (	or the programme																				
Objectives	2.To understand the various s		develonm	nent																				
(Minimum	3. To learn the syntax and sen																							
3)	4. To learn the usage of struct																							
-,		T - 6	<i>8</i> . TT	81																				
CO1			vcharts ar	nd pseudocode to design algorithms	s for																			
	solving computational proble																							
CO2	,		a types to	o construct arithmetic expressions	with																			
~~~	appropriate precedence rules																							
CO3		ents and loops	to contro	l program flow and optimize algor	rithm																			
CO4	efficiency.	ithme using over	ve (1 D a	nd 2-D), character arrays, and string	ac to																			
CU4	manipulate and store data eff		iys (1-12) a	mu 2-D), character arrays, and string	gs to																			
CO5			s and recu	rsion, including advanced examples	such																			
	as Quick Sort and the Ackern				~																			
Unit-No.	Content		Contact	Learning Outcome	KL																			
			Hour	_																				
Ι	Introduction to Programs	•		Demonstrate proficiency in																				
	chart/pseudocode, compil		11	constructing and interpreting	1,2																			
	Variables (including data typ	es)		flowcharts and pseudocode for	,																			
II	Arithmetic expressions and	l precedence		algorithm design. Apply knowledge of variables,																				
11		and Loops,		data types, and arithmetic																				
	Writing and evaluation of		10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10		expressions with appropriate	1,2
	and consequent branching,			precedence in programming tasks.																				
	loops.																							
III				Implement conditional branching																				
	Arrays (1-D, 2-D), Charact	er arrays and	10	and iterative structures to control	1,2																			
	Strings			program flow and optimize																				
IV	Basic Algorithms: Searching	Rasic		algorithm efficiency. Develop proficiency in																				
1 4	Sorting Algorithms, Finding			manipulating arrays, character																				
	equations, idea of time comp			arrays, and strings to manage and																				
	Function and Recursion		7	process data effectively.	1,2																			
	(including using built i	n libraries),																						
	Recursion with example prog																							
	Quick sort, Ackerman function																							
V	Structure and Pointers: Point			Analyze and evaluate algorithm																				
	Structures (including self references and linked list no		7	efficiency through the application of basic searching and sorting	1,2																			
	structures e.g., linked list, no introduction)	uonai	,	techniques, understanding time	1,4																			
	File handling			complexity implications.																				
Practical	- 110 110110111115			comprome; implications.	1 2																			
			30		1,2, 3,4																			

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
 E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Apply programming concepts such as flowcharts and pseudocode to design algorithms for solving computational problems.	1,3				
2	Analyze and synthesize variables and data types to construct arithmetic expressions with appropriate precedence rules.	3,4,8				
3	Evaluate conditional statements and loops to control program flow and optimize algorithm efficiency.	6,8,12				
4	Create and implement algorithms using arrays (1-D and 2-D), character arrays, and strings to manipulate and store data effectively.	4,6				
5	Design and develop solutions using functions and recursion, including advanced examples such as Quick Sort and the Ackermann function.	7,11,12				

	SEMESTER – II								
Course		Engineering Graphics and Design							
Title									
Course	22BTCE124R	Total credits: 3	L	T	P	S	R	O/F	C
code		Total hours:	1	0	4	0	0	0	3
		10T+40P							
Pre-	Nil	Co-requisite				N	il		
requisit		_							
e									
Progra	B.Tech Civil Engineering								
mme									

Semeste	Fall/ II semester of 1st year of the programme						
r	, , ,						
Course	1. To introduce students to the principles and techniques of traditional and computer-						
Objecti	based engineering graphics.						
ves		necessary	to interpret, create, and analyze techn	nical			
(Minim	drawings and models.						
um 3)			engineering graphics software and	l its			
	applications in design and visual						
CO1	Introduction to engineering design and its pla	ace in society	y.				
CO2	Exposure to the visual aspects of engineering	design.					
CO3	Exposure to engineering graphics standards.						
CO4	Exposure to solid modelling.						
CO5	Exposure to computer-aided geometric desig	n					
Unit-No.	Content	Contact Hour	Learning Outcome	KL			
I	Unit 1: Traditional Engineering Graphics: Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles.	3	Upon completion of the course, students will be able to demonstrate the application of orthographic projection using Descriptive Geometry principles.	1,2			
П	Unit 2: Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.	2	Students will be able to interpret and create technical drawings incorporating isometric projection, sectional views, and accurate dimensioning.	1,2			
Ш	Unit 3: Computer Graphics: Engineering Graphics Software; - Spatial Transformations; Orthographic Projections; Model Viewing.	2	Students will develop proficiency in utilizing engineering graphics software for spatial transformations, model viewing, and orthographic projections.	1,2			
IV	Unit 4: Co-ordinate Systems; Multiview Projection; Exploded Assembly	2	Upon completion, students will understand the principles of coordinate systems and multi-view projection, and apply them effectively in technical drawings.	1,2			
V	Unit 5:Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)	1	Students will be able to utilize surface and solid modeling techniques in BIM to design and visualize complex engineering structures.	1,2			

- 1. Bhatt, N.D., Engineering Drawing, Charotar Publishing House Pvt. Ltd.
- 2. John, K.C. Engineering Graphics, Prentice Hall India Publishers.

Reference Books:

- 1. Anilkumar, K.N., Engineering Graphics, Adhyuth narayan Publishers
- 2. Agrawal, B. And Agrawal, C.M., Engineering Darwing, Tata McGraw Hill
 - 3. Varghese, P.I., Engineering Graphics, VIP Publishers

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Introduction to engineering design and its place in society.	1,3,6				
2	Exposure to the visual aspects of engineering design.	3,4,7				
3	Exposure to engineering graphics standards.	6,8,12				
4	Exposure to solid modelling.	4,6,8				
5	Exposure to computer-aided geometric design	7,11				

	SEMESTER – II								
Course	Effective English for Engineers								
Title									
Course	22UBPD12R	Total credits: 2	\mathbf{L}	T	P	S	R	O/F	C
code		Total hours: 40P	0	0	4	0	0	0	2
Pre-	Nil	Co-requisite	Nil						
requisite									
Program		B.Tech Civ	vil Em	gineeri	ng				
me									
Semester	Fall/ II semester of first year of the programme								
Course	1. To introduce students to fundamental grammatical concepts and sentence analysis techniques.								
Objective	2. To enhance vocab	ulary skills through the st	udy of	synon	yms, an	tonym	s, and h	omonyms.	

S	3 To develop practical skills in reading com	nrehension	and information interpretation				
(Minimu m 3)	3. To develop practical skills in reading comprehension and information interpretation.						
CO1	Identify and classify different types of sentences using grammatical rules and structures.						
CO2	Demonstrate proficiency in using synonyms, and spoken contexts.	, antonyms,	and homonyms appropriately in wr	ritten			
CO3	Apply effective reading techniques such as SQ3R to gather and interpret information from diverse texts.						
CO4	Apply dress code ethics effectively by chomeetings.			rmal			
CO5	Demonstrate effective time management skill	s by priorit	izing tasks and meeting deadlines.				
Unit-No.	Content	Contact Hour	Learning Outcome	KL			
I	 Module 1- Grammar i. Interchange of Interrogative and Assertive Sentences ii. Interchange of Exclamatory and Assertive Sentences iii. Analysis of Sentences iv. Types of Tenses v. Exercises on Tense 	3	Students will be able to identify and classify different types of sentences using grammatical rules and structures.	1,2			
П	Module 2- Vocabulary i. Synonyms ii. Antonyms iii. Homonyms	2	Students will demonstrate proficiency in using synonyms, antonyms, and homonyms appropriately in written and spoken contexts.	1,2			
III	Module 3- Reading Skills i. Techniques of Effective Reading ii. Gathering ideas and information from a text iii. The SQ3R Technique iv. Interpret the text	2	Students will apply effective reading techniques such as SQ3R to gather and interpret information from diverse texts.	1,2			
IV	Module 4- Dress Code Ethics i. Introduction to Dress Code Ethics, ii. Purpose and Importance, iii. How to Make FIRST IMPRESSION iv. What to WearDuringInterviews or Any Other Formal Meetings – Male & Female Activity:	1	Students will apply dress code ethics effectively by choosing appropriate attire for interviews and formal meetings.	1,2			
V	Module 5- Time-Management Skills i. Introduction To Time Management,	2	Students will demonstrate effective time management skills by prioritizing tasks and meeting deadlines.	1,2			

ii. Purpose And Importance of Time Management, iii. Basic Tips to Maintain Time.	
Activity: Problem solving activity: A situation will be given to the students and they will have to tell us how to handle the situation or solve the problem	

- 1. Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA.
- 2. Solid Mechanics by Dr. Utasv Chandra Kalita

Reference Books:

- 1. Mechanics of Materials Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf TMH 2002.
- 2. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979
- 3. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Students will be able to identify and classify different types of sentences using grammatical	1,3			

	rules and structures.	
2	Students will demonstrate proficiency in using synonyms, antonyms, and homonyms appropriately in written and spoken contexts.	3,4,7
3	Students will apply effective reading techniques such as SQ3R to gather and interpret information from diverse texts.	6,8
4	Students will apply dress code ethics effectively by choosing appropriate attire for interviews and formal meetings.	4,6,8
5	Students will demonstrate effective time management skills by prioritizing tasks and meeting deadlines.	7,12

	SEMESTER – II								
Course	Universal Human Values (UHV) + Professional Ethics								
Title									
Course	22UUHV102R	Total credits: 2	L	T	P	S	R	O/F	C
code		Total hours:	1	0	2	0	0	0	2
		45T+30P							
Pre-	Nil	Co-requisite		Nil					
requisite									
Program		B.Tech Ci	vil Em	gineeri	ing				
me									
Semester		Fall/ II semester of fi	rst yea	r of th	e progi	ramme	•		
Course	1. To help the s	students appreciate the e	ssentia	l comp	olement	arily b	etween	'VALUES	s' and
Objective	'SKILLS' to e	ensure sustained happines	ss and j	prospe	rity, wh	ich are	the co	re aspiratio	ons of
S	all human bei	ngs							

(Minimu m 3)	 To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature 							
CO1	Analyze the need and significance of Valcontent, and processes.	Analyze the need and significance of Value Education, understanding its basic guidelines, content, and processes.						
CO2	Evaluate the concepts of self-exploration, achieving continuous happiness and prosperit		ceptance, and experiential validation	n in				
CO3	Apply the principles of right understanding, fulfill basic human aspirations.		p, and physical facilities to prioritize	and				
CO4	Synthesize the knowledge of harmony within strategies to maintain this harmony.	n the self, f	amily, society, and nature, and form	ulate				
CO5	Create a framework for integrating human professional practices, ensuring the devel technologies and systems.	opment of	eco-friendly and socially respon	sible				
Unit- No.	Content	Contact Hour	Learning Outcome	KL				
I	Course Introduction - Need, Basic Guidelines, Content and Process for ValueEducation 1. Understanding the need, basic guidelines, content and process for Value Education 2. Self Exploration—what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self exploration 3. Continuous Happiness and Prosperity-A look at basic Human Aspirations 4. Right understanding, Relationship and Physical Facilities—the basic requirements for fulfillment of aspirations of every human being with their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the currentscenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	3	Students will understand the need for value education and its basic guidelines, content, and process.	1				
II	Understanding Harmony in the Human Being - Harmony in Myself! 1. Understanding human being as a co- existence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I')	3	Students will comprehend the concept of self-exploration, including its content and process, and the mechanisms of natural acceptance and experiential validation.	2				

***	and 'Body' - Sukh and Suvidha 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of 'I' and harmony in 'I' 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya-Practice Exercises and Case Studies will be taken up in Practice Sessions.			
III	Understanding Harmony in Human- Human Relationship 1. Understanding Harmony in the family — the basic unit of human interaction 2. Understanding values in human- human relationship; meaning of Nyaya and programfor its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship 3. t mea of Differ betw inten a Underst h ning ence een tion n anding e Vishwas; d compete nce t mea of Differ betw respe a 4. h ning ence een ct n Underst e Samman, d anding differentiation; the other salient values in relationship 5. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals 6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!- Practice Exercises and Case Studies will be taken up in Practice Sessions.	5	Students will gain insight into the basic human aspirations of continuous happiness and prosperity and how to achieve them through right understanding, relationships, and physical facilities.	3
IV	Understanding Harmony in the Nature and Existence - Whole existence asCo-existence 1. Understanding the harmony in the Nature 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-	4	Students will recognize the importance of harmony in human relationships, family, society, and nature, and how it contributes to a universal harmonious order.	4

	regulation in nature 3. Understanding Existence as Coexistence (<i>Sah-astitva</i>) of mutually interacting unitsin all-pervasive space 4. Holistic perception of harmony at all levels of existence-Practice Exercises and Case Studies will be taken up in Practice Sessions.			
V	Implications of Holistic Understanding of Harmony on Professional Ethics 1. Natural acceptance of human values 2. Definitiveness of Ethical Human Conduct 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic UniversalOrder 4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universalhuman order b. Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, c. Ability to identify and develop appropriate technologies and managementpatterns for above production systems. 5. Case studies of typical holistic technologies, management models and productionsystems	5	Students will develop competence in professional ethics by understanding human values, ethical human conduct, and strategies for transitioning to a universal human order.	5
	6. Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations			

- **1.** R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
- **2.** R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.

- 2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
- 3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986,1991
- 4. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins,USA
- 5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III,1972, limits to Growth, Club of Rome's Report, Universe Books.
- 6. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen(Vaidik) KrishiTantra Shodh, Amravati.
- 7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
- 8. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
- 9. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Analyze the need for value education and its impact on personal and societal well-being.	1,4				
2	Evaluate the concepts of self-exploration, natural acceptance, and experiential validation as mechanisms for understanding human aspirations.	3,4,7				
3	Differentiate between happiness and prosperity and assess their implications on human aspirations in the current scenario.	6,8,10				
4	Demonstrate understanding of harmony in human relationships, family, society, nature, and existence.	4,6,8				
5	Apply principles of professional ethics to develop sustainable and humanistic solutions in their professional practice.	7,11				

SEMESTER – II									
Course	Computational Systems and Digital World								
Title									
Course	22UUDL103R	Total credits: 1	L	T	P	S	R	O/F	C
code		Total hours: 10P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite	Nil						
requisite									
Program		B.Tech Civ	vil Em	gineeri	ng				
me									
Semester	Fall/ II semester of first year of the programme								
Course	To provide a compreh	To provide a comprehensive understanding of computer systems, office automation tools, and							
Objective	their practical applica	tions.	_						

s (Minimu m 3)	To equip students with skills for effective data management, analysis, and visualization using MS-Excel. To enhance knowledge of the internet, social media, e-commerce, and digital payment systems, including their ethical and legal aspects Identify the components of a computer system and explain their functions.					
CO2	Apply office automation tools like MS-W managing, and presenting data.	ord, MS-E	Excel, and MS-PowerPoint for crea	iting,		
CO3						
CO4	Demonstrate the use of computer networks,					
CO5	Evaluate the impact of social media, e-co	mmerce, a	and digital payment systems in mo	dern		
	society, including associated crimes and legal			1		
Unit-	Content	Contact	Learning Outcome	KL		
No.		Hour				
I	Fundamentals of Computer Systems,		Students will understand the			
	Office Automation and Internet Searchi. Components of a Computer and their		fundamental components of computer systems and their			
	functions.		respective functions.			
	ii. Office Automation using MS-Word,		respective functions.			
	MS-Excel, and MS-PowerPoint.	2				
	iii. Data management, Statistical Data	2				
	Analysis and Data Visualization with MS-					
	Excel.					
	iv. Use of Functions, Graphs & Charts in					
	MS-Excel.					
II	Internet & Cyber World		Students will be proficient in			
11	 i. Introduction to Computer Networks, Internet and World Wide Web, Websites and Web portals. ii. Creation and use of Email Accounts. 		using MS-Word, MS-Excel, and MS-PowerPoint for office automation tasks.			
	 iii. Web browsing, Web Searching, Different aspects of Web Searching- Search Keywords, conditions and combinations. iv. Study of different Search Engines like Google, Microsoft Bing, Yahoo, Yandex, DuckDuckGo, Ask.com etc. v. Cyber Crimes, Cyber Laws and IT Act 2000, India 	2				
III	Introduction to Social Media and E-Commerce i. Relevance of Social Media in present scenario. Posting different types of contents in Social Media. ii. Creating accounts and using some popular Social media portals and Apps like WhatsApp, Facebook, etc. Social Media Etiquettes & Crimes. iii. Definition of E-Commerce; E-Commerce versus traditional Commerce. iv. Case studies of popular E-Commerce portals like Amazon. v. E-commerce Etiquettes & Crimes.	2	Students will be able to manage and analyze data, and create data visualizations using MS-Excel.			

IV	 Digital Payments and Digital Transactions i. Introduction to Digital Payment Systems. ii. Creating accounts and using Digital Payment Systems like Credit Cards, Debit Cards, Netbanking, UPI. iii. Digital payments Etiquettes & Crimes. 	2	Students will gain skills in web browsing, web searching, and understanding the use of various search engines.	
V	i. Introduction to Basic accounting concepts, Introduction to an Accounting Software like GnuCash or Tally. ii. Introduction to Technical Document writing using LaTex. iii. Introduction to Data Visualization software – Sigma, Google Charts, Tableau.	2	Students will acquire knowledge of digital payment systems, social media, e-commerce, and their related etiquettes and crimes.	

- 1. Sinha Pradeep K. and Priti Sinha. *Computer Fundamentals: Concepts Systems & Applications*. 3rd ed. New Delhi: BPB Publications.
- 2. Goel, A, 2010. Computer Fundamentals, Pearson India.

Reference Books:

- 1. Balaguruswamy, E. 2009 Fundamentals of Computers, Tata McGraw-Hill Education.
- 2. Balaguruswamy, 2014. E. Fund Of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-Hill Education.
- 3. Lawson, C. 2022. Introduction to Social Media, Oklahoma State University.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Identify the components of a computer system and explain their functions.	1,3,6					
2	Apply office automation tools like MS-Word, MS-Excel, and MS-PowerPoint for creating, managing, and presenting data.	3,4,7					

3	Analyze statistical data and create visualizations using MS-Excel.	6,8,12
4	Demonstrate the use of computer networks, the Internet, and web searching techniques.	4,6,8
5	Evaluate the impact of social media, e-commerce, and digital payment systems in modern society, including associated crimes and legal frameworks.	7,11

SEMESTER – II									
Course	CO-CURRICULAR ACTIVITIES								
Title									
Course	22UBCC121	Total credits: 1	L	T	P	S	R	O/F	C
code		Total hours: 10P	0	0	0	4	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite									
Programm		B.Tech Civ	il Em	gineer	ing				
e									
Semester		Fall/ II semester of fir	st yea	r of th	e prog	ramm	e		
Course									
Objective	•	needs of the students an	d cove	ering a	broad/	wide ra	ange of	their abiliti	ies and
S	talents.								
(Minimu	2 To etimulo	to the interests in the st	idonta	and n	rovido	agual a	nnortu	nitios to al	1 tha
m 3)		te the interests in the sto participate	adems	and p	rovide	equai (эрроги	mues to an	i tile
	2 To anhone	a tha laomina avnamian	22 of	the et	.donta	and ha	1		and
		the learning experien					-		
	• •	g their inner skills such	as ie	eadersn	np qua	nues,	creative	e or innova	auve
001	skills etc.	1 11 / 1 1	1	1	CC ·		С .		• 1
CO1	•	be able to analyze and		ite the	effectiv	veness	of vari	ous co-cur	rıcular
G04		heir academic curriculum				1 11 1	. •	1 . 1	
CO2	•	be able to organize and			kshops,	exhibi	tions, a	ind guest le	ectures
000	-	erstanding of their acader		-	1 0	1 111		• • •	
CO3		will be able to demonst	rate ir	nprove	d soft	skills a	and apt	itude by ac	ctively
	participating in related t	ests and activities.							

	Evaluate: Students will evaluate the impact of co-curricular activities on their personal professional growth, particularly in terms of employment and higher education opportunities.							
Unit- No.	Content	Conta ct Hour	Learning Outcome	K				
I	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	10	Engage in mandatory co- curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing and participating in various programs and events.	1,;; 3,; 5				

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Analyze: Students will be able to analyze and evaluate the effectiveness of various co-curricular activities in relation to their academic curriculum.	1,3					
2	Organize: Students will be able to organize and execute workshops, exhibitions, and guest lectures that foster a deeper understanding of their academic subjects.	3,4,7					
3	Demonstrate: Students will be able to demonstrate improved soft skills and aptitude by actively participating in related tests and activities.	6,8					
4	Develop: Students will develop the ability to independently plan and implement programs that promote the exchange of ideas and information among peers.	4,6					

curricular activities on their personal and professional growth, particularly in terms of	5	Evaluate: Students will evaluate the impact of co-	7,11
Lemployment and higher education opportunities.		.	

		SEMESTER	- II						
Course Title		EXTRA-CURRIC	RICULAR ACTIVITIES						
Course	22UBEC121	Total credits: 1	L	T	P	S	R	O/F	С
code		Total hours: 10P	0	0	0	4	0	0	1
Pre-	Nil	Co-requisite			1 -	N	il		
requisite						_			
Program		B.Tech Civ	vil Eng	ineeri	ng				
me			· -		8				
Semester	•	Fall/ II semester of fin	rst veai	of th	e progr	amme	;		
Course		nd soft skills: Foster the acc						ne managem	ent
Objectiv	_		•		•				
S		development: Encourage st	tudents	to enga	age in m	ultiface	ted activ	ities beyond	
(Minimu	academics, nurtu	ring their leadership and in	terests.						
m 3)	Facilitate in-de	oth expression: Provide or	pportun	ities fo	r studer	nts to a	rticulate	their ideas	and
ŕ		early and critically analyze	-			u	· ilouiute	c.i iacas	3.10
CO1		ey can make meaningful o				a com	mitment	and manag	e their
201	time and priorities.	o, can make meaningful c	Jimiou	, 1		a com		,	
CO2		ents who demonstrate lead	lershin a	nd nur	sue inter	ests be	vond the	ir academics	
CO3	-	rious co-curricular activitie	-	-					
COS							_		pinent.
CO4	Express their ideas, views	, In-depth evaluation and a	nalysis (clearly	in the to	pic of t	heir inte	rest.	
CO5	Demonstrate and practic transferable skills.	es different activities, b	y Integ	rating	learnin	g expe	riences	by demons	trating
Unit-	Conte	ent	Cont	a	L	earnin	g Outco	ome	KL
No.			ct						
			Hou						
I	AdtU encourages a range of							well-rounded	
	the regular curriculum in			-	ersonality		cluding		
	learner's interest, These activ				anning,		adership	skills, e activities,	
	develop the social and soft sk	=			ear ex				
	holistic development to the							experiences,	
	in mind the 360 degree learn				stering h				
		ne students are engaged in different activities					-		
		eaded under different clubs viz. Dance, nusic, photography, drama, literary etc., The							1,2,
		-	10						3,4,
	_	tudents are encouraged to participate in egular club activities, workshops,							5,4,
	C	ompetitions as per their interest and hobbies,							
	-	The student members of the club are trained							
	represent AdtU in various								
	student and national lev	=							
	Renewed personalities are in								
	workshops that benefit th								
	students by giving them the								
1	from experts in the respective	-							
	in the respective		l .						

CO PO Mapping	

SN	Course Outcome (CO) Mapped Program Outcome						
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,9,11,12					
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,9,11,12					
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,9,11,12					
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,9,11,12					
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,9,11,12					

	SEMESTER II										
Course Title	MOOCS I: E	Ecosystem Services	: A Met	hod f	for Su	ıstair	able	Developr	nent		
Course code	MOOCSCECE1	Total credits: 2	L	T	P	S	R	O/F	С		
		Total hours: 30	0	0	0	0	0	0	2		
Pre-requisite	Nil	Co-requisite					Nil				
Programme		B.Techii	ı Civil E	ngine	ering						
Semester		Fall/II Semester of									
Course		dents with a compreh	ensive ui	nderst	anding	g of e	cosyste	em service	s and their		
Objectives		ble development.									
(Minimum 3)		nts with the skills to							vices using		
		nic, ecological, social									
		lents to critically eva							strategies,		
		niques for the sustaina									
CO1		oncept and classifica	tion of e	cosys	tem s	ervice	s and	their impo	ortance in		
~~*	sustainable developr										
CO2		methods for valuin	g ecosys	stem s	servic	es an	d ider	itify the c	challenges		
001	associated with their		1	1,							
CO3		e of provisioning, reg	guiating,	cuitui	rai, an	a sup	portin	g services	to assess		
CO4	their impact on huma	and management s	trotogica	for	intoor	otina	22221	istom som	ricos into		
CO4		ing and impact assess		101	miegi	aung	ecosy	stem serv	rices into		
CO5		te tools and technique		s GIS	and re	emote	sensir	o for asse	essing and		
005	mapping ecosystem		s, such a	o OID	una iv		SCHSH	15, 101 4550	ossing and		
Unit-No.		tent	Contac	t	Les	arnin	g Outo	rome	BL		
			Hour		200	***	, out				
I			8	S	tudent	s will	under	stand the	1,2,3		
	Introduction to Ed	osystem Services						fications,	_,_,_		
		•		aı	nd ec	ologic	al for	undations			
	Definition	and Classification						ices, and			
		of Ecosystem Services recognize their significance									
	•	d Evolution of						elopment			
		Services Concept			irough		arious	s case			
		e of Ecosystem		st	udies.						
		Sustainable									
	Ser vices ii	i Sustamatic							l		

II	Development	12	Students will analyze different economic, ecological, social, and cultural valuation methods for ecosystem services, conduct cost-benefit analyses, and identify challenges associated with the valuation process.	3,4
	 Social and Cultural Valuation Methods Cost-Benefit Analysis in Ecosystem Services Challenges in Ecosystem Services Valuation 			
III	 cosystem Services and Human Wellbeing Linkages between Ecosystem Services and Human Wellbeing Provisioning Services (e.g., food, water, raw materials) Regulating Services (e.g., climate regulation, water purification) Cultural Services (e.g., recreational, aesthetic, spiritual) Supporting Services (e.g., nutrient cycling, soil formation) 	8	Students will apply their knowledge to identify and assess the linkages between ecosystem services and human well-being, focusing on provisioning, regulating, cultural, and supporting services.	3,4
IV	Policy and Management of Ecosystem Services Integrating Ecosystem Services into Policy and Planning Ecosystem Services in Environmental Impact Assessment Ecosystem-Based Management Approaches Payment for Ecosystem Services (PES) Programs Case Studies in Policy and Management	6	Students will evaluate various policy and management strategies, including the integration of ecosystem services into policy and planning, environmental impact assessments, ecosystembased management approaches, and payment for ecosystem services programs.	4

Tools and Techniques for Ecosystem Services Assessment Geographic Information Systems (GIS) in Ecosystem Services Remote Sensing and Spatial Analysis Modelling Ecosystem Services Participatory Approaches and Stakeholder Engagement Case Studies of Tools and Techniques	assessing and mapping ecosystem services, supported by relevant case studies.	4
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TEXT BOOKS:

1. "Ecosystem Services: From Concept to Practice"** by J. Maes, M. L. Paracchini, G. Zulian, M. Thijssen, and E. Bidoglio

REFERENCE BOOKS:

1. "Natural Capital: Theory and Practice of Mapping Ecosystem Services"** edited by Peter Kareiva, Heather Tallis, Taylor H. Ricketts, Gretchen C. Daily, and Stephen Polasky

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	To understand the concept and classification of ecosystem services and their importance in sustainable development.	1,2,3,4,				
2	To analyze various methods for valuing ecosystem services and identify the challenges associated with their valuation.	3,4,5				
3	To apply knowledge of provisioning, regulating, cultural, and supporting services to assess their impact on human well-being.	5,10,12				
4	To evaluate policy and management strategies for integrating ecosystem services into environmental planning and impact assessments.	10,12				
5	To analyze and utilize tools and techniques, such as GIS and remote sensing, for assessing and mapping ecosystem services.	1,2,3,,10				

			SEMES	TER – II								
Course	Title		Techno	o Profess	ional S	Skills-	I					
Course	code	22BTCE125R	Total credits		L	T	P	S	R	O/F	С	
			Total hours: 20P		0	0	2	0	0	0	1	
Pre-		Nil	Co-requ	uisite			•	Nil				
requisit												
Program				ech Civil E								
Semeste Course			Fall/ III semeste						a malar	cont to air	.21	
Objecti	Objectives (Minimum engineering. Develop students' ability to create accurate and detailed engineering drawings using basic graphical to						aphical too					
CO	1	Understand the basic principle	es and standards	of engineer	ring gra	phics.						
CO	2	Develop proficiency in using 1	basic drawing to	ols and tec	hniques	for civ	il engin	eering a	applica	ations.		
CO	3	Create accurate and detailed 2	D engineering d	lrawings of	civil str	ructures						
CO	4	Interpret and visualize engineer	ering designs thr	rough graph	nical rep	resenta	tion.					
CO	5	Apply engineering graphics sk	tills in practical	civil engine	eering p	rojects.						
Unit- No.		Content	(Contact Hour		Lea	arning	Outc	ome		KL	
I	Intro	duction to Engineering Graph	nics: 6	11041	Under	stand th	ne princ	iples an	d stan	dards of	1, 2	
-	Overv	view of engineering graphics, drards, and conventions. Importan eering.	awing				raphics				1, 2	
II	Basic Introd basic	Basic Drawing Tools and Techniques: Introduction to drawing instruments, scales, and pasic construction techniques. Use of lines, angles, and geometric shapes.							2, 3			
III	Ortho	Orthographic Projections: Principles of 6 Create accurate orthographic projections orthographic projection, multi-view drawing, and sectional views of civil structures.						3, 4				
IV	Techi persp objec		of 3D		Interpret and visualize engineering designs through isometric and perspective drawings.						4, 5	
V	on pro	objects on 2D planes. Practical Applications and Projects: Hands- on projects involving the creation of detailed engineering drawings for civil engineering applications. Apply engineering graphics skills in practical civil engineering projects.						5				

CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the basic principles and standards of engineering graphics.	5, 7					

2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10
4	Interpret and visualize engineering designs through graphical representation.	11,12
5	Apply engineering graphics skills in practical civil engineering projects.	10

MAPPING TABLE (2nd Semester):

Subject Code	Course Name	PO 1	P O	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE121R	Engineering Mathematics II	3	2	2	2	1		1					2
22BTCE122R	Engineering Chemistry	1		2									
22BTCE123R	Programmin g for Problem Solving	2		3	1	2							2
22BTCE124R	Engineering Graphics and Design	1	2	3		2	1						2
22UBPD12R	Effective English for Engineers						1		1	2	3	2	2
MOOCSCECE1	MOOCS I	2		3	1	2							2
22UBCC121	Co-curricular	1	2	3		2	1						2
22UBEC121	Extra- curricular	1	2	3		2	1						2
22BTCE125R	Techno- Professional Skills I						1		1	2	3	2	2
22UUHV102R	Universal Human Values (UHV) + Professional Ethics						1		1	2	3	2	2
22UUDL103R	Computation al Systems and Digital World	2		3	1	2							2

	_
SEMESTER – III	Į

Course Title)			Engineeri	ng Me	echan	ics				
Course	<u> </u>	22BTCE211R	Total credits	: 3	L	T	P	S	R	O/F	C
code			Total hours:		2	1	0	0	0	0	3
Pre-		Nil	Co-requisite		Nil					· I	
requisi	te		-								
Progra	mme		Bachelor o	f Technol	ogy in	Civil	Engir	eering	3		
Semest	er	Fall:	Winter/ III so	emester of	f secor	nd yea	ar of th	ne pro	gran	ıme	
Course)	1. This course tead	ches students l	now to app	oly Ne	wtoni	an phy	sics to	rela	tively sir	nple real-
Object		life applications	}								_
(Minin	num	2. This course cov	ers statics, dyr	namics and	l elem	entary	part o	f stren	gth c	of materia	als
3)		3. This course of	overs statics	, dynami	ics, a	nd m	nechan	ics of	f ma	aterials,	offering
		fundamental	principles to	analyze	engi	ineeri	ng pr	oblem	ıs iı	nvolving	forces,
		motion, and m	•	•	Ü		0 1				·
		4. Students gain		derstandir	ng of	thes	e prir	ciples	s. er	nabling	them to
		effectively sol	•		_		-	-		_	
CO1		Construct free bod									
		equilibrium.	, anagranii ai	and Curcur	111	100		11000	Jour y	to one	,are suite
CO2		Study the effect of fr	iction in static	and dvnar	nic co	nditio	ns.				
CO3		Understand the differ						and ms	iteria	1 propert	ies.
CO4		Analyze and solve di							110110	ii propert	105.
CO5		Apply the concepts of						,,			
Unit-	Cont			Conta			Outcor	ne			KL
No.	0022			ct							
				Hour							
I	UNI	Γ I Importance of th	e knowledge		Stude	ents	will	be i	ntroc	luced t	o 1, 2
	of	•	chanics in		funda	ment	al co	oncepts	s c	of force	
		neering. Introduction			syste	ms, i				of force	es
	_	ept of particle and			(conc	urren	t, cop	lanar,	and	spatial),
		of forces; collinear	-		comp	onent	s of f	orces	in s	pace, an	.d
	copla		oncepts of		mome	ent o	f force	es. Th	ey v	will lear	n
	•	entrated and distrib	1		how	to a	nalyze	and	reso	lve forc	e
		or and scalar quantition			syste		using	_	incip		of
		or, principle of tra			•				•	diagram	
			· ·						inde	terminac	У
		e is a vector,			will a	ılso be	e cover	ed.			
		missibility. Introduct									
	_	ora, parallelogram l									
	and	subtraction vector									
		em statement &	-	5							
		or, Bound vector, R	_								
		orces in terms of I	•								
	_	act and Dot product									
	appli	cations. Moment of	a force about								
	a poi	int and about an axi	s. Numerical								
	probl	ems discussion Two	dimensional								
	force	system; resolution	of forces;								
	Mom	ent. Varignon's	theorem;								
	state	ment and proof Coup	le; resolution								
		force by its equiva									
		le system; resultan									
	_	erical problem discus									
		r									
	-	-	· · · · · ·								

II	UNIT II Concept and Equilibrium of forces in two dimensions; Free body concept and diagram, Conditions of equilibrium. Discussion on concept of free body with different examples Numerical problem discussion Concept of Friction; Coulomb's law of dry friction; Angle of friction; Angle of Repose; Coefficient of friction. Angle of friction, cone of friction concept of drawing FBD for different problems Numerical problems discussion Concept of Distributed Force: Centroid and Centre of Gravity;	10	Students will study the equilibrium of particles in both two and three dimensions, understanding how forces act to maintain static equilibrium. They will extend this knowledge to rigid bodies, applying principles of equilibrium to analyze systems of forces acting on bodies in static equilibrium. Methods for determining resultant forces, moments of forces, and solving equilibrium equations will be taught.	1, 2, 3, 4
III	UNIT III Centroid of a triangle, quadrilateral, rectangle and circular sector. To determine coordinates of centroid of composite areas consisting of above figures. Theorem of Pappus &Guldinus and its applications To find out the coordinates of the centroid of different composite area, curves etc. Discussion of the different numerical problems. Concept of mass moment of inertia, concept of moment of inertia of areas about an axis in its plane. Parallel axis theorem, perpendicular axis theorem and its applications Mass moment of inertia of symmetrical bodies like cylinder, sphere and cone; To determine MI of plane areas and solid	10	Students will calculate centroids of simple figures and composite sections using first principles. They will understand the concept of centre of gravity and its practical implications in engineering applications. The unit includes the calculation of area moment of inertia for plane sections, including theorems of moment of inertia and their applications in structural analysis. Mass moment of inertia for circular plates, cylinders, cones, spheres, and hooks will also be covered.	1, 2, 3, 4, 5
IV	UNIT IV Concept of simple stresses and strains, Normal stress, Shear stress, Bearing stress, Normal strain and shearing strain, L Hooke's Law, Elastic constants and their relation. Poisson's ratio; Stress -strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety Discussion of some numerical applications; Principle of virtual work – Explanation and its applications. Numerical problem based on the principle of virtual work Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to	10	The unit revisits particle dynamics, covering rectilinear motion, plane curvilinear motion (rectangular, path, and polar coordinates), and 3-D curvilinear motion. Students will apply Newton's second law of motion in different coordinate systems and study work-kinetic energy, power, potential energy, impulse-momentum (linear and angular), and impact (direct and oblique).	2, 3, 4

	gravity. Rectilinear motion of particles; determination of position, velocity and acceleration under uniform acceleration rectilinear motion; construction of x -t, v -t and a -t graphs non -uniformly accelerated rectilinear motion; construction of x -t, v -t and a -t graphs; Numerical problems on uniform and non -uniform acceleration Plane curvilinear motion of particles: Rectangular components; Normal and tangential components (circular motion).			
V	UNIT V Radial and transverse components of acceleration; Projectile motion. Numerical problem on the above problems; D.Alembert's principle and free body diagram – principle, concept and examples Principle of work and energy applied to particle and rigid bodies; Principle of conservation of energy; Applications of D.Alembert's principle – numerical discussion. Applications of conservation of energy; Power and efficiency Applications of conservation of work energy & moment principle Kinetics of particles: Newton's second law; Equation of motion.	10	Students will understand basic terms and general principles in dynamics, including types of motion and instantaneous centre of rotation in plane motion. They will study D'Alembert's principle and its applications in plane motion and connected bodies. The work-energy principle will be applied to analyze plane motion of connected bodies and kinetics of rigid body rotation	2, 3, 4, 5

- 1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
- 2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I Statics, Vol II, Dynamics, 9th Ed, Tata McGraw Hill
- 3. R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.
- 4. Andy Ruina and Rudra Pratap (2011), Introduction to Statics and Dynamics, Oxford University Press.

Reference Books:

- 1. Shanes and Rao (2006), Engineering Mechanics, Pearson Education,
- 2. Hibler and Gupta (2010), Engineering Mechanics (Statics, Dynamics) by Pearson Education
- 3. Reddy Vijaykumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics
- 5. Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
- 6. Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.

7. Tayal A.K. (2010), Engineering Mechanics, Umesh Publications

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.	1,2,3	
2	Study the effect of friction in static and dynamic conditions.	3,5,6	
3	Understand the different surface properties, property of masses and material properties.	7,2,4	
4	Analyze and solve different problems of kinematics and kinetics.	8,1,9	
5	Apply the concepts of mechanics and work in force analysis.	10,4,7	

			S	EMEST	ER –	III							
Course	e			Engi	neerii	ng G	eolog	y					
Title			T		1		1	1			1	1 -	
Course	е	22BTCE212R	Total cr		_	<u>L</u>	T	P	S	R	O/F	0	
code		X 701		ours: 307	L'	1	0	2	0	0	0	2	
Pre-	:40	Nil	Co-requ	usite		Nil							
requisi Progra			Rocholo	or of Tech	moloc	w in	Civil	Engi	noorir	.			
e	3111111		Dacher	or or recr	moros	3y 111	CIVII	Liigi	incei ii	ıg			
Semes	ter	Fall: V	Vinter/ II	I semeste	er of S	Secoi	nd vea	r of	the pr	ogra	mme		
Course		1. Use suitable sof										EH	IRP data to
Object	tives	characterize a ge			C				C				
(Minin	num	2. Calculate the but	lk proper	ties of roo	cks an	d un	conso	lidate	d sedi	ment	s such a	as d	ensity, void
3)		ratio, water conto											
		3. Evaluate rock-m											
CO1		1. Discuss the importance	e of Geo	logy in m	aking	eng	ineerii	ng de	cisions	s spe	cially si	te s	selection of
CO2		engineering projects.	of hore	inorala f	****	d 41	in	o for	dontic		tha == =1	, f.	min ~
CO2		2. Analyze the concepts											
CO3		3. Analyze graphs and tectonics.	models u	isea in st	ructur	ai ge	eology	/ Ior	demoi	istrai	ing stre	ess,	strain and
CO4		4. Generalize rocks using	r hasic ge	ological s	vetem	ne foi	r selec	tive o	onetru	ction	materi	a1	
CO5		5. Apply quantitative sl											z problems
COS		related to geological feat					_		_		~ ~		proorems
Unit	Con						g Outo						KL
-No.				ct									
				Hour									
I		duction- Branches of	~ ~.			_					for sit		1, 2
		al to civil engineering, s			selec			undat		desig			
		ogical studies in variou									t hazaro		
		neering projects. Mine eral, Origin and comp	eralogy-								nd aid i resourc		
		ical properties of m			mana				or		stainabl		
		eptibility of minera		5	cons	_		•	.01	50	Stamao		
		ation, basic of	optical		Coms		1011.						
		eralogy, Rock forming m											
		ascopic identification											
	1	2 .	condary										
	mine												
II		ology-Rock forming pro				0.0					nowledg	_	1, 2, 3, 4
	_	rific gravity of rocks.	-				_	-		_	structura		
	diag	ram. Igneous per anic Phenomenon and d	trology-		_		-	-	ogy, an d ge		gineerin y help	-	
	1	rials ejected by vol									er stres		
		es of volcanic eruption.			while		hydro			deal			
		_	Geysers.								geolog		
	1	acteristics of different t	•								affectin		
	1	ma. Division of rock on t	• •	5			ion sit						
	of c	lepth of formation, an											
		acteristics. Chemical	and										
		eralogical Composition.											
		its types. Various forms of											
		S Classification of phaner											
		anic rock Field Classi t. Structures. Classifica											
			asis of										
	Igne	ous rocks on the Di	asis 01										

	Chemical composition. Detailed			
	study of Acidic Igneous rocks like			
	Granite, Rhyolite or Tuff, Felsite,			
	Pegmatite, Hornfels. Metamorphic			
	Aureole, Kaolinization. Landform as			
	Tors. Engineering aspect to granite.			
	Basic Igneous rocks Like Gabbro,			
	Dolerite, and Basalt. Engineering			
	aspect to Basalt. Sedimentary			
	petrology- mode of formation,			
	Mineralogical Composition. Texture			
	and its types, Structures, Gradation			
	of Clastic rocks. Classification of			
	sedimentary rocks and their			
	characteristics. Detailed study of			
	Conglomerate, Breccia, Sandstone,			
	Mudstone and Shale, Limestone			
	Metamorphic petrology- Agents and			
	types of metamorphism,			
	metamorphic grades, Mineralogical			
	composition, structures & textures in			
	metamorphic rocks. Important			
	Distinguishing features of rocks as			
	Rock cleavage, Schistosity, Foliation.			
	Classification. Detailed study of			
	Gneiss, Schist, Slate with			
	engineering consideration.			
III	Physical Geology- Weathering.		Geological studies are crucial for site	1, 2, 3, 4,
	Erosion and Denudation. Factors		selection, foundation design, and	5
	affecting weathering and product of		material sourcing. They prevent hazards	
	weathering. Engineering		like landslides and sinkholes and aid in	
	consideration. Superficial deposits		environmental assessments and resource	
	and its geotechnical importance:		management for sustainable	
	Water fall and Gorges, River	5	construction.	
	meandering, Alluvium, Glacial			
	deposits, Laterite (engineering			
	aspects), Desert Landform, Loess,			
	Residual deposits of Clay with flints,			
	Solifluction deposits, mudflows,			
	Coastal deposits.			
IV	Strength Behavior of Rocks- Stress		Physical geology examines weathering	2, 3, 4
	and Strain in rocks. Concept of Rock		(mechanical, chemical), erosion, and	
	Deformation & Tectonics. Dip and		denudation processes influencing rock	
	Strike. Outcrop and width of outcrop.		properties. Superficial deposits like	
	Inliers and Outliers. Main types of		alluvium and glacial deposits impact	
	discontinuities according to size.		construction and groundwater	
	Fold- Types and nomenclature,		management. Geological structures such	
	Criteria for their recognition in field.	5	as folds, faults, and joints affect rock	
	Faults: Classification, recognition in	5	strength and stability. Understanding	
	field, effects on outcrops. Joints &		these structures is vital for engineering	
	Unconformity; Types, Stresses		operations, preventing hazards like	
	responsible, geotechnical importance.		landslides and earthquakes	
	Importance of structural elements in		1	
	engineering operations.			
	Consequences of failure as land			
	sliding, Earthquake and Subsidence.			
L	5. La inquitte una babbiachec.	1		

	Strength of Igneous rock structures.			
V	Geological Hazards-Rock Instability and Slope movement: Concept of sliding blocks. Different controlling factors. Instability in vertical rock structures and measures to prevent collapse. Types of landslide. Prevention by surface drainage, slope reinforcement by Rock bolting and Rock anchoring, retaining wall, Slope treatment. Case study on black clay. Ground water: Factors controlling water bearing capacity of rock. Pervious & impervious rocks and ground water. Lowering of water table and Subsidence. Earthquake: Magnitude and intensity of earthquake. Seismic sea waves. Revelation from Seismic Records of structure of earth. Case Study on Elevation and Subsidence in Himalayan region in India. Seismic Zone in India.	10	Geological hazards include slope instability, groundwater dynamics, and seismic activities. Prevention measures like drainage systems, slope reinforcement, and seismic design mitigate risks in civil engineering projects. This structured approach covers essential topics in geology relevant to civil engineering, ensuring a comprehensive understanding of geological principles and their practical applications.	2, 3, 4, 5

- 1. P.C. Varghese, Engineering Geology for Civil Engineers, PHI Learning private limited.
- 2. Parbin Singh, Engineering & General Geology, S.K. Kataria and Sons- Delhi.

Reference Books:

- 1.Dr. D.V. Reddy, Engineering Geology, Vikas Publishing House.
- 2.Chadha S. K., Elements of Geological Maps for Geology, Geography & Civil Engineering, CBS Publishers & Distributors- New Delhi.
- 3. Gautam Mahajan, Evaluation and Development of Ground Water, APH Publishers.
- 4.Jerome V. Degraff Robert B. Johnson, Principles of Engineering Geology, Wiley India Pvt Ltd.
- 5. Geology for Geotechnical Engineers, J.C. Harvey, Cambridge University Press (1982).

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Discuss the importance of Geology in making engineering decisions specially site selection of engineering projects.	1,2	
2	Analyze the concepts of how minerals form and their uses for identifying the rock forming.	3,5,6	
3	Analyze graphs and models used in structural geology for demonstrating stress, strain and tectonics.	7,2	
4	Generalize rocks using basic geological systems for selective construction material	1,9	
5	Apply quantitative skills and frame work for solving basic engineering geology problems related to	4,7	

geological	features	and	geological	hazards	and
remedial m	easures the	ereof.			

		SE	EMESTE	R – II	II						
Course	Computer-aided Civil Engineering Drawing										
Title											
Course	22BTCE214R	Total cre		_	L	T	P	S	R	O/F	C
code		Total hou			0	0	4	0	0	0	2
Pre-	Nil	Co-requi	site]	Nil						
requisite											
Programme											
Semester	Fall: Winter/III semester of seond year of the programme 1. To develop parametric design and the conventions of formal engineering drawing										
Course Objectives	 To develop parametric design and the conventions of formal engineering drawing Produce and interpret 2D & 3D drawings 										
(Minimum	3. To communicate a		•	_	nicall	v/ vic	บาลไไร				
3)	4. To develop graphic	_				-	•	leas ar	d des	sions of	engineering
3)	products graphically										engmeering
CO1	CO1- Examine a designment										ent learn to
	interpret drawings, and to										
CO2	CO2- Get a Detailed stud	_									
CO3	CO3- Examine a desig	•				tandi	ng of	CAD	- Th	ne stude	ent learn to
	interpret drawings, and to										
CO4	CO4- Construct accura	te 2D ge	ometry a	s per	the	dime	ension	s follo	wing	standa	rd drawing
	practices with proper din	nensioning	g using Co	mput	ter Ai	ided o	draftin	g softv	vare		_
CO5	CO5- Create 2D represe						, eleva	itions,	side v	views ar	nd sections /
	auxiliary views using Co	mputer Ai	ided drafti								
Unit-No.							KL				
			ct								
T	LIMIT I INTRODI	ICTION	Hour	TC1 ·			1	.1		, ,	1.0
I	UNIT-I: INTRODU	•								cept of asizing	1, 2
		cept of								ing for	
	drawings, Interpretat			conc		_	and	_		nensive	
	typical drawings,	_							•	covers	
	drawings to show inf						•			es, and	
	concisely and compreh	-		_		-		_		lrawing	
	optimal layout of draw	0								ystems	
	Scales; Introductio									lrawing	
	_	drawing,								, text,	
	coordinate systems, i					_				andards	
	planes. Commands:	Initial						_	•	entation	
	settings, Drawing aids,	•	5							ity and	
	basic entities,	Modify			sisten			in	te	chnical	
	commands, Layers, T			docu	umen	tatio	1.				
	Dimensioning, Blocks.	_									
	presentation norms	and									
	standards.										

II	UNIT-II: SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards	5	Symbols and sign conventions play a crucial role in engineering drawings across various disciplines such as materials, architecture, structural engineering, electrical systems, and plumbing. This unit explores standard symbols used in rebar drawings, structural steel fabrication, and welding, alongside dimensioning standards. Understanding these conventions is essential for accurate communication and interpretation of technical details in construction and	1, 2, 3, 4
III	UNIT-III: MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall	10	engineering projects. Building drawing essentials are covered in this unit, including terms, planning elements, and methods for creating line drawings and detailed architectural drawings. It includes the depiction of site plans, floor plans, elevations, sections, foundation plans, and roof drainage plans for small residential buildings. Detailing of joinery, fittings, fixtures, and finishes, along with the use of notes for clarity, enhances the communicative value of architectural drawings.	1, 2, 3, 4, 5
IV	UNIT-IV: BUILDING DRAWING: Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity	5	Building drawing essentials are covered in this unit, including terms, planning elements, and methods for creating line drawings and detailed architectural drawings. It includes the depiction of site plans, floor plans, elevations, sections, foundation plans, and roof drainage plans for small residential buildings. Detailing of joinery, fittings, fixtures, and finishes, along with the use of notes for clarity, enhances the communicative value of architectural drawings.	2, 3, 4
V	UNIT-V: PICTORIAL VIEW: Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modelling (BIM)	5	Principles of isometric and perspective drawing techniques are explored in this unit, emphasizing their application in architectural representation. It includes creating perspective views of buildings and introduces fundamentals of Building Information Modelling (BIM), highlighting its role in digital representation, collaboration, and	2, 3, 4, 5

project management in contemporary architectural and construction	
practices.	

- 1. Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers
- 2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 2001", Tata- Mc Graw-Hill Company Limited, New Delhi
- 3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,

Reference Books:

- 1. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age
- 2. International Pvt. Ltd.,
- 3. Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades publishing
- 4. KDR building, Calicut,
- 5. (Corresponding set of) CAD Software Theory and User Manuals.
- 6. Malik R.S., Meo, G.S. (2009) Civil Engineering Drawing, Computech Publication Ltd
- 7. New Asian.
- 8. Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria& Sons,

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.	1,2,3	
2	Get a Detailed study of an engineering artifacts.	3,5,6	
3	Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D	7,2,4	
4	Construct accurate 2D geometry as per the dimensions following standard drawing practices with proper dimensioning using Computer Aided drafting software	8,1,9	
5	Create 2D representations of 3D objects as plan view, elevations, side views and sections / auxiliary views using Computer Aided drafting software	10,4,7	

SEMESTER – III												
Course Title	<u> </u>			Biology	for Eng	<mark>gineer</mark>	<mark>'S</mark>					
Course		22BTCE213R	Total credi	its: 3	L	T	P	S	R	O/F	C	
code			Total hour	s: 45T	2	1	0	0	0	0	3	
Pre-		Nil	Co-requisi	Nil								
	requisite											
Progra		Bachelor of Technolo										
Semest		Fall: Winter/ III sem	ester of sec	ond year	of the p	rogra	mme					
Course		1. To make connections between the various branches of science										
Object		1. To make connections between the various branches of science. 2. To identify and define the basic life processes, the basic needs and the chemistry of										ster of
(Minin 3)	lum	2. To identify and define the basic life processes, the basic needs and the chemistry of living things.										
3)		3. Biology for Engineers is designed to introduce engineering students to fundamental										
		concepts in bio									unua	incitai
CO1		Discuss biological science				ciigiii	cering	discip	mics	•		
001			, 1	1 1								
CO2		Discuss regarding the eco	ological energ	getics, its w	orking m	echani	sm, ide	entifica	tion o	of organis	ms.	
CO3		Analyse the mechanism of	of transfer of	character fr	om parer	nt to no	ext gen	eration				
CO4		Explain the genetic code and production of proteins.										
CO5		Interprets the relation bet	ween various	physiologi	cal proce	esses o	f our b	ody				
Unit-	Cont	ent		Conta	Learni	ng Oı	ıtcom	e				KL
No.				ct								
I	* * * * * * * * * * * * * * * * * * * *			Hour						rtance a		1, 2
	scien biolo differ engir work came Biolo centu in the resea biolo	UNIT I Introduction Importance and scope of Biology as an important scientific discipline Branches of biological sciences Fundamental differences between science and engineering Comparison between the working mechanism of eye and camera, Bird flying and aircraft Biological observations of 18th century that lead to major discoveries in the world Steps in scientific research works Brownian motion in biological sciences		10	scope of biology, covering its branches and comparing fundamental differences between science and engineering. It explores biological systems such as the eye versus a camera and bird flight versus aircraft dynamics. Students also learn about key 18th-century biological observations and phenomena like Brownian motion.					nes ces It the ght llso cal ike		
II	UNIT II Classification & Ecology Classification of organisms, Basis of classification: Morphological, biochemical or ecological, level of organization, symmetry, germ layer organization, segmentation, notochord Concept of unicellular and multicellular organisms; prokaryotes and eukaryotes; Habitat & Adaptations Concept of Ecosystem: Structure & Function Energy flow in an ecosystem: Lindemann ten percent law Types of excretion: Ammonotelism, Ureotelism and Uricotelism Animal Kingdom:		10	Students study organism classification based on morphology, biochemistry, and ecology. They learn about unicellular and multicellular organisms, prokaryotes versus eukaryotes, and habitats and adaptations. The unit covers ecosystem structures, functions, energy flow, and types of excretion (ammonotelism, ureotelism, uricotelism).				and lar tes and em	2, 3, 4			

	Characters of phylum with examples Model organisms for the study of biology come from different groups. E. coli, S. cerevisiae, D. Melanogaster, C. elegans, A. thaliana, M. musculus			
III	UNIT III Genetics & Biomolecules Concept of Allele; Dominance & Recessive; Monohybrid, Dihybrid & Trihybrid cross; Mitosis & Meiosis Mendel's laws, Concept of Segregation and Independent assortment Concept of co-dominance and incomplete dominance with illustrations Sex determination in human Genetic disorders in human beings DNA & RNA as genetic material Enzymes: Classification; Mechanism of enzyme action	10	This unit covers basic genetics including alleles, dominance, and recessiveness. Students learn about monohybrid, dihybrid, and trihybrid crosses, mitosis, meiosis, Mendel's laws, and genetic disorders. Biomolecules like DNA, RNA, enzymes (classification and mechanism), and genetic material are also discussed.	1, 2, 3, 4
IV	UNIT IV Information Transfer & Metabolism Genetic code: Properties Structure of DNA Concept of recombination and crossing over Proteins: Primary secondary, tertiary and quaternary structure Concept of Central dogma ATP as an energy currency of cell Concept of docking: Protein Ligand interaction	10	Students delve into the genetic code, DNA structure, recombination, crossing over, and protein structures (primary, secondary, tertiary, quaternary). The unit covers the central dogma of biology, ATP as an energy carrier, and protein-ligand interactions.	1, 2
V	UNIT V Physiology Human Circulatory System: Heart and its working mechanism; Blood groups; Erythroblastosis fetalis Neuroendocrine system of human: Endocrine glands and their functions Human Excretory system: Structure of Kidney and Nephron Nervous system of human: Structure of neuron; Resting Membrane Potential; Origin and conduction of nerve impulse Human Respiratory System: Structure of lungs and exchange of gases Human digestive enzymes: Components and enzymes Mechanism of muscle contraction.	5	This unit focuses on human physiology, covering the circulatory system (heart function, blood groups), neuroendocrine system (endocrine glands and functions), excretory system (kidney structure, nephron), nervous system (neuron structure, nerve impulse), respiratory system (lung structure, gas exchange), digestive enzymes, and muscle contraction mechanisms.	2, 3, 4, 5

- 1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- 2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- 3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company.

Reference Books:

- 1. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
- 2. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.
- 3. Brown Publishers

CO PO Mapping									
SN	Course Outcome (CO)	Mapped Outcome	Program						
1	Discuss biological sciences, its scope and perspectives.	2,6,4							
2	Discuss regarding the ecological energetics, its working mechanism, identification of organisms.	3,9,7							
3	Analyse the mechanism of transfer of character from parent to next generation.	1,3,5							
4	Explain the genetic code and production of proteins.	2,9							
5	Interprets the relation between various physiological processes of our body	10,12							

			SE	MESTER	R – III							
Course	e		English	for Emp	loyabili	ity for	Engi	neers				
Title		AALIDDDA4AD ==			1.	787		10		0.5	1~	
Course	e		Total credi		L	T 0	P 4	S 0	R	O/F	2	
code Pre-			Total hour Co-requisi		0 Nil	U	4	U	U	0	<u> </u>	
requis	ita	NII	.o-requisi	ıe	NII							
Progra		Bachelor of Technolog	v in Civil	Engineer	ring							
Semes		Fall: Winter/ III semes				rngr	amme					
Course		Tun. Winter, III Senie.	or or sec-	ona year	or the p	of Ugit	***************************************					
Object		 To capacitate the 	e students	with mast	tery over	r Basi	c Engl	ish gra	mma	r.		
(Minir	num	2. To enable the st		communi	cate cor	nfiden	tly wit	h a fo	cus o	n listeni	ng	
3)		and speaking ski				_			_			
		3. With the help of the basics of Phonetics, the students will be able to										
		pronounce word	•									
CO1		4. To interact succe				1 1	1	1	1 0			
COI		Demonstrate clear and con industry-specific terminolo		cai commu	ınıcatıon	in bot	n writt	en and	oral f	ormats, 1	ncorp	orating
CO2		Develop expertise in craf		es, cover	letters,	and te	chnical	report	ts to	effective	ly sh	owcase
		engineering qualifications.										
CO3		Acquire proficiency in cre			impactfu	ıl pres	entatio	ns, utili	zing	visual ai	ds to	convey
CO4		engineering concepts to div Cultivate effective interper			orative t	eamu	ork em	nhasizi	no act	ive lister	nina	conflict
CU4		resolution, and clear comm	unication w	vithin engi	neering c	context	s.	•	Ū			
CO5		Prepare for engineering jo	ob intervie	ws by arti	iculating	quali	fication	s, expe	rience	es, and	caree	r goals,
	1 -	addressing both technical a	and behavior									
Unit-	Cont	tent		Conta	Learn	ing O	utcom	ie				KL
No.				ct Hour								
I				Hour	In this	mod	ule st	udents	will	master	the	1, 2
•										mar. T		1, 2
										of spec		
					includ	ing	nouns	, pro	noun	ıs, vei	rbs,	
	7.	Parts of Speech			adjecti			erbs,		epositio		
	i.	Articles			conjun			and		terjectio		
	i.	Auxiliary Verbs		_						finite		
	i.	Affirmative and	Negative	5						age will earn ab		
	Sente	ences								in form		
										he mod		
							-			ruction		
					affirm					sentend		
					_	-			_	mmatica	ally	
					correc			_				2 -
II										nodule v		2, 3,
					delve			ermine		and tl dents v	neir	4
	i.	Determiners								techniq		
	i.	Sentence Construction	n							senten		
	i.	Types of S	Sentences	_						gative,		
	(Asse	ertive, Imperative, etc.)		5			_			the deg		
	k .	Degree of Compariso	n		of co	mpari	son (j	positiv	e, co	mparati	ive,	
	k .	Comprehension Exerc	cises							lored.		
										prehens		
							-			e stude		
					ability	to	unde	rstand	and	inter	oret	

		1		
			written texts effectively	
III	i. What is listening? i. The Process of Listening c. Factors that adversely affect Listening c. Difference between Listening and Hearing, i. Purpose and Importance of Effective Listening i. How to Improve Listening Process.	5	Students will be introduced to the fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	1, 2, 3, 4
IV	i. Introducing yourself i. Self-discovery i. Basics of Phonetics, pronunciation i. Extempore speech i. Video Recording for Self reflection	10	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	c. Introduction to Communication, i. Importance of Communication Skills, i. Purpose of Communication, i. Types of Communication, i. Formal and informal communication i. Importance of Communication, i. Barriers to Communication, i. How to improve/ tips to improve Communication skills. i. Responding to different questions in various situations (formal/informal)	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of communication, distinguishing between formal and informal contexts. Students will learn about the importance of communication skills and the barriers that can impede effective communication. Tips and strategies to improve communication skills will be provided. The module will also include exercises on responding to different questions in various situations, enhancing students' adaptability and effectiveness in both formal and informal interactions.	2, 3, 4, 5

1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011. Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.

2.Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first edition, S. Chand & Delhi.

Reference Books:

- 1.Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2.Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Klett

Other Learning Resources:

https://youtu.be/bEB8-SWMYhI

https://youtu.be/-zZau_dttRY

CO	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Outcome	Program					
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	2,6,3						
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	3,9,8						
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	1,3,9						
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	2,9,4						
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10,12						

			SE	MESTEI	R – III								
Course		Introduction to Civil Engineering											
Title		22DECE215D	/D 4 1 19	24 2	1+	/m	- I D	- C	- T-D	n 10 m 1			
Course		22BTCE215R	Total credi		<u>L</u>	T 0	P 0	S 0	R	0/F 0	C 2		
code Pre-		Nil	Total hour Co-requisi		Nil	U	U	U	U	U	<u>Z</u>		
requisi	to	INII	Co-requisi	ıe	INII								
Progra		Bachelor of Technological	ngy in Civil	Engineer	 ing								
Semest		Fall: Winter/ III sem				rngrs	amme						
Course		1. To give an ur						breadtl	h and	numer	ous a	areas of	
Object		engagement av	•										
(Minin		2. to motivate th								of Civil	Engi	neering	
3)		with deep inter	rest and keer	nness.									
		2 To avmosa th	a students	to the r	i		00 011	ماماداد	for	doina	t	vo and	
		3. To expose the innovative work											
		of public utilit		id by silo	weasing	tiic iii	iairy iii	Onum	into a	na mspi	iiiig j	projects	
CO1		Gaining practical and		experience	e in con	ductir	ng inde	epende	nt res	search o	on an	y Civil	
		Engineering subject, as well as in oral and written presentations, in team work and in self-discipline											
CO2		Explore the scope of v	arious discip	olines of C	Civil Eng	gineer	ing.]	
CO3		The student will learn											
CO4		Ability to define construction management, environmental issues and the sustainable											
GO =		development. Assess possible avenues of career and entrepreneurial opportunities in the Civil Engineering											
CO5			es of career	and entr	epreneu	rial o	pportu	nities	in the	e Civil	Engii	neering	
Unit-	Cont	profession.		Conta	Learn	ing ()	utcom	16			1	KL	
No.	Come	ciit		ct	Learn	m _s O	utcom	ıc					
				Hour									
I		c Understanding : Wh								rosion		1, 2	
		neering/ Infrastructure?								echanis	-		
	Broa	neering and Civil E		focusing on simple rehabilitation systems. It introduces non-destructive									
		d disciplines o neering; Importance			-					the use			
		neering, Importance neering, Possible sco			_					nposite			
	caree	-	pes for u		structu			ome ur	ia co.	провис	3 111		
		ory of Civil engineer	ing: Early			,							
	const	ructions and develop	nents over										
		Ancient monuments											
		els; Development o		5									
		rials of construction ar											
		onstruction; Works o engineers.	i Eminent										
	CIVII	engineers.											
	Over	view of National Pla	nning for										
		struction and Infr											
		elopment; Position											
		ruction industry vis-											
	indus	stries, five year plan	outlays for										
		ruction; current bu	dgets for										
	infra	structure works.											

II	Fundamentals of Architecture & Town Planning: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities Fundamentals of Building Materials: Stones, bricks, mortars, Plain, Reinforced & Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes Basics of Construction Management & Contracts Management: Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Automation & Robotics in Construction; Modern Project management Systems; Advent of Lean Construction; Importance of Contracts Management.	10	This unit highlights typical software applications in civil engineering such as Finite Element Method, Computational Fluid Dynamics, and Computational Geotechnical Methods. It includes software for highway design (MX), Building Information Modelling (BIM), and various other tools like SAP, STAAD, ABAQUS, MATLAB, and AUTOCAD.	2, 3, 4
III	Environmental Engineering & Sustainability: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction. Geotechnical Engineering: Basics of soil mechanics, rock mechanics and geology; various types of foundations; basics of rock mechanics &tunneling. Hydraulics, Hydrology &Water Resources Engineering: Fundamentals of fluid flow, basics of water supply systems; Underground Structures; Underground Structures Multipurpose reservoir projects. Ocean Engineering: Basics of Wave and Current Systems; Sediment transport systems; Ports & Harbours and other marine structures	5	Industry professionals present case studies of large civil engineering projects, covering comprehensive planning through commissioning. Topics include project management strategies, challenges faced, and solutions implemented.	1, 2, 3, 4
IV	Power Plant Structures: Chimneys, Natural & Induced Draught Colling towers, coal	5	This unit explores professional ethics, entrepreneurial opportunities, and encourages creative and innovative	1, 2

	T	1		
	handling systems, ash handling systems; nuclear containment structures; hydro power projects Structural Engineering: Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies; Surveying & Geomatics: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR; Traffic & Transportation Engineering: Investments in transport infrastructure development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and FreightTransportation; Road Safety under heterogeneous traffic; Sustainable and resilientpavement materials, design, construction and management; Case studies and examples.		approaches in civil engineering. It enhances technical writing skills and discusses facilities management, quality assurance, and health, safety, and environment (HSE) systems in construction.	
V	Repairs & Rehabilitation of Structures: Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. Computational Methods, IT, IoT in Civil Engineering: Typical software used in Civil Engineering- Finite Element Method, Computational Fluid Dynamics; Computational Fluid Dynamics; Computational Geotechnical Methods; highway design (MX), Building Information Modelling; Highlighting typical available software systems (SAP, STAAD, ABAQUS, MATLAB, ETAB, NASTRAN, NISA, MIKE 21, MODFLOW, REVIT, TEKLA, AUTOCAD,GEOSTUDIO, EDUSHAKE, MSP, PRIMAVERA, ArcGIS, VisSIM,)	5	This unit focuses on sustainability principles in civil engineering, addressing environmental, social, and economic aspects. It covers sustainable construction materials and practices, energy-efficient design, and green building certifications. Topics include lifecycle assessment, carbon footprint reduction strategies, and renewable energy integration in infrastructure projects. Case studies highlight successful sustainable initiatives and their impact on the built environment.	2, 3, 4, 5

Industrial lectures : Case studies of	
large civil engineering projects by	
industry	
professionals, covering	
comprehensive planning to	
commissioning;	
Basics of Professionalism:	
Professional Ethics, Entrepreneurial	
possibilities in Civil	
Engineering, Possibilities for creative	1
& innovative working, Technical	
writing Skills	
enhancement; Facilities Management;	
Quality & HSE Systems in	
Construction	

- 1. Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- 2. Avtarsingh (2002), Law of Contract, Eastern Book Co.
- 3. Dutt (1994), Indian Contract Act, Eastern Law House.

Reference Books:

- 1. Anson W.R.(1979), Law of Contract, Oxford University Press
- 2. Kwatra G.K.(2005), The Arbitration & Conciliation of Law in India with case law on
- 3. UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
- 4. Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern Book Co.
- 5. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
- 6. P. S. Narayan (2000), Intellectual Property Rights, Gogia Law Agency.
- 7. The National Building Code, BIS, (2017).
- 8. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act.

CO	PO Mapping	I
SN	Course Outcome (CO)	Mapped Program Outcome
1	Gaining practical and theoretical experience in conducting independent research on any Civil Engineering subject, as well as in oral and written presentations, in team work and in self-discipline	2,6,4
2	Explore the scope of various disciplines of Civil Engineering.	3,9,7
3	The student will learn about role of transportation as well as of water and its conservation	1,3,5
4	Ability to define construction management, environmental issues and the sustainable development.	2,9
5	Assess possible avenues of career and entrepreneurial opportunities in the Civil Engineering profession.	10,12

	SEMESTER – III
Course	PDE and transform mathematics

Title Course Code Total credits: 3 L T P S R O/Code Total hours: 45T 2 1 0 0 0 0 0	application, ons between the ations (PDEs) arious complete ferent complete fer
Total hours: 45T 2 1 0 0 0 0 0 0 0 0 0	application, ons between the ations (PDEs) se fundamenta arious completiferent completification compl
Pre- requisite Programme Bachelor of Technology in Civil Engineering	application, ons between the ations (PDEs) te fundamenta arious comple
Programme Bachelor of Technology in Civil Engineering	ons between the ations (PDEs) see fundamenta arious comples ferent comples
Programme Bachelor of Technology in Civil Engineering	ons between the ations (PDEs) see fundamenta arious comples ferent comples
Semester Fall: Winter/ III semester of second year of the programme	ons between the ations (PDEs) see fundamenta arious comples ferent comples
Course Objectives I. To familiarize the students with Laplace Transform, Fourier Transform, their is logic group, sets, lattices, Boolean algebra and Karnaugh mapso make connection various branches of science. 2. It aims to present the students with standard concepts and tools. 3. This course delves into the theory and applications of Partial Differential Equa and Transform Mathematics, providing students with a strong foundation in these mathematical concepts. CO1	ons between the ations (PDEs) see fundamenta arious comples ferent comples
CO1	ons between the ations (PDEs) see fundamenta arious comples ferent comples
2. It aims to present the students with standard concepts and tools. 3. This course delves into the theory and applications of Partial Differential Equa and Transform Mathematics, providing students with a strong foundation in thes mathematical concepts. CO1 Understand the concept and application of transform calculus in solving vaproblems. CO2 Understand the basic principles of set theorem and apply them in solving differential Equation of transform calculus in solving vaproblems. CO3 Understand the basic principles of set theorem and apply them in solving differential Equation of transform calculus in solving vaproblems. CO4 Understand the basic principles of set theorem and apply them in solving differential Equation of transform calculus in solving vaproblems. CO3 Understand and apply the concepts of proposition logic. CO4 Understand and apply the concept of algebraic structures including Boolean algebra and Bapply them in understanding complex problems. CO5 Understand apply the concept of graphs. CO6 Understand apply the concept of graphs. CO7 Understand apply the concept of graphs.	e fundamenta arious comple ferent comple
3. This course delves into the theory and applications of Partial Differential Equation and Transform Mathematics, providing students with a strong foundation in thes mathematical concepts. CO1 Understand the concept and application of transform calculus in solving vaproblems. CO2 Understand the basic principles of set theorem and apply them in solving difference problems. CO3 Understand and apply the concepts of proposition logic. CO4 Understand the concept of algebraic structures including Boolean algebra and Boapply them in understanding complex problems. CO5 Understand apply the concept of graphs. Unit- Content Conta Learning Outcome	e fundamenta arious comple ferent comple
and Transform Mathematics, providing students with a strong foundation in thes mathematical concepts. CO1 Understand the concept and application of transform calculus in solving various problems. CO2 Understand the basic principles of set theorem and apply them in solving difference problems. CO3 Understand and apply the concepts of proposition logic. CO4 Understand the concept of algebraic structures including Boolean algebra and Boapply them in understanding complex problems. CO5 Understand apply the concept of graphs. Unit- Content Conta Learning Outcome	e fundamenta arious comple ferent comple
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CO4 Understand the concept of algebraic structures including Boolean algebra and Boolean apply them in understanding complex problems. CO5 Understand apply the concept of graphs. Unit- Content Conta Learning Outcome	oolean ring ar
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CO5 Understand apply the concept of graphs. Unit- Content Conta Learning Outcome	
Unit- Content Conta Learning Outcome	
	KL
No. ct	112
Hour	
I Transform Calculus -1 This unit covers polynomials, inc	cluding 1, 2
orthogonal polynomials like Lagr	
Polynomials – Orthogonal and Chebyshev polynomials, as w	
Polynomials – Lagrange's, Chebysev trigonometric polynomials. It intr	oduces
Polynomials; Trigonometric the Laplace Transform, its proj	perties,
Polynomials; Laplace Transform, and the Laplace transform of p	
Properties of Laplace Transform, functions. Methods for findin	•
Laplace transform of periodic inverse Laplace transform,	
functions. Finding inverse Laplace convolution theorem, and the eva	
transform by different methods, of integrals using Laplace transfor	
convolution theorem. Evaluation of also discussed. Applications of	
integrals by Laplace transform, Laplace Transform in solving or	
solving ODEs and PDEs by Laplace 10 differential equations (ODEs) and	_
Transform method. differential equations (PDEs) included.) are
Propositional Logic:	
Symtox and comenties proof exetens	
Syntax and semantics, proof systems,	
satisfiability, validity, soundness,	
completeness, deduction theorem, etc. Decision problems of propositional	
logic. Introduction to first order logic	
and first order theory.	
and mot order divory.	
II Transform Calculus-2 This unit focuses on Fourier trans	sforms, 2, 3
Z-transforms, and Wavelet trans	
Forming their properties me	•
Wavelet transforms: properties, 10 covering their properties, including their properties, inverses, and applications. It also	
methods, inverses and their into set theory, exploring	basic
operations on sets, Cartesian pro	oducts,

	applications. Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.		disjoint unions (sums), and power sets. Different types of relations and functions, along with their compositions and inverses, are also examined.	
Ш	Partially ordered sets: Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.	10	The propositional logic section addresses syntax, semantics, proof systems, satisfiability, validity, soundness, completeness, and the deduction theorem. Decision problems of propositional logic and an introduction to first-order logic and theory are also included. The unit then explores partially ordered sets, including concepts like complete partial ordering, chains, lattices, and Boolean lattices.	1, 2, 3, 4
IV	Algebraic Structures: Algebraic structures with one binary operation — semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operationsring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).	5	This unit covers algebraic structures with one binary operation, such as semigroups, monoids, and groups. Topics include cosets, Lagrange's theorem, normal subgroups, homomorphic subgroups, congruence relations, and quotient structures. The unit also introduces error-correcting codes and algebraic structures with two binary operations, such as rings, integral domains, fields, Boolean algebra, and Boolean rings, with definitions and simple examples.	1, 2
V	Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination, summations. Introduction to recurrence relation and generating functions. Introduction to Graphs: Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.	10	This unit introduces basic counting techniques, including inclusion and exclusion, the pigeonhole principle, permutations, combinations, and summations. It also covers recurrence relations and generating functions. The introduction to graphs section explores basic properties of graphs, such as degrees, paths, cycles, subgraphs, isomorphism, Eulerian and Hamiltonian walks, and trees.	2, 3, 4, 5

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- 3. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
- 4. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
- 5. R. L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., Addison-Wesley, 1994.

Reference Books:

- 1. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
- 2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010.
- 3. N. Deo, Graph Theory, Prentice Hall of India, 1974.
- 4. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.
- 5. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

CO	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Outcome	Program						
1	Understand the concept and application of transform calculus in solving various complex problems.	2,6,3							
2	Understand the basic principles of set theorem and apply them in solving different complex problems.	3,9,8							
3	Understand and apply the concepts of proposition logic.	1,3,9							
4	Understand the concept of algebraic structures including Boolean algebra and Boolean ring and apply them in understanding complex problems.	2,9,4							
5	Understand apply the concept of graphs.	10,12							

G 10°41	1	SEMESTER – I		I (1) 11 A					
Course Title	Teemio I Oteggional Dam 2								
Course code			L	T P	S	R O/F	C		
		Total hours: 20P	0	0 2	0	0 0	1		
Pre-	Nil	Co-requisite			Ni	il			
requisite	<u> </u>	D.T. I.C.	1	•					
Programme	TO 1	B.Tech Civ							
Semester	ra	II/ III semester of seco	ond year	of the progra	amme				
Course Objectives	1. Equip students with advanced AutoCAD skills necessary for civil engineering projects, enhancing their								
(Minimum	1. Equip students with advanced AutoCAD skills necessary for civil engineering projects, enhancing the technical proficiency and professional competency.								
3)									
3)	5								
	Develop students' ability to cre		ng drawin	gs and detai	led desig	gns, fostering atte	ntion t		
	detail and accuracy in their work	k.							
	l								
	Enhance problem-solving and	_	ties throu	igh practical	AutoCA	D applications, p	reparin		
	students for real-world enginee								
CO1	Demonstrate proficiency in using	g AutoCAD tools for a	creating co	omplex civil	engineer	ing drawings.			
CO2	Apply advanced AutoCAD techn	migues to design detail	ad atminatio	mal mlane and	lorrorita				
CO2	** *	•		-					
CO3	Develop the ability to interpret and convert conceptual sketches into precise digital drawings.								
CO4	Integrate AutoCAD skills with o								
CO5	Exhibit improved problem-solvi	ng skills and technical	knowledg	ge through pr	actical A	autoCAD application	ons.		
Unit-No.	Content		Contact	L	earning	Outcome	KL*		
_			Hour						
	Introduction to Advanced Auto		4			drawing tools	1, 2		
	Overview of advanced drawing					features in			
	customization options, and prod			AutoCAD.					
II	Creating Detailed Civil Engineer		_	_					
		_	4	-		d detailed civil	2, 3		
	Techniques for creating detailed	d structural and	4	engineeri	ng drawi	ngs with	2, 3		
	architectural drawings, including	d structural and	4	-	ng drawi	ngs with	2, 3		
	architectural drawings, including dimensioning, and annotation.	d structural and g layering,		engineeri advanced	ng drawi techniqi	ngs with ues.			
III	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization:	d structural and g layering,	4	engineerii advanced Develop 3	ng drawi techniqi D mode	ngs with ues. Is and visualize	2, 3		
III	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visualization.	d structural and g layering, Introduction to 3D ization techniques		engineerii advanced Develop 3 civil engin	ng drawi techniqu BD mode eering d	ngs with ues.			
	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering	d structural and g layering, Introduction to 3D ization techniques applications.	4	engineerii advanced Develop 3 civil engin AutoCAD.	ng drawi techniqu D mode eering d	ngs with ues. Is and visualize esigns using	3, 4		
	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering Integration with Other Tools: N	d structural and g layering, Introduction to 3D ization techniques applications. Methods for		engineerii advanced Develop 3 civil engin AutoCAD. Integrate	ng drawi techniqu D mode eering d AutoCAE	ngs with ues. Is and visualize esigns using O skills with other			
	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering Integration with Other Tools: Mintegrating AutoCAD with other	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for co	ng drawi technique D mode eering d AutoCAL compreh	ngs with ues. Is and visualize esigns using O skills with other ensive	3, 4		
	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering Integration with Other Tools: No integrating AutoCAD with other software and tools, including im	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering aporting/exporting	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for co	ng drawi technique D mode eering d AutoCAL compreh	ngs with ues. Is and visualize esigns using O skills with other	3, 4		
IV	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering Integration with Other Tools: No integrating AutoCAD with other software and tools, including im files and collaborative project with the software and tools.	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering aporting/exporting vorkflows.	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for cengineerii	ng drawi technique D mode eering d AutoCAL compreh ng projec	ngs with ues. Is and visualize esigns using O skills with other ensive ct development.	3, 4		
IV	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visualization in AutoCAD for civil engineering Integration with Other Tools: Mintegrating AutoCAD with other software and tools, including im files and collaborative project we Practical Applications and Project	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering aporting/exporting orkflows. ects: Hands-on	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for cengineerii Apply Aut	ng drawi technique D model eering d AutoCAL compreheng project	ngs with ues. Is and visualize esigns using O skills with other ensive ct development. ills in practical	3, 4		
IV	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visuali in AutoCAD for civil engineering Integration with Other Tools: Mintegrating AutoCAD with other software and tools, including imfiles and collaborative project we Practical Applications and Projects and case studies to approperts.	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering aporting/exporting workflows. Lects: Hands-on only AutoCAD skills in	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for cengineerii Apply Aut projects, cengineeris	ng drawi technique D model eering d AutoCAE comprehing project oCAD sk demonst	ngs with ues. Is and visualize esigns using O skills with other ensive ct development. ills in practical rating problem-	3, 4		
III IV V	architectural drawings, including dimensioning, and annotation. 3D Modeling and Visualization: modeling, rendering, and visualization in AutoCAD for civil engineering Integration with Other Tools: Mintegrating AutoCAD with other software and tools, including im files and collaborative project we Practical Applications and Project	d structural and g layering, Introduction to 3D ization techniques applications. Methods for engineering aporting/exporting orkflows. Pects: Hands-on only AutoCAD skills in narios, including	4	engineerii advanced Develop 3 civil engin AutoCAD. Integrate tools for cengineerii Apply Aut projects, cengineeris	ng drawi technique D model eering d AutoCAE comprehing project oCAD sk demonst	ngs with ues. Is and visualize esigns using O skills with other ensive ct development. ills in practical	3, 4		

		CO PO Mapping	
SN	Course Outcome (CO)		Mapped Program Outcome

1	Demonstrate proficiency in using AutoCAD tools for creating complex civil engineering drawings.	5, 7
2	Apply advanced AutoCAD techniques to design detailed structural plans and layouts.	8
3	Develop the ability to interpret and convert conceptual sketches into precise digital drawings.	7.9,10
4	Integrate AutoCAD skills with other engineering tools and software for comprehensive project development.	11,12
5	Exhibit improved problem-solving skills and technical knowledge through practical AutoCAD applications.	10

			SE	MESTER	R – III							
Course)		Ma	terial Tes	sting and	l Eva	luatio	n				
Title												
Course	9	22BTCE218R	Total credi		L	T	P	S	R	O/F	C	
code			Total hour		1	1	2	0	0	0	3	
Pre-		Nil Co-requisite Nil										
	requisite											
	Programme Bachelor of Technology in Civi											
	Semester Fall: Winter/ III semester of											
Course		1. Provide students with all information concerning principle, way of measurement, as well as										
Object		practical application of				1	1	a1 E		•		
(Minin	num	2. Make measurements							_	_		L
3)		3. Introduce experimen										
		devices giving exposur 4. Make measurements									eciii	iques.
CO1		Describe the various er										
COI		Describe the various en	iginicering ii	nateriais,	uicii qua	nucs,	and in	ow the	y arc	made		
CO2		Identify the mechanic	al behavior	r and cha	aracterist	ics. 1	he str	ength	chara	acteristi	cs. a	nd the
		history of fracture mech										
CO3		Perform mechanical tes									non-	-ferrous
		metals. Additional med										
		research, creep, and fati	igue researc	h								
CO4		Discuss the methods used to evaluate soils, bitumen, bitumen blends, bricks, sand, concrete,										
		and other materials Identify the mechanical characteristics and qualities of special materials, metals, cementitious										
CO5		1			qualities	of sp	pecial	materia	als, n	netals, c	ceme	ntitious
	1 -	materials, composites,	and polyme		1							
Unit-	Cont	tent		Conta	Learni	ng O	utcom	e				KL
No.				ct Hour								
I	IINII	Γ 1- Introduction to E	ngineering	11001	This 1	ınit	nrovid	lec an	OV	erview	of	1, 2
1			nents, M-									1, 2
		, Concrete (plain, reinf			various engineering materials essential civil engineering. It covers differe							
		fibre/ glass fibre-i			types of							
		-weight concrete,	High		forms							
	_	ormance Concrete,	_		reinford	ced,	steel	fibi	e/gla	ss fil	bre-	
	Conc	erete), Ceramics, and Re	efractories,		reinford	ced,	li	ghtwei	ght,	hi	igh-	
	Bitur	nen and asphaltic	materials,	10	perforn	nance	, and j	polyme	er coi	ncrete.	The	
		ers, Glass and Plastics,		10		also	delv		nto	ceram		
		and other Metals, F			refracto							
		ishes, Acoustical ma	terial and			_	_			tural st		
	geote	extiles,								onally,		
					discuss							
					materia							
					their			and a	appii	cations	ın	
II	IINII	Γ 2- Introduction to	Matarial		Constru			e moto	rial a	ngingg	ring	2, 3,
111	Testi				This unit introduces material engineering and its significance, focusing on the						_	2, 3, 4
		terial Engineering"?; N			mechar							7
			nechanical							sticity		
		acteristics; Elasticity –		10						, standa		
	and	characteristics;	Plastic		for ten							
		emation of metals; Ten					_			tress-st		
	stand		material							s hardr		
				I								

	(brittle, quasi-brittle, elastic and so on), True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic; Internal friction, creep – fundaments and characteristics;		tests, bending and torsion tests, the strength of ceramics, and the fundamentals of internal friction and creep.	
Ш	UNIT 3- Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics.	5	This unit addresses the brittle fracture of steel, particularly focusing on the temperature transition approach. It provides background knowledge on fracture mechanics, discusses fracture toughness testing for various materials, and introduces the concept of material fatigue. The unit also covers structural integrity assessment procedures using fracture mechanics principles.	1, 2, 3, 4
IV	UNIT 4-Standard Testing & Evaluation Procedures covering, Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures	10	This unit covers the standard procedures and laboratory practices for mechanical testing. It includes discussions on mechanical testing methods, naming systems for various irons, steels, and nonferrous metals. The unit explores elastic and plastic deformation, impact tests, and transition temperatures, emphasizing the importance of these tests in material evaluation	1, 2
V	UNIT 5-Testing of polymers and polymer-based materials, tests and testing of metals, special materials, composites and cementitious materials. Explanation of mechanical behaviour of these materials.	10	This unit focuses on the testing of polymers and polymer-based materials, as well as metals, special materials, composites, and cementitious materials. It explains the mechanical behaviour of these materials and the specific tests used to evaluate their properties, providing a comprehensive understanding of their performance in engineering applications.	2, 3, 4, 5

- 1.S. Delhi. Peter Domone and J. M. Illston. (2018), Construction Materials: Their Nature and Behaviour", Taylor& Francis
- 2.SK Duggal, Building materials(2019), New Age Publishers
- 3.Materials Testing and Evaluation for Civil Engineering, by K. Subramanian, Oxford University Press (2019)

Reference Books:

- 1.Material Testing for Civil Engineering, by E.A. Avallone (McGraw-Hill, 2009)
- 2.Materials Testing for Civil and Construction Engineers, by A.G. Kulkarni and R.T. Johns (CRC Press, 2011)
- 3.Handbook of Material Testing for Construction and Industry, by B.J. Monahan and A.T. Murray (CRC Press, 2018)

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Describe the various engineering materials, their qualities, and how they are made	2,6,8	
2	Identify the mechanical behavior and characteristics, the strength characteristics, and the history of fracture mechanics. Metals can deform in both elastic and plastic ways	3,9,5	
3	Perform mechanical testing on a range of metals, including iron, steel, and various non-ferrous metals. Additional mechanical testing includes impact testing, background fracture toughness research, creep, and fatigue research	1,7,9	
4	Discuss the methods used to evaluate soils, bitumen, bitumen blends, bricks, sand, concrete, and other materials	9,1,8	
5	Identify the mechanical characteristics and qualities of special materials, metals, cementitious materials, composites, and polymers	10,12,6	

		SEMESTE	R III						
Course Title		CO CURRIO	CULAR	AC.	ΓΙVΙΊ	ΓIES			
Course code	22UBCC211	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 15P	0	0	0	4	0	0	1
Pre-requisite	Nil	Co-requisite					Nil		
Programme	1111	-	hnology	Civil	Engir				
Semester	Bachelor of Technology Civil Engineering Fall/ IV semester of the second year of the program								
Course	Complement classroom education by integrating practical experiences and							es and	
Objectives		activities that reinfor							
(Minimum 3)		ssential skills such a		-	-			-	
	_	ation, and collabora	_		_			_	gned
	activities.	,							6
		students to expl	lore the	eir i	nteres	ts ar	ıd ta	lents. bu	ild self-
		e, and cultivate a we							
		lar programs.				,	1		
CO1		bility to apply theo	retical	know	ledge	from	the	classroon	to real-
	world situations th	rough hands-on exp	eriences	s and	proje	cts.			
CO2		oblem-solving, critica			mmun	icatio	n, and	collaborat	ion skills,
		ademic and profession							
CO3		f-confidence, self-awa	reness,	and a	well-	round	ed cha	aracter by	exploring
		interests and talents.							
CO4		nity service and soci	ial initia	tives,	foste	ring a	sens	se of resp	onsibility,
GO.	empathy, and active								
CO5		teamwork and leaders				d thro	ugh p	articipatioi	ı ın group
Unit-No.		ship roles within co-cu	Contac			aunin.	· Ot	20220	BL
Omt-No.	Cor	itent	Hour		Lea	arnin	g Out	come	BL
I	AdtU encourages a	a range of activities	15	C	lo-curi	ricular		activities	
		gular curriculum						practical	
		learner's interest,						academic	
		e aimed to develop			oncep		critica		
		skills and promote a			evelop			problem-	
		ent of the learners,						nication),	
		the 360 degree			oster		onal	growth	
		ogy the students are			confid			self- ote social	
		nt activities headed							
		clubs viz. Dance, ny, drama, literary			espons ommu	•		through	
		are encouraged to						agement, work and	3
		lar club activities,			eaders		tcam	abilities,	3
		etitions as per their					em fo	r holistic	
		bies, The student						mic and	
		club are trained			ocial c				
		in various inter							
	_ <u>*</u>	and national level							
		ewed personalities							
		luct workshops that							
		ers and students by							
		atform to learn from							
	experts in the respe	ective fields.							

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands- on experiences and projects.	1,2,3,4,5,6,10,12
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12

	SEMESTER III								
Course Title		EXTR	A-CURI	RICU	LAR				
Course code	22UBEC211	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 60P	0	0	0	4	0	0	1
Pre-requisite	Nil Co-requisite Nil								
Programme	Civil Engineering								
Semester		Summer/ V semester	of the th	ird ye	ear of	the p	rogra	m	
Course	Develop so	ocial and soft skills: Fo	oster the a	ecquis	ition c	of inte	rperso	nal skills	and time
Objectives	manageme	nt abilities among lear	rners.						
(Minimum 3)	2. Promote ho	olistic development: E	ncourage	stude	ents to	engag	ge in n	nultifacete	d activities
	beyond aca	demics, nurturing the	ir leaders	hip an	d inte	rests.			
	3. Facilitate i	n-depth expression: Pr	rovide op	portur	nities f	or stu	dents	to articula	te their
	ideas and o	pinions clearly and cr	ritically a	nalyze	topic	s of ir	terest.		
CO1	Learn to a plan so t	hat they can make me	eaningful	contr	ibutio	ns, m	aintair	a commi	tment, and
	manage their time a	nd priorities.							
G0.	TD 6	1 . 1 1			1.	1			1.1.
CO2	_	te students who demo	onstrate I	eader	ship a	nd pu	rsue 11	nterests be	eyond their
	academics.								
CO3	Learn to participate	in various co-curricu	lar activi	ties le	ading	to the	eir mu	ltifaceted	personality
005	development.	in various co carried	iai activi	iios io	ading	to the) II III (I	imacetea	personanty
	-								
CO4	Express their ideas,	views, In-depth evalu	ation and	analy	sis cle	early i	n the t	opic of the	eir interest.
CO5	Domonstrate and	practices different a	ativitiaa	h	Intoon	atin a	1	ina avaa	ianaaa hu
COS		•	icuvines,	бу	megr	aung	iearn	ing expe	fiences by
	demonstrating trans	ierabie skilis.							
Unit-No.	Co	ntent	Contac	et	Lea	arning	g Outo	come	BL
			Hour			•	,		
I		a range of activities	8					a well-	
	outside the re	egular curriculum			ounded		pe	rsonality,	
		learner's interest,			ncludir	_		effective	
		re aimed to develop						ip skills,	2,3
		skills and promote a			articip		in		
		ent to the learners,						xpression	
	Keeping in min	d the3 60 degree		0	f idea	s, and	linteg	ration of	

learning methodology the students are	learning	experiences,	
engaged in different activities headed	fostering	holistic	
under different clubs viz. Dance,	development.		
music, photography, drama, literary			
etc., The students are encouraged to			
participate in regular club activities,			
workshops, competitions as per their			
interest and hobbies, The student			
members of the club are trained			
represent AdtU in various inter			
University student and national level			
competitions, Renewed personalities			
are invited to conduct workshops that			
benefit the members and students by			
giving them the platform to learn from			
experts in the respective fields.			

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,9,11,12					
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,9,11,12					
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,9,11,12					
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,9,11,12					
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,9,11,12					

SEME	<u>STER</u>	- III										
Course	e	Basic Life Saving Sk	Basic Life Saving Skills									
Title					1			,		1		
Course	e	22UULS212R	Total credi		L	T	P	S	R	O/F	C	
code		X701	Total hour		0	0	2	0	0	0	1	
Pre-	•4	Nil	Co-requisi	te	Nil							
requisi		Daabalaa af Taabaala	: C'1	E	<u> </u>							
Progra Semest		Bachelor of Technology				иодио	mmo					
Course		Fall: Winter/ III sem						-cavin	a tec	hniques	incl	ıdina
	Course 1. Equip students with essential knowledge and skills in basic life-saving techniques. CPR and first aid.						, men	aumg				
(Minin		2. Develop the ability t	to assess em	ergency s	ituations	and r	espond	effect	ivelv	to vario	ous tv	pes of
3)		injuries and medical co		. B					, , ,			1
		3. Foster an understand		entive me	asures ar	ıd safe	ety prot	tocols	to mi	nimize	the	
		occurrence of emergen	cies and enh	nance over	rall com	nunit	y safety	7.				
CO1		Demonstrate proficien	cy in perfo	orming Cl	PR, adm	iniste	ring fi	rst aid	l, and	d using	auto	mated
		external defibrillators (
CO2		Exhibit the ability to		ess emer	gency si	tuatio	ns and	make	info	ormed d	ecisio	ons to
CCC		provide immediate care			1 .		,			11		
CO3		Understand and apply	basic safe	ty protoc	ols to p	reven	t accid	ents a	nd h	andle e	merge	encies
CO4		efficiently. Display confidence an	d compoton	ce in hon	dling o =	ango	of mad	ical a	nerc	encies d	from	minor
CU4		injuries to life-threaten	•		uning a f	ange	or med	iicai el	nerg	CHCIES,	HUIII	11111101
CO5		Advocate for and pron			ntive me	asure	s within	n the c	omm	ninity c	ontril	huting
		to a safer environment		ina provo		asaro.	, WILLIA		011111	iaiiity, c	Omm	outing.
Unit-	Cont		·	Conta	Learni	ng O	utcome	<u> </u>				KL
No.				ct		O						
				Hour								
I	Skill	Importance of life-s skills Basic principles of the Legal and ethical as providing first aid Personal safety and protective equipment Assessing the scene emergency	aving First aid pects of use of nt	5	saving first aid aspects emphas safety equipm assess ensure aid.	skills d. It desiring and and the s safety	and the iscusse of protection the interest of	ne basis the loviding portar use ts will of an fficient	ic priegal a fince of lean emecy in	of person protect rn how ergency providi	of cal id, nal ive to to ing	1, 2
II	Resu	2: Cardiopulmonary scitation (CPR) and mated External Defiberance Defiberation (CPR) and mated External Defiberation (CPR) and another to CPR steps for performing adults, children, and Use of an AED: pring and procedures Hands-on practice standard CPR and AED use Recognizing and research and procedures and AED use Recognizing and research and SPR and AED use Recognizing and research and SPR and AED use Recognizing and research and SPR and AED use Recognizing and research and SPR an	ology g CPR on l infants nciples essions for	5	physiol steps of children the prin an AEI to ens	ogy refor point, and notiple D, with ure	elevant erform d infan es and h hand proficie recogni	to CFing Cits. This processon processon processon.	PR, le PR is un lures raction The	atomy a carning to on adu it include for usi ce session unit a respondi	the lts, les ing ons lso	2, 3, 4

	to cardiac emergencies			
III	 Unit 3: First Aid Techniques Managing bleeding, wounds, burns, and fractures Providing first aid for choking, poisoning, and shock Practical sessions for bandaging, splinting, and other first aid procedures 	5	This unit teaches essential first aid techniques for managing bleeding, wounds, burns, and fractures. Students will learn how to provide first aid for choking, poisoning, and shock. The unit includes practical sessions to practice bandaging, splinting, and other first aid procedures	1, 2, 3, 4
IV	Unit 4: Emergency Medical Conditions Recognizing symptoms of heart attacks, strokes, asthma attacks, and diabetic emergencies Immediate response actions for medical emergencies Ongoing care until professional help arrives Importance of staying calm and effective communication during emergencies	5	Students will explore common medical emergencies such as heart attacks, strokes, asthma attacks, and diabetic emergencies. This unit covers the recognition of symptoms, immediate response actions, and ongoing care until professional help arrives. Emphasis is placed on staying calm and effective communication during emergencies.	1, 2
V	 Unit 5: Safety and Prevention Home and workplace safety measures Fire prevention and electrical safety Accident prevention strategies Community safety programs Advocating for safety and preventive measures within the community 	5	The final unit focuses on preventive measures to minimize the occurrence of emergencies. Students will learn about home and workplace safety, including fire prevention, electrical safety, and accident prevention. The unit also covers community safety programs and how to advocate for safety and preventive measures within the community.	2, 3, 4, 5

Textbooks:

- 1. "First Aid Manual" by British Red Cross, St John Ambulance, St Andrew's First Aid, 2016.
- 2. "Emergency Care and Transportation of the Sick and Injured" by American Academy of Orthopaedic Surgeons (AAOS), 2016.
- 3. "Advanced First Aid, CPR, and AED" by American Academy of Orthopaedic Surgeons (AAOS), 2011.

Reference Books:

- 1. "Wilderness First Responder: How to Recognize, Treat, and Prevent Emergencies in the Backcountry" by Buck Tilton, 2010.
- 2. "Prehospital Trauma Life Support" by National Association of Emergency Medical Technicians (NAEMT), 2014.
- 3. **"Fundamentals of Basic Emergency Care"** by Richard W. O. Beebe, Deborah L. Funk, 2013.
- 4. "CPR and AED" by Alton L. Thygerson, Steven M. Thygerson, 2011.
- 5. "Basic Life Support (BLS) Provider Manual" by American Heart Association, 2020.

CO	PO Mapping	Γ	
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Demonstrate proficiency in performing CPR, administering first aid, and using automated external defibrillators (AEDs).	2,3,4	
2	Exhibit the ability to quickly assess emergency situations and make informed decisions to provide immediate care	1,2,4	
3	Understand and apply basic safety protocols to prevent accidents and handle emergencies efficiently.	3,5,6	
4	Display confidence and competence in handling a range of medical emergencies, from minor injuries to life-threatening conditions.	3,2,5	
5	Advocate for and promote safety and preventive measures within the community, contributing to a safer environment.	2,3,7	

SEMESTER – III									
Course Title		Personal Financial Planning							
Course	22UUFL213R	Total credits: 1	L	T	P	S	R	O/F	С
code		Total hours: 15T	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite	Nil						

requisi	te				
Progra		Bachelor of Technology in Civil	Engineer	ing	
Semest		Fall: Winter/ III semester of sec			
Course				ciples and concepts of personal financial	
Objecti		planning.	nuai pini	cipies and concepts of personal infancial	
(Minim			CMADT	financial goals and creating effective bu	ıdaat
3)		-	SMAKI	illiancial goals and creating effective of	luget
		plans.	•		
				tment vehicles, their risks, returns, and	
		suitability for different f			
4. Learn strategies for tax-efficient financial planning and retirement					
	5. Acquire knowledge of estate planning essentials and legal considerations for				
		asset distribution.			
CO1		Ability to create comprehensive	personal	financial plans aligned with individual go-	als and
		values.			
CO2			cting appr	opriate investment options based on risk to	lerance
		and financial objectives.			
CO3				ng effectively, and optimizing financial reso	
CO4			and regu	lations to minimize tax liabilities and ma	aximize
		savings.			
CO5			trategies	to protect and transfer wealth according to p	ersonal
		wishes and legal requirements.			
Unit-	Cont	ent	Conta	Learning Outcome	KL
No.			ct		
			Hour		
I		1- Fundamentals of Financial		This unit covers the foundational	1, 2
	Planr	ning		principles of financial planning,	
				including setting financial goals, creating	
	•	Principles of financial	_	budgets, and managing cash flow	
		planning	5	effectively. It emphasizes the importance	
	•	Setting financial goals		of understanding personal financial	
	•	Budgeting and cash flow		statements and the role of financial	
		management		planning in achieving long-term financial	
				security.	
II	UNI	7 2- Investment Planning		This unit focuses on different types of	2, 3,
				investments such as stocks, bonds,	4
	•	Types of investments (stocks,		mutual funds, and real estate. It explores	
		bonds, mutual funds, etc.)	_	risk and return analysis, asset allocation	
	•	· · · · · · · · · · · ·	5	strategies, and portfolio management	
	•	Portfolio management		techniques to help individuals build and	
		strategies		manage their investment portfolios	
				effectively.	
III	UNI	Γ 3- Retirement Planning		TRetirement planning addresses the	1, 2,
				process of saving and investing for	3, 4
	•	Retirement savings vehicles		retirement. It covers retirement savings	
		(401(k), IRA, pension plans)	_	vehicles like 401(k) plans and IRAs,	
	•	Estimating retirement needs	5	estimating retirement needs based on	
	•	Social Security and Medicare		lifestyle expectations, and navigating	
		considerations		Social Security and Medicare benefits to	
				optimize retirement income.	
	***				1.0
IV	UNI	Γ 4- Tax Planning		Tax planning involves strategies to	1, 2
			5	minimize tax liabilities and maximize	
	•	Tax-efficient investment		after-tax income. This unit discusses tax-	

	strategies		efficient investment strategies, deductions, credits, and tax implications related to retirement contributions, distributions, and estate planning.	
V	 Wills, trusts, and probate Power of attorney and healthcare directives Charitable giving and legacy planning 	5	Estate planning encompasses the process of managing and distributing assets in accordance with an individual's wishes upon death. It covers essential topics such as wills, trusts, probate, power of attorney, healthcare directives, charitable giving, and strategies for minimizing estate taxes.	2, 3, 4, 5

Textbooks:

- 1. "Personal Finance" by Jeff Madura, 2016.
- 2. "Personal Financial Planning" by Lawrence J. Gitman, Michael D. Joehnk, and Randy Billingsley, 2013.
- 3. "Fundamentals of Financial Planning" by Michael A. Dalton, James F. Dalton, 2011.

Reference Books:

- 1. "The Bogleheads' Guide to Retirement Planning" by Taylor Larimore, Mel Lindauer, Richard A. Ferri, Laura F. Dogu, 2009.
- 2. "The Financial Planning Workbook: A Practical Guide to Creating Your Own Financial Plan" by Coventry House Publishing, 2018.
- 3. "The Millionaire Next Door: The Surprising Secrets of America's Wealthy" by Thomas J. Stanley, William D. Danko, 2010.
- 4. "Your Money or Your Life: 9 Steps to Transforming Your Relationship with Money and Achieving Financial Independence" by Vicki Robin, Joe Dominguez, 2008.
- 5. "Smart Couples Finish Rich: 9 Steps to Creating a Rich Future for You and Your Partner" by David Bach, 2009.

COI	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Outcome	Program				
1	Ability to create comprehensive personal financial plans aligned with individual goals and values.	2,3,4					

2	Proficiency in analyzing and selecting appropriate investment options based on risk tolerance and financial objectives.	1,2,4
3	Competence in managing cash flow, budgeting effectively, and optimizing financial resources.	3,5,6
4	Capability to navigate tax laws and regulations to minimize tax liabilities and maximize savings.	3,2,5
5	Understanding of estate planning strategies to protect and transfer wealth according to personal wishes and legal requirements.	2,3,7

		SEMESTER	R – III						
Course Title	e MO	OCS-III THE AGE OF	SUSTAI	NABL	E DEVI	ELOPN	MENT		
Course code	e 22UBPD224R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	4	0	0	0	2
Pre-requisit	te Nil	Co-requisite				N	il		
Programme		B.Tech C							
Semester		Fall/ IV semester of se	econd yea	ır of tl	ne progn	amme			
Course									
Objectives		nts with a comprehensive					s, theori	ies, and fran	neworks
(Minimum 3	of sustainable dev	elopment and their appli	cation to g	global	challeng	es.			
	2. To equip student	s with the knowledge a	nd akilla	to ada	lross on	vironm	antal ac	onomia on	d social
		es through practical appl					emai, ec	onomic, an	u sociai
	Sustainaointy issu	es anough praedeal appi	ications a	ia cast	Studies	•			
	3. To enable studen	ts to critically evaluate	integrated	and:	interdisc	iplinary	y approa	aches to sus	tainable
		develop effective strateg							
CO1	Understand the definitions					develop	oment, a	s well as the	global
	challenges addressed by th								
CO2	Apply knowledge of ecos		ersity con	servati	on, and	renewa	ble ener	rgy technolo	gies to
G02		address environmental sustainability challenges. Analyze economic sustainability concepts, including sustainable economic growth, green economy, and							
CO3	corporate social responsibi								iy, and
CO4	Apply principles of socia								ion for
04	sustainable development, a			equity	, comm	idility h	our trespu	tion, caacat	1011 101
CO5	Evaluate integrated approa			includ	ling inte	rdiscipl	linary ar	nd transdisci	plinary
	methods, systems thinking	, and sustainable urban p	planning,	and as	sess the	effectiv	veness o	f policy inte	gration
	and governance.								,
Unit-No.	Conter	nt	Contac	t	L	earning	g Outco	me	KL
_			Hour						
I					udents		unders		
	Introduction to Sustain	able Development			finition	, ,	orinciple	•	
								ustainable	
	 Definition and Print 	nciples of						ognize the	
	Sustainable Devel	opment	-	sig	nifican	ce of	global	challenges	1.0
		and Evolution of the	7			•	the S	ustainable	1,2
	Concept			De	velopm	nent	Goals	(SDGs),	
	 Global Challenges 	and Sustainable		su	pported	d by	relev	ant case	
	Development Goa			stı	ıdies.	·			
	Key Theories and	-							
	- Key meones and	Tarricworks							

	Case Studies of Sustainable Development Initiatives			
п	 Environmental Sustainability Ecosystem Functions and Services Biodiversity Conservation Climate Change: Science, Impacts, and Mitigation Renewable Energy Sources and Technologies Environmental Policy and Legislation 	7	Students will apply their knowledge of ecosystem functions, biodiversity conservation, and renewable energy technologies to propose and implement solutions for environmental sustainability challenges.	1,2
III	 Sustainability Sustainable Economic Growth Green Economy and Circular Economy Corporate Social Responsibility (CSR) and Ethical Business Practices Economic Instruments for Environmental Management Case Studies of Sustainable Economic Practices 	7	Students will analyze concepts related to sustainable economic growth, green economy, corporate social responsibility, and economic instruments for environmental management, and evaluate case studies demonstrating sustainable economic practices.	1,2
IV	 Social Sustainability Social Equity and Justice Community Development and Participation Education for Sustainable Development Health and Well-being Cultural Dimensions of Sustainability 	7	Students will apply principles of social sustainability to promote social equity and justice, enhance community participation, support education for sustainable development, and improve health and well-being.	1,2
V	Integrated Approaches to Sustainable Development Interdisciplinary and Transdisciplinary Approaches Systems Thinking and Resilience Sustainable Urban Planning and Development Policy Integration and Governance for Sustainability Monitoring and Evaluation of Sustainable Development Projects	7	Students will evaluate integrated approaches to sustainable development, including interdisciplinary and transdisciplinary methods, systems thinking, sustainable urban planning, and the effectiveness of policy integration and governance for sustainability.	1,2

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 5. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 6. Fast track Objective mathematics for Competitive exam by Arihant
- 7. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Understand the definitions, principles, and historical context of sustainable development, as well as the global challenges addressed by the Sustainable Development Goals (SDGs).	5, 7				
2	Apply knowledge of ecosystem functions, biodiversity conservation, and renewable energy technologies to address environmental sustainability challenges.	8				
3	Analyze economic sustainability concepts, including sustainable economic growth, green economy, and corporate social responsibility, and evaluate case studies of sustainable economic practices.	7.9,10				
4	Apply principles of social sustainability to promote social equity, community participation, education for sustainable development, and overall health and wellbeing.	11,12				
5	Evaluate integrated approaches to sustainable development, including interdisciplinary and transdisciplinary methods, systems thinking, and sustainable urban planning, and assess the effectiveness	10				

of policy integration and governance.	

MAPPING TABLE (3RD SEM)

177	IAFFING TABLE (3 SER	'1)										1	1
Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE211R	Engineering Mechanics	3	3	1	1	1		1					1
22BTCE212R	Engineering Geology	2	3	2	1	1	1	1					1
22BTCE213R	Biology for Engineers	3	3	1	1	1		1					1
22BTCE214R	Computer Aided Design (CAD)	3	2	2	3	2	1				1		
22BTCE215R	Introduction to Civil Engineering	3	3	1	1	1		1					1
22BTCE216R	PDE and transform mathematics	2	3	2	1	1	1	1					1
22BTCE217R	Techno-Professional Skills II	3	3	1	1	1		1					1
22BTCE218R	Material Testing and Evaluation	3	2	2	3	2	1				1		
22UBPD213R	English for Employability for Engineers	3	3	1	1	1		1					1
22UBCC211	Co-curricular	2	3	2	1	1	1	1					1
22UBEC211	Extra-curricular	3	3	1	1	1		1					1
22UULS212R	Basic Life Saving Skills	3	2	2	3	2	1				1		
22UUFL213R	Personal Financial Planning	3	3	1	1	1		1					1

	SEMESTER – IV								
Course Title		Basic Electronics for C	Civil En	gineer	ing Ap	plicati	on		
Course code	22BTCE225R	Total credits: 3 Total hours: 30T+30P	<u>L</u> 3	T 0	P 1	S 0	R 0	O/F 0	C 4
Pre- requisite	Nil	Co-requisite				N	il		

Programm	B.Tech (Civil Emgino	eering			
Semester	Fall/ IV semester of s	econd vear	of the programme			
Course Objective (Minimum 3)	 Understand the principles of electronic components, circuits, and semiconduc devices relevant to civil engineering applications. Analyze electronic applications in civil engineering for designing, constructing, a maintaining infrastructure. Acquire proficiency in digital electronics, including the understanding and application of logic gates for civil engineering applications. Improve problem-solving skills through hands-on exercises and practical application of electronic principles in civil engineering projects. Apply acquired knowledge in projects, designing and implementing electronic systemationed for specific civil engineering applications. 					
CO1	Attain foundational knowledge in electronic	ronic com	ponents, circuits, and semicondu	ictor		
CO2	devices. Analyze electronic applications in civ	vil engine	ering for infrastructure design	and		
602	maintenance					
CO3	Attain digital electronics expertise, i applications.	ncluding	logic gates, for civil enginee	ering		
CO4		Enhance problem-solving with hands-on application of electronic principles in civil				
CO5	Apply knowledge in projects, design tailo	red electro	onic systems, fostering practical sk	ills.		
Unit-No.	Content	Contact Hour	Learning Outcome	KL		
I	 Introduction to Electronics and Circuit Fundamentals Overview of electronics and its relevance to civil engineering Basic electronic components: resistors, capacitors, inductors Ohm's Law, Kirchhoff's Laws, and circuit analysis 	7	Understand basic electronic components and fundamental circuit analysis techniques using Ohm's Law and Kirchhoff's Laws in the context of civil engineering applications.	1,2		
II	 Semiconductor Devices and Diodes Introduction to semiconductor materials Diodes and their applications in civil engineering Zener diodes and voltage regulation Rectifiers and power supply basics	7	Comprehend the properties and applications of semiconductor materials and diodes, including rectification and voltage regulation in civil engineering.	1,2		
III	 Transistors and Amplifiers Bipolar Junction Transistors (BJTs) and Field Effect Transistors (FETs) Transistor amplifiers and amplifier 	7	Learn the operation and applications of BJTs, FETs, and operational amplifiers, and their use in designing transistor amplifiers and amplifier	1,2		

	configurations		configurations.	
	Operational amplifiers (Op-amps) and their applications			
IV	Sensors and Instrumentation in Civil Engineering Overview of sensors and transducers Types of sensors relevant to civil engineering Data acquisition systems and instrumentation	7	Gain knowledge of various sensors and transducers, their applications in civil engineering, and the principles of data acquisition systems and instrumentation.	1,2
V	Digital Electronics and Control Systems Basics of digital electronics Logic gates and digital circuits Introduction to control systems in civil engineering applications	7	Understand the basics of digital electronics, logic gates, digital circuits, and the introduction of control systems for civil engineering applications.	1,2
Practical	 To study about the components used in electronics laboratory To Study the V-I characteristics of Forward Biased PN junction diode. To Study the Reverse characteristics of Zener diode. To Study the working of a diode as half wave rectifier with and without filter To Study the working of a diode as full wave rectifier with and without filter. To study the input and output characteristic of in CE configuration. To study and verify the truth table of logic gates. Practical Implementation of Electronic circuit based 35 projects in real world 	30	Describe, illustrate and explain and apply the concepts of electronics engineering in engineering prospect.	1,2, 3,4

TEXT BOOKS:

- 1. Electronic Devices and Circuit Theory" by Robert L. Boylestad and Louis Nashelsky
- 2. Introduction to Control System Technology" by Robert N. Bateson

REFERENCE BOOKS:

- 1. Basic Electronics, Santiram Kal, Prentice Hall
- 2. Basic Electronics, BL Thareja, S.Chand Publishing
- 3. All-in-One Electronics Simplified, A.K. Maini, Khanna Book Publishing

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Attain foundational knowledge in electronic components, circuits, and semiconductor devices	1,3 & 4						
2	Analyze electronic applications in civil engineering for infrastructure design and maintenance	1,2						
3	Attain digital electronics expertise, including logic gates, for civil engineering applications.	7.9,10						
4	Enhance problem-solving with hands-on application of electronic principles in civil projects	5,7						
5	Apply knowledge in projects, design tailored electronic systems, fostering practical skills.	5,8						

		SEMESTER	– IV						
Course Title		Environ	mental	Science	ce				
Course code	22UBPD226R	Total credits: 2 Total hours: 30T	L 2	T 0	P 0	S	R	O/F 0	C 2
Pre- requisite	Nil	Co-requisite			l v	N	il		
Programm e	B.Tech Civil Emgineering								
Semester		Fall/ IV semester of se	cond ye	ar of tl	he prog	ramme			
Objectives (Minimum 3)	1. This course provides students with a comprehensive overview of fundamental ecological principles, environmental chemistry, biodiversity conservation, and the impacts of human activities on the environment.								
	complexities of pollution the	end of theoretical knowled on, resource management ecological systems, aiming ental harmony.	, and su	ıstainab	ole deve	elopmen	it. The o	course emp	hasizes
		ing environmental skills needed to critica		istry, lyze an		diversity oose so			ollution, nporary

	environmental challenges.							
CO1	Understand the relationships between natura	al and man	-made systems.					
CO2	legal) for environmental protection, consersustainable development.	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.						
CO3	Understand the consequences of human action of human life.	ions on the	web of life, global economy, and qu	ality				
CO4	Understand about Environment Pollution, Population and modern civilization on the En		nvironment issues, Impact of Hu	man				
CO5	Analyse various aspects of human populatio environment.	n, and the	impact of the population growth or	the				
Unit-No.	Content	Contact Hour	Learning Outcome	KL				
I	To Develop a comprehensive understanding of the components of the environment, including the atmosphere, hydrosphere, lithosphere, and biosphere. Gain knowledge of the structure and composition of these systems, as well as the principles governing life systems, metabolic processes, and the diversity of plant and animal life.	6	Develop a holistic understanding of the environment's components and principles governing life systems, metabolic processes, and biodiversity.	1,2				
II	To Acquire proficiency in ecological concepts, including terminology, ecosystem structure and function, mineral cycling, energy flow, trophic chains, and the development and evolution of ecosystems. Understand the relationships between different components of ecosystems and their ecological roles.	6	Acquire proficiency in ecological terminology, ecosystem structure, energy flow, trophic chains, and understand the relationships between ecosystem components and their ecological roles.	1,2				
Ш	To Develop the ability to analyze environmental pollution by examining its sources, causes, assessment, effects, and methods of prevention and control. Explore strategies for managing different types of pollution, emphasizing the concept of sustainability and the relationships between energy, environment, and human activities.	6	Develop the ability to analyze environmental pollution sources, causes, effects, and prevention methods, emphasizing sustainability and the interplay between energy, environment, and human activities.	1,2				
IV	To Gain knowledge of the utilization and sustainable management of water and forest resources. Understand the role of human activities in shaping the environment, including the management of rivers, lakes, forests, and wildlife. Explore concepts related to urbanization, green cities, global warming, and carbon sequestration.	6	Gain knowledge of sustainable water and forest resource management, understand human impacts on the environment, and explore concepts related to urbanization, global warming, and carbon sequestration.	1,2				
V	To Develop awareness of international agreements and protocols addressing global environmental issues. Understand the role of society, non-governmental organizations (NGOs), and government agencies in addressing environmental challenges. Familiarize yourself with national forest	6	Develop awareness of international agreements and protocols addressing global environmental challenges, understand the roles of society, NGOs, and government agencies, and familiarize oneself with	1,2				

policies, environmental	laws, acts,	and	national environmental policies	
Environmental Impact	Assessment	(EIA)	and laws, including	
processes.			Environmental Impact	
			Assessment processes.	

- 1 H.S. Peavy, D.R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill International.
- 2 J. G. Henry and G.H. Heinke, Environmental Science and Engineering, Prentice Hall International.

Reference Books:

- 1 G.M. Masters, Introduction to Environmental Engineering and Science, Pearson Education.
- 2 R.T. Wright and D.F. Boorse, Environmetal Science Towards a Sustainable Future, PHI Learing.
- 3 P.A. Vesilind and S.M. Morgan, Introduction to Environmental Engineering, Thomson Books.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the relationships between natural and man-made systems.	1,3 & 4
2	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.	1,2
3	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	7.9,10
4	Understand about Environment Pollution, Global Environment issues, Impact of Human Population and modern civilization on the Environment	5,7
5	Analyse various aspects of human population, and the impact of the population growth on the	5,8

environment.	

		SEMESTER	– IV						
Course Title		Geotechni	cal En	ginee	ring				
Course code	22BTCE224R	Total credits: 4 Total hours:	1 3	T 0	P 1	S 0	R 0	O/F 0	C 4
Pre- requisite	Nil	45T+30P Co-requisite				N	il		
Programi e	n	B.Tech C	ivil Emg	ineerii	ng				
Semester Course Objective (Minimur	Course Dbjectives (Minimum 1. To focus on the study of soil behavior stability, and conduct geotechnical investigation. To impart knowledge on the various factors.				o design struction ne Engir	secure and en eering	founda	ental projects	
3) CO1	3. To characterize parameters of so	ls for various Geotechnica e the failure criteria and oils. ype based on their propert	d to eva	aluate	the she		ngth an	d compress	ibility
CO2	Calculate soil parameters	of soils at different site co	ondition.						
CO3	Predict the occurrence of	failure of sub-soil beneatl	h any fou	ındatio	n.				
CO4	_	pacity of soil and possible	settleme	ent of t	he found	lation.			
CO5	Test various direct and in		~						T
Unit-No.	Conte		Contac Hour		Learning Outcome			KL	
I	Introduction—Origin ar Basic Definitions and R three-phase system in volume, voids ratio Definitions: moisture weights, degree of sature porosity, specific gravity, etc. Relationsh weights voids ratio-moweight- percent air moisture content, respecific gravity etc. various parameters (scontent, Specific gravity soil), Plasticity Characteristics, consistency limits limit, shrinkage limit, and Consistency indices indices, definitions sensitivity. Determinat plastic limit, Classification	elationships-Soil as terms of weight, o, and porosity. e content, unit uration, voids ratio, vity, mass specific ip between volume isture content, unit voids, saturation-moisture content-Determination of such as: Moisture ty, Unit weight of cteristics of Soil cons of: plasticity of liquid limit, plastic plasticity, liquidity s, flow & toughness of activity and ion of: liquid limit,	11	ba es ke co	isic pro tablish y parar	opertie relati neters	es of onships such a	types, and soils, and s between s moisture, and void	1,2

II	Permeability of Soil- Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method, Seepage Analysis-Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets. Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table, Stresses in soils.	10	Learn and apply Darcy's law to determine soil permeability using laboratory methods and perform seepage analysis through the construction of flow nets.	1,2
III	Compression of soil: Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation,.	10	Grasp the concept of effective stress, analyze the impact of the water table on soil stress, and differentiate between soil compaction and consolidation processes.	1,2
IV	Shear Strength- Mohr circle and its characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, unconfined compression tests, vane shear test, Types of slopes and their failure mechanisms, factor of safety, Introduction to of finite and infinite slopes.	7	Analyze soil shear strength using Mohr-Coulomb theory and various shear tests, and understand the mechanisms of slope failures and the factor of safety in slope stability.	1,2
V	Soil Exploration- Introduction, methods of site exploration and soil investigation, methods of boring, soil samplers, sampling procedures, trail pits, borings, penetrometer tests, analysis of borehole logs, geophysical methods.	7	Acquire knowledge of site exploration methods, soil sampling techniques, and the interpretation of borehole data for geotechnical investigations.	1,2
Practical	 Moisture content by oven dry method Field density by core cutter method Sieve analysis Liquid limit test by Casagrande Apparatus Plastic limit test Standard compaction test (OMC& MDD) Consolidation test Direct shear test 	30	Describe, illustrate and explain and apply the concepts of geotechnical engineering in engineering prospect.	1,2, 3,4

9.	Unconfined compression test		

- 1. Ranjan G., Rao A.S.R (2011), Basic and Applied Soil Mechanics
- 2. Saran S. (2015) Analysis and Design of Substructures
- 3. Punmia B.C. (2005), Soil Mechanics And Foundation Engineering

Reference Books:

- 1. Soil Mechanics by Craig R.F., Chapman & Hall
- 2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- 3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
- 4. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri.

CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome		
1	Distinguish various soil type based on their properties and behabior.	1,3 & 4		
2	Calculate soil parameters of soils at different site condition.	1,2		
3	Predict the occuarance of failure of sub-soil beneath any foundation.	7.9,10		
4	Determine the bearing capacity of soil and possible settlement of the foundation.	5,7		
5	Test various direct and indirect soil exploration.	5,8		

	SEME	STER – I	V						
Course Title	Introduc	ction to	Fluic	l med	chanic	S		_	
Course code	22BTCE222R Total credits: 4 Total hours: 45T+30P	-	1 3	T 0	1	S 0	0 0	0/F 0	4
Pre- requisite	Nil Co-requisit	e				Ni	il	1	
Programi e	n B.T	ech Civil	Emgi	neerii	ng				
Semester	Fall/ IV semeste								
 Course Objectives (Minimum					d computation problem-s	arious ational olving fluid			
CO1		study and professional practice in the field. Determine the various fluid characteristics that affect fluid behaviour.							
CO2	Explain the fluid pressure and about its i	neasuren	nents.						
CO3	Summarize the various fluid flow.								
CO4	Apply the conservation laws for fluids in fluid dynamics.								
CO5	Discuss various non dimensional parame	eters of fl	luid fl	ow.					
Unit-No.	Content		ontact Hour	t Learning Outcome K				KL	
I	Basic Concepts and Definitions – Distinct between a fluid and a solid; Density, Speweight, Specific gravity, Kinematic dynamic viscosity; variation of viscosity; variation of viscosity; variation, boiling point, cavitation; surfaces tension, capillarity, Bulk modulus of elastic compressibility.	cific and with oour face	11	pro sur an	Comprehend fundamental fluid properties such as viscosity, density, surface tension, and compressibility, and understand the distinction between fluids and solids.			,	
П	Fluid Statics - Fluid Pressure: Pressure a point, Pascals law, pressure variation v temperature, density and altitu	with ude. ngle ntial sure rce:	10	ma un bu	Analyze fluid pressure variations and measure pressure using various manometers and gauges, while understanding hydrostatic forces and buoyancy on submerged and floating bodies.		8 2 1		
Ш	Fluid Kinematics-Classification of fluid flosteady and unsteady flow; uniform and runiform flow; laminar and turbulent flow; rotational and irrotational flow; compress and incompressible flow; ideal and real flow; one, two and three dimensional flow; stream line, path line, streak line and streatube; stream function, velocity poter function. One-, two- and three -dimension continuity equations in Cartesian coordinates.	non- ow; ible luid ows; eam onal	10	un vis co	Classify different types of fluid flow understand flow patterns and visualization methods, and apply the continuity equation in one, two, and three dimensions.			1	

IV	Fluid Dynamics- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation — derivation; Energy Principle; Practical applications of Bernoulli's equation : venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow — Free and Forced	7	Apply Euler's and Bernoulli's equations to solve fluid flow problems and analyze forces in practical applications like venturimeters, orifice meters, and pipe bends.	1,2
V	Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem.	7	Utilize dimensional analysis and understand dimensionless numbers like Reynolds, Froude, Mach, Weber, and Euler for modeling and analyzing fluid flow similarity.	1,2
Practical	 Bernoulli's Theorem Discharge Over Notches Triangular Rectangular Impact Of Jet On Vanes Flat Hemispherical Flow Through Orifice And Mouthpiece Reynolds's Number Determination Losses Due To Pipe Friction Determination of metacentric height of a given ship model 	30	Describe, illustrate and explain and apply the properties of fluid in engineering prospect.	1,2, 3,4

- 1. Dr. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering".
- 2. Dr. R.K.Bansal, "A textbook on Fluid Mechanics and Hydraulic Machines", Laxmi Publication ltd
- 3. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010.

Reference Books:

- 1. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House.
- 2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- 3. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

CO PO Mapping

SN	Course Outcome (CO)	Mapped Program Outcome
1	Determine the various fluid characteristics that affect fluid behaviour.	1,3 & 4
2	Explain the fluid pressure and about its measurements.	1,2
3	Summarize the various fluid flow.	7.9,10
4	Apply the conservation laws for fluids in fluid dynamics.	5,7
5	Discuss various non dimensional parameters of fluid flow.	5,8

SEMESTER – IV									
Course Title		SOLID	MECHA	NICS					
Course	22BSBT221R	Total credits: 3	L	T	P	S	R	O/F	C
code		Total hours: 35T	3	0	0	0	0	0	3
Pre-	Nil	Co-requisite				N	il		
requisite									
Programm	B.Tech Civil Emgineering								
e									
Semester	Fall/ IV semester of second year of the programme								
Course	1. Introduce to continuum mechanics and material modelling of engineering materials based								
Objectives	on first energy principles: deformation and strain; momentum balance, stress and stress states;								
(Minimum	elasticity and elasticity bounds; plasticity and yield design								
3)	2. To understand analytical methods for determining the strength, stiffness (deformation								
	characteristics), and stability of the various members in a structural system.								
CO1	3. Understanding, modelling and design of a large range of engineering materials Relate and describe the strain and strain produced by engineering materials when they are								
COI		·	oduced	т ву е	ngmeer	ing m	ateriais	when the	y are
G0.	subjected to various fo								
CO2	1	ons of equilibrium for o		_				ending mo	ment
	diagrams for different	types of loads on cantil	ever an	d simp	ly supp	orted l	beams.		
CO3	Identify the principal	stresses, maximum she	earing s	tresses	s and a	ingles	acting	on any arb	itrary
	plane within a structur	al element using Mohr'	s circle	metho	d.				
CO4		of theories of failure				ending	mome	ent relation	s for
		stress, shear stress distr				_			
CO5		ept of torsion and buck							e the
	stresses at various poi		iiig Oi		10113, 3	5110103	,	o acterimin	c tric
TI24 NI-			C 4	4		<u> </u>	- 04		TZT
Unit-No.	Conte	nt	Contac Hour	τ	L	earnin	g Outco	me	KL

I Simple Stresses and Strains- Concept of stress and strain, St. Venant's principle, stress and strain, St. Venant's principle, stress and strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications. :Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal planes, Relationship between elastic constants. II Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
strain diagram, Elasticity and plasticity – Types of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications. :Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams-Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
of stresses and strains, Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications. :Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams-Bending moment and Shear force (5F) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain Energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications. :Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams-Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
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Resilience — Gradual, sudden, impact and shock loadings — simple applications. :Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams-Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
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plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams- Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part Analyze and construct bending moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure. 7
Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants. II Bending moment and Shear Force Diagrams-Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part Manalyze and construct bending moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure.
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Relationship between elastic constants. II Bending moment and Shear Force Diagrams- Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part Analyze and construct bending moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure. 7
Bending moment and Shear Force Diagrams- Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part Analyze and construct bending moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure. 7
Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure. 7
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simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part critical values and points of contraflexure.
without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part contraflexure. 7
BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part
distributed loads over the whole span or part
of span, combination of concentrated loads
(two or three) and uniformly distributed loads,
uniformly varying loads, application of
moments.
III Flexural Stresses-Theory of simple bending – Apply the theory of simple bending
Assumptions – Derivation of bending and shear stress distribution to
equation: $M/I = f/v = F/R$ - Neutral axis - calculate stresses in different beam
Determination of handing stresses – Section sections and design simple beam
modulus of rectangular and circular sections
(Solid and Hollow), I,T, Angle and Channel 7
sections — Design of simple beam sections.
Shear Stresses- Derivation of formula – Shear
stress distribution across various beam
sections like rectangular, circular, triangular, I,
T angle sections.
IV Slope and deflection- Relationship between Utilize moment-area and Macaulay's
moment, slope and deflection, Moment area methods to determine the slope and
method, Macaulay's method. Use of these 7 deflection in determinate beams. 1,2
methods to calculate slope and deflection for
determinant beams.
torsion and bending stresses and
the hollow and solid circular sharts, torsional / calculate stresses in thin walled 1.4
rigidity, Combined torsion and bending of cylinders and spheres under internal
circular shafts, principal stress and maximum pressure.

shear stresses under combined loading of	
bending and torsion. Analysis of close-coiled-	
helical springs, Thin Cylinders and Spheres-	
Derivation of formulae and calculations of	
hoop stress, longitudinal stress in a cylinder,	
and sphere subjected to internal pressures.	

Text Books: Example

- 1 Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA.
- 2 Solid Mechanics by Dr. Utasv Chandra Kalita

Reference Books: Example

- 1 Mechanics of Materials Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf TMH 2002.
- 2 Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979
- 3 Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Relate and describe the strain and strain produced by engineering materials when they are subjected to various forms of stress.	1,3 & 4
2	Summarize the equations of equilibrium for constructing the shear force and bending moment diagrams for different types of loads on cantilever and simply supported beams.	1,2
3	Identify the principal stresses, maximum shearing stresses and angles acting on any arbitrary plane within a structural element using Mohr's circle method.	7.9,10
4	Apply the knowledge of theories of failure, shear force and bending moment relations for analyzing the flexural stress, shear stress distributions and	5,7

	failure of beam sections.	
5	Understand the concept of torsion and buckling of thin shells, spheres, etc. to determine the stresses at various points of geometry.	5,8

		SEMESTER	– IV						
Course		Surveying	and G	eoma	tics				
Title									
Course	22BTCE223R	Total credits: 4	L	Т	P	S	R	O/F	C
code		45T+30P							4
Pre-	Nil	Co-requisite				N	il		
requisite	D. Took Civil Empire anting								
Programm	B.Tech Civil Emgineering								
e Semester	Fall/IV samestan of second mean of the macronum.								
Course	1 771	Fall/ IV semester of second year of the programme							
Objectives	1. The course equips students with essential theoretical knowledge and practical skills								
(Minimum	required for surveying and geomatics, preparing them for careers in engineering and land								
3)	management industries.								
3)	2. Students gain hands-on experience in modern surveying techniques, enhancing their								
	ability to apply these skills in real-world geospatial data analysis and mapping.								
	3. The curriculum is designed to prepare students for professional success, enabling them to								
	excel in various applications of surveying and geomatics within engineering and land							land	
	management s	ectors.							
CO1	Use of various surveying instruments and mapping								
CO2	Explain Methods of Le	veling and setting Level	s with d	lifferer	nt instru	ıments	;		
CO3	Explain the principle planes.	Explain the principle and working of theodolitefor measuring angles in vertical and horizontal							
CO4	Apply the methods of	of radiation and interse	ectionfo	r obta	aining a	n area	enclo	sed with i	n the
	traverse				0 -				
CO5	Discuss the concept a	nd principle of modern s	urveyir	ıg.					
Unit-No.	Conte	nt	Contac Hour	et	L	earninș	g Outco	me	KL

I	Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying.		Understand the fundamental principles, classifications, and objectives of surveying, including the use of scales, conventional symbols, and various surveying accessories.	
	Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections. Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination and	11		1,2
П	dip. Leveling- Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction. Contouring- Characteristics and uses of Contours, methods of contour surveying. Areas -Determination of areas consisting of irregular boundary and regular boundary. Volumes -Determination of volume of earth work in cutting and embankments for level section, volume of borrow pits, capacity of reservoirs.	10	Acquire skills in measuring linear distances and directions using chains, tapes, and prismatic compasses, and comprehend corrections for tape measurements and the impact of magnetic declination.	1,2
III	Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible. Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.	10	Master different leveling techniques, including the use of various types of levels and levelling staves, and understand the methods and applications of contour surveying.	1,2
IV	Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves. Tachometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total stationadvantages and Applications. Field Procedure for total station survey, Errors in Total Station	7	Learn to calculate areas with irregular and regular boundaries and determine the volumes of earthwork in different contexts, such as cutting, embankments, borrow pits, and reservoir capacities.	1,2

	Survey, Global Positioning System- Principle			
V	and Applications. Photogrammetry Surveying:Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.	7	Apply advanced surveying methods using theodolites, traverse computations, curves, tacheometry, and modern instruments like EDM, total stations, and GPS, along with understanding the principles and applications of photogrammetry.	1,2
Practical	 To range a line more than one chain length and recording the details in a field book. Profile leveling and cross section leveling with Dumpy level. Trigonometric Constant Close Compass Traversing to plot the existing layout or built up area Measurement of horizontal and angles with Theodolite Measurement of vertical angles with Theodolite Contouring of a given area by method of grid and prepare the contour map of that area. 	30	Describe, illustrate and explain and apply the concepts of surveying in engineering prospect.	1,2, 3,4

1. Chandra A M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi.

2.Duggal S K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Reference Books:

- 1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
- 2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
- 3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
- 4. Surveying (Vol -1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications (P) ltd., New Delhi.

CO PO Mapping

SN	Course Outcome (CO)	Mapped Program Outcome
1	Use of various surveying instruments and mapping	1,3 & 4
2	Explain Methods of Leveling and setting Levels with different instruments	1,2
3	Explain the principle and working of theodolitefor measuring angles in vertical and horizontal planes.	7.9,10
4	Apply the methods of radiation and intersectionfor obtaining an area enclosed with in the traverse	5,7
5	Discuss the concept and principle of modern surveying.	5,8

		SEMESTER -	· IV						
Course Title		Basic Acclima	tizing	Skill	s (BAS	5)			
Course code	22UULS201R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 20P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				\mathbf{N}	il		
requisite									
Programme		B.Tech Ci							
Semester		Fall/ IV semester of se	cond ye	ear of t	he prog	ramme	<u> </u>		
Course									
Objectives		ents' abilities in technical w							
(Minimum		and solutions.Analyze ele	ctronic	applica	ations ir	n civil e	engineer	ing for des	igning,
3)	constructing, and maintaining infrastructure.								
	2. Focus on crafting professional resumes and cover letters tailored for engineering positions,								
	improving students' chances of securing employment.								
	3. Strengthen to	eamwork abilities and pr	epare	student	ts for j	ob inte	erviews	through pr	actical
	exercises and targeted	training, enhancing their re	adines	s for en	gineerir	ng care	ers.		
CO1	Demonstrate clear	and concise technical co	mmu	nicatio	n in bo	oth wri	itten ar	nd oral for	mats,
	incorporating indust	ry-specific terminology.							
CO2	Develop expertise i	Develop expertise in crafting resumes, cover letters, and technical reports to effectively							
	showcase engineering qualifications.						tively		
	showcase engineering	_	ver let	tters, a	and ted	Lillicai	тероге	s to chec	tively
CO3		ng qualifications.							
CO3	Acquire proficiency	ng qualifications. in creating and deliverin	g imp						
	Acquire proficiency convey engineering	ng qualifications. in creating and deliverin concepts to diverse audio	g imp	actful	present	tations	, utilizir	ng visual a	ids to
CO3	Acquire proficiency convey engineering (ng qualifications. in creating and delivering concepts to diverse audic terpersonal skills for coll	g impences.	actful	present imwork	tations	, utilizir nasizing	ng visual a	ds to
	Acquire proficiency convey engineering of Cultivate effective in conflict resolution, a	ng qualifications. in creating and deliverin concepts to diverse audio	g impences. aborat	actful tive tea engine	present Imwork Pering c	ations , empl	, utilizir nasizing	ng visual a	ds to ening,

Unit-No.	Content	Contact Hour	Learning Outcome	KL
I	Unit 1- Introduction to Accommodation Management	4	Develop skills in telephone handling, room organization, cleaning equipment usage, and bed-making processes.	1,2
П	Unit-2- Fundamental of Cooking Uses of basic cooking equipments Uses of fire & Fuel Different cuts of vegetables Uses of herbs & spices Regional Food Habits	4	Gain proficiency in using basic cooking equipment, fire, and fuel, as well as preparing different cuts of vegetables, utilizing herbs, spices, and understanding regional food habits.	1,2
III	Unit 3- Food and Beverage skills Introduction to catering industry Types menus and beverages Identifications of Cutlery, crockery & glassware Table etiquettes or manners Customer handling skills or Situation Handling	4	Understand catering industry basics, menu types, beverage identification, table etiquette, and customer handling skills.	1,2
IV	Unit 4- Travel management Travel Documentation (Types) Application of passport & Visa Tourism products (UNESCO sites) Types of logistics in travel and tourism management	4	Learn about travel documentation, passport and visa applications, tourism products like UNESCO sites, and various logistics in travel and tourism management.	1,2
V	Unit 5- Basic Hospitality Skills Various Egg Preparations Canapés preparations Mocktail & Shakes Preparations Butter Rice / Lemon Rice Various Lentils Preparations 1 non-veg preparation/ 1 veg preparation	4	Master various egg preparations, canapés, mocktails, shakes, rice dishes, lentil preparations, and both vegetarian and nonvegetarian dishes.	1,2

- 1. Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt ltd-New Delhi.
- 2. Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restauranteur, Guides.
- 3. Mohammed Zulfikar (2010) Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.
- 4. Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013.

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7				
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8				
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10				
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12				
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10				

	SEMESTER – IV								
Course Title		CO-CURRIC	JLAR	ACTI	VITII	ES			
Course code	22UBCC221	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	1s
Pre-	Nil	Co-requisite	Nil						
requisite									
Programme	B.Tech Civil Emgineering								
Semester		Fall/ IV semester of se	cond ye	ear of tl	ne prog	ramme	!		
Course									
Objectives	1. 1. Meeting the	needs of the students	and co	vering	a broa	ad/wide	e range	of their a	bilities
(Minimum 3)	and talents.								
	2.To stimulate	e the interests in the st	udents	and pr	ovide e	equal o	pportui	nities to al	l the
		o participate		1		•	* *		

CO1 CO2 CO3	3.To enhance the learning experience of the students and help in recognizing and developing their inner skills such as leadership qualities, creative or innovative skills etc. Apply foundational acclimatization principles to adapt effectively in diverse environments and situations. Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms. Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.						
CO4	Synthesize acclimatization strategies for varying in response.	for varying contexts, demonstrating creativity and flexibility n techniques, utilizing critical thinking to address unforeseen					
Unit-No.	Content	Contac t Hour	Learning Outcome	KL			
I	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	30	Engage in mandatory co-curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing and participating in various programs and events.	1,2			

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5, 7				
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8				

3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7.9,10
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

		SEMESTER	– IV						
Course Title	ENGI	LISH LANGUAGE PR	ROFICII	ENCY	FOR	ENGI	NEERS	S	
Course code	e 22UBPD224R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	4	0	0	0	2
Pre-requisit	e Nil	Co-requisite				N	il		
Programme		B.Tech Ci	ivil Emgi	neerin	ıg				
Semester		Fall/ IV semester of second year of the programme							
Course Objectives (Minimum 3	engineering concepts an constructing, and maintain	2 of the production of the control of the production of the control of the contro							
	Focus on craftir improving students' chance	ng professional resumes ses of securing employmen		ver le	tters ta	ilored	for eng	gineering po	sitions,
	_	3. Strengthen teamwork abilities and prepare students for job interviews through practical exercises and targeted training, enhancing their readiness for engineering careers.							
CO1	Demonstrate clear and incorporating industry-s		ommunio	ation	in bo	th wr	itten aı	nd oral fo	rmats,
CO2	Develop expertise in cra engineering qualificatio	•	etters, ai	nd tec	hnical r	eports	s to effe	ectively sho	wcase
CO3	Acquire proficiency in convey engineering con	•		tful p	oresent	ations,	, utilizir	ng visual a	ids to
CO4	Cultivate effective inte conflict resolution, and	rpersonal skills for col	laborativ			•	hasizing	g active list	ening,
CO5	Prepare for engineering addressing both technic	•	_			exper	iences,	and career	goals,
Unit-No.	Conte	nt	Contact Hour		Le	earning	g Outco	me	KL
	Writing Skills i. Paragraph Writing & N ii. Letter Writing	arratives	Develop proficiency in various forms of writing, including paragraph and narrative						1,2

II	Pipe and cistern i. Introduction of pipes and cistern iii.Solving different types of questions iv. Worksheet1 and Worksheet 2 Self-Management Skills i. SWOT Analysis ii. Goal Setting and Personal Hygiene Mixture allegation and Clock i.Introduction of basics ii.Solving questions on mixture and alligationion. iii.Worksheet1 and Worksheet 2	7	Construction, letter writing, and technical documentation. Gain competency in solving practical problems related to pipes and cisterns, mixtures and alligations, clocks, and profit, loss, and discounts through targeted practice and worksheets.	1,2
III	Vocabulary Development i.Understanding different aspects of a word (such as the use of say, tell, speak). ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement Iv. Worksheet1 and Worksheet 2	7	Enhance personal effectiveness through SWOT analysis, goal setting, and maintaining personal hygiene.	1,2
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Worksheet1	7	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom) i. Word-stress, Syllables	7	Master interview techniques for various formats, understand dress code ethics, and improve	1,2

Practice Session: Common Errors (testing the	performance through mock
students' grammar already learnt)	interviews and puzzle-solving
Profit loss and discount	exercises in linear, circular, and
i.Introduction to basics	matrix arrangements.
ii.Introduction to discount	
iii.Probems related on the topics	
Iv. Worksheet 1 and Worksheet 2	

- 1.Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2.McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3.A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7					
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8					
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10					
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active	11,12					

	listening, conflict resolution, and clear communication within engineering contexts.	
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

		SEMESTER	R – IV						
Course Title		Extra-cur		Activ	ities				
Course code	22UBEC221	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	1s
Pre-requisite	Nil	Co-requisite				N	il		
Programme									
Semester	Fall/ IV semester of second year of the programme								
Course Objectives (Minimum 3)	1. Equip students with effective time management and prioritization skills, fostering leadership qualities and a commitment to their endeavors.								
CO1	 Encourage exploration of interests beyond academics and participation in co-curricular activities, cultivating well-rounded individuals capable of making meaningful community contributions. Enhance students' abilities to express ideas clearly and engage in in-depth evaluation and analysis, while integrating learning experiences to practice transferable skills across various activities. Learn to a plan so that they can make meaningful contributions, maintain a commitment, and 								
	manage their time and	priorities.							
CO2	Transform passionate sacademics.	students who demons	strate lea	dersh	ip and	pursue	intere	ests beyond	d their
CO3	Learn to participate in development.	various co-curricular	activitie	s lead	ling to	their i	multifac	ceted pers	onality
CO4	Express their ideas, view	vs, In-depth evaluatior	n and ana	lysis c	learly in	n the to	pic of t	heir intere	st.
CO5	Demonstrate and pr demonstrating transfer		tivities,	by Ir	ntegrati	ng lea	arning	experienc	es by
Unit-No.	Conte	nt	Contac Hour	t	L	earning	g Outcor	me	KL
I	AdtU encourages a range of activities outside the regular curriculum intended to meet learner's interest, These activities are aimed to develop the social and soft skills and promote a holistic development of the learners, Keeping in mind the 360 degree learning methodology the students are engaged in different activities headed under different clubs viz. Dance, music, photography, drama, literary etc., The students are encouraged to participate in regular club activities, workshops,			ac so de ex an	tivities ft skill velopn posure	to deve s, achi nent, a throu	eve hol nd gair	ocial and listic n kshops	1,2

competitions as per their interest and hobbies, The student members of the club are trained represent AdtU in various inter University student and national level competitions, Renewed personalities are invited to conduct workshops that benefit the members and students by giving them the platform to learn from experts in the respective	
learn from experts in the respective fields.	

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5,7					
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8					
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10					
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12					
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10					

	SEMESTER – IV								
Course Title	Techno Professional Skills-III								
Course	22BTCE227R	Total credits: 2	L	T	P	S	R	O/F	C
code		Total hours: 20P	0	0	2	0	0	0	1

Pre-	Nil Co-re	equisite		Nil					
requisite									
Programm	n	B.Tech Civ	il Emgine	eering					
e				0.17					
SemesterFall/ IV semester of first year of the programmeCourseIntroduce students to the fundamental principles and techniques of engineering									
Course Objective		nental princi	iples and	techniques of engineering graph	hics				
(Minimur	" loie vaint to civil oliginicaling.								
3)	Develop students ability to crea	ate accurate a	and detai	iled engineering drawings using	basic				
,	graphical tools.								
	=	cills and the	ability to	interpret engineering designs th	rough				
	graphical representation.								
CO1	Understand the basic principles and st	andards of eng	ineering g	graphics.					
CO2	Develop proficiency in using basic dra	•	-	0 0 11					
CO3	Create accurate and detailed 2D engin								
CO4	1 0	Interpret and visualize engineering designs through graphical representation.							
CO5	Apply engineering graphics skills in p	ractical civil e	ngineering	g projects.					
Unit-	Content	(Contac	Learning Outcome	KL				
No.		t	Hour						
Ι	Introduction to Engineering Gra	phics: 6	•	Understand the principles and	1, 2				
	Overview of engineering graphics,	1		standards of engineering					
	drawing standards, and convention	ıs.		graphics.					
	Importance in civil engineering.								
II	Basic Drawing Tools and Techni	iques: 6)	Develop proficiency in using	2, 3				
	Introduction to drawing instrument	-		basic drawing tools and					
	scales, and basic construction techn			techniques.					
	Use of lines, angles, and geometric	-		1					
III	Orthographic Projections: Princi)	Create accurate orthographic	3, 4				
	orthographic projection, multi-view	-		projections and sectional	- , -				
	drawing, and sectional views.			views of civil structures.					
IV	Isometric and Perspective Drawi	ing: 6	:)	Interpret and visualize	4, 5				
- '	Techniques for creating isometric a	-		engineering designs through	', 5				
	perspective drawings. Visualization			isometric and perspective					
	objects on 2D planes.	01 31		drawings.					
V	Practical Applications and Proje	ects: 6	;	Apply engineering graphics	5				
•	Hands-on projects involving the cr		'	skills in practical civil					
	1 0			-					
	of detailed engineering drawings for	OI CIVII		engineering projects.					
	engineering applications.								

		CO PO Mapping	
SN	Course Outcome (CO)		Mapped Program Outcome

1	Understand the basic principles and standards of engineering graphics.	5, 7
2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10
4	Interpret and visualize engineering designs through graphical representation.	11,12
5	Apply engineering graphics skills in practical civil engineering projects.	10

			,	SEMEST	ER –	IV						
Course	e		MOOCS	IV-Excel	Skill	s for l	Busin	ess: E	ssenti	als		
Title												
Course	e	22MOCE221R	Total cro			L	T	P	S	R	O/F	C
code			Total ho	urs: 15T		0	0	0	0	0	0	1
Pre-		Nil	Co-requ	isite		Nil						
requisi												
Progra				or of Tecl								
Semest			Summer/					r of tl	ie pro	gran	ıme	
Course		Introduce the fundamenta										
Object		Teach data manipulation a										
(Minin	num	Develop skills for creating										
3)		Equip students with advan					o auto	matio	n.			
001		Apply Excel skills to real										
CO1		Navigate and utilize the E	excel inter	tace for b	asic d	ata ma	anage	ment t	asks.			
CO2		Manipulate and analyze c	omplex da	atasets usi	ng ad	vance	d Exc	el fun	ctions.			
CO3		Create clear and impactfu	l data visu	alizations	S.							
CO4		Automate repetitive tasks	with mac	ros and ac	lvance	ed fun	ctions	S.				
CO5		Apply Excel skills to fina	ncial mod	eling, buc	lgeting	g, fore	ecastii	ng, and	dother	busi	ness app	plications.
Unit- No.	Cont	ent		Conta ct Hour	Leai	ning	Outc	ome				KL
I	This unit introduces the basics of Excel, including the user interface, navigation, and essential functions. Students will learn how to create, save, and open workbooks, enter and edit data, and use basic formulas. This unit lays the foundation for more advanced			3	Upon completing this unit, students will be able to confidently navigate the Excel interface, understanding the structure of workbooks and worksheets. They will acquire basic data entry skills and learn essential formatting techniques to manage data effectively.					el of ill m		

	Excel skills, ensuring students are comfortable with the fundamental operations and tools available in Excel.			
П	Unit 2: Data Management and Analysis Students will delve into data management techniques, including sorting, filtering, and using Excel tables. This unit covers data validation, conditional formatting, and the use of functions for data analysis such as SUM, AVERAGE, COUNT, and IF statements. The focus is on organizing and analyzing data efficiently to extract meaningful insights.	3	This unit will enable students to manipulate and analyze data efficiently within Excel. They will learn to sort and filter data, use advanced functions such as VLOOKUP and HLOOKUP, and apply data validation techniques to ensure data accuracy.	1, 2, 3, 4
III	Unit 3: Advanced Formulas and Functions Building on the basics, this unit introduces more advanced formulas and functions. Students will learn about VLOOKUP, HLOOKUP, INDEX, MATCH, and complex nested formulas. This unit also covers text functions, date and time functions, and logical operators, enabling students to perform sophisticated data manipulations and analyses.	3	Students will gain the ability to create and customize various types of charts and graphs, essential for effective data visualization. They will learn to use pivot tables and pivot charts to summarize large datasets and generate meaningful visual representations. The unit will also emphasize best practices for designing clear and impactful visualizations, which are crucial for business reports and presentations. By the end of this unit, students will be proficient in visually communicating data insights and findings.	1, 2, 3, 4, 5
IV	Unit 4: Data Visualization with Charts and Graphs Effective data visualization is crucial for business reporting and decision-making. This unit teaches students how to create and customize various types of charts and graphs in Excel, including bar charts, line charts, pie charts, and scatter plots. Students will learn how to use chart elements, formatting options, and design principles to present data clearly and effectively.	3	In this unit, students will be introduced to advanced Excel functions and the use of macros to automate repetitive tasks. They will learn complex functions such as INDEX and MATCH, array formulas, and logical functions like IF, AND, and OR.	2, 3, 4
V	Unit 5: PivotTables and PivotCharts PivotTables and PivotCharts are powerful tools for summarizing and analyzing large datasets. In this unit, students will learn how to create, format, and manipulate PivotTables and PivotCharts to explore data from different perspectives. The unit covers	3	The final unit will focus on applying Excel skills to real-world business scenarios. Students will learn to create financial models, perform budgeting and forecasting, and conduct what-if analysis using tools like Scenario Manager and Goal Seek.	2, 3, 4, 5

grouping, filtering, and using calculated fields to enhance data		
analysis.		

Textbooks:

- 1. "Excel 2019 Bible" by Michael Alexander, Richard Kusleika, and John Walkenbach, 2018.
- 2. "Microsoft Excel 2019 Step by Step" by Curtis Frye, 2018.
- 3. "Excel 2016 in Depth" by Bill Jelen, 2015.

Reference Books:

- 1. "Excel Data Analysis: Modeling and Simulation" by Hector Guerrero, 2018.
- 2. "Excel Formulas and Functions for Dummies" by Ken Bluttman and Peter G. Aitken, 2018.
- 3. "Pivot Table Data Crunching" by Bill Jelen and Michael Alexander, 2016.

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

COF	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Navigate and utilize the Excel interface for basic data management tasks.	1,4,7							
2	Manipulate and analyze complex datasets using advanced Excel functions.	2,3,5							
3	Create clear and impactful data visualizations.	3,7,9							
4	Automate repetitive tasks with macros and advanced functions.	6,8,10							
5	Apply Excel skills to financial modeling, budgeting, forecasting, and other business applications.	10,12,4							

MAPPING TABLE (4TH Semester)

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE221R	Solid Mechanics	3	2	3	1	1	1	1					1
22BTCE222R	Introduction to Fluid mechanics	3	3	3	2					1		1	1
22BTCE223R	Surveying and Geomatics	3	3	2	2	2				1			3
22BTCE224R	Geotechnical Engineering	2	2	1	1	1	1	1					
22BTCE225R	Basic Electronics for Civil Engineering Application	2	2	1	1	3	1	1	1				
22BTCE226R	Environmental Science	3	2	2	3	2	2	2					
22UBPD223R	English Language	2	2	2	3	2	3	3		1	1		1

	Proficiency for Engineers											
22UBCC221	Co-curricular	3	3	2	2	2				1		3
22UBEC221	Extra- curricular	2	2	1	1	1	1	1				
22BTCE227R	Techno- Professional Skills III	2	2	1	1	3	1	1	1			
22MOCE221R	MOOCS III	3	2	2	3	2	2	2				
22UULS221R	Basic Acclimatizing Skills (BAS)	2	2	2	3	2	3	3		1	1	1

		SEMESTER	R – V										
Course Title		Environmo	ental Eng	ginee	ring								
Course	22BTCE311R	Total credits: 3	L	T	P	S	R	O/F	С				
code		Total hours: 45T+30P	2	0	2	0	0	0	3				
Pre-	Nil	Co-requisite			1	N	il	I					
requisite Programi	n	B.Tech C	ivil Emgi	neerii	1g								
e													
Semester Course	1 To understand the		of third year of the programme										
Objective		1. To understand the basic principles and concepts and processes involved in water and waste water treatment.											
(Minimur	n waste water treati	waste water treatment. 2. To develop a student's skill in the basic design of unit operations and processes											
3)	_	2. To develop a student's skill in the basic design of unit operations and processes involved in water and wastewater treatment.											
		s of water treatment		mpos	ition a	nd its	charact	eristics					
			etures involved in an water treatment plant										
CO1													
CO1	Analyze characteristic	s of water and waster	water										
CO2	Estimate the quantity	of drinking water and	d domest	ic wa	stewat	er gen	erated						
CO3	Identify the componer	nts of water supply sy	stems										
CO4	Design sewerage syste	em											
CO5	Plan strategies to cont	trol, reduce and moni	tor pollu	tion.									
Unit-No.	Conten	t	Contact Hour		L	earning	g Outco	me	KL				
I	1.Water: -Sources of Water	•		Ur	Understand the implications of								
		nent for different				-		neters on					
	beneficial uses, Water qua	-	public health and enviro					ronmental					
	quality indices, water s Supply systems, Need			su	stainab	ility.							
	supply systems, Need supply schemes, Water de	•											
	agricultural water require												
	of water supply system; Tr	_	9				1,2						
	Distribution system, Vari												
	W/S systems, service res	_											
	Water Treatment: aerat	· ·											
	coagulation floccula												
	disinfection, advanced	treatments like											
	adsorption, ion exchange,	-											
II	Sewage- Domestic and St				dersta		the factors						
	of Sewage, Sewage	flow variations.		influencing water demand and wastewater generation.									
	Conveyance of sewage- So parameters, operation as			Wa	istewat	er gen	eration						
	sewers, Sewage pumping		9										
	appurtenances, Design of	sewerage systems.											
	Small bore systems,												
	Quantification and design	n of Storm water;											

				_
III	Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage — quality requirements for various purposes.		To be able to evaluin the relation	
	Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations, Noise- Basic concept, measurement and various control methods.	9	To be able to explain the role of infrastructure in ensuring reliable and safe water supply.	1,2
IV	Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities, Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.	9	Understand the principles of gravity flow and hydraulic design in sewerage systems.	1,2
V	Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.	9	To be able to design and implement monitoring programs to track pollution levels in water bodies.	1,2

TEXT BOOKS:

- 1. Droste R.L., (1997)., Theory and Practice of water wastewater treatment, John Wiley & sons.
- 2. Garg S.K., (2001), Environmental Engineering, Vols. I and II, 12th Edition, Khanna Publishers, New Delhi.

Reference Books

- **1.** PeavyH.S.,.Rowe D.R and George Tchobanoglous (2001), Environmental Engineering, McGraw-Hill Company, New Delhi.
- **2.** Metcalf and Eddy (2003), Wastewater Engineering, Treatment and reuse, Tata McGraw-Hill Edition, Fourth edition.
- **3.** Rangwala (1999), Water supply & Sanitary Engineering, Charotar Publishing House, Anand-16th Edition.

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Analyze characteristics of water and wastewater	1,2,7&10							
2	Estimate the quantity of drinking water and domestic wastewater generated	1,3,6&7							
3	Identify the components of water supply systems	1,2,3,5,6 &7							
4	Design sewerage system	1,2,3,5&6							
5	Plan strategies to control, reduce and monitor pollution.	1,2,3,7							

		SEMESTEI	R –V								
Course Title		Mechanics of Materials									
Course	22BTCE312R	Total credits: 3	L	T	P	S	R	O/F	C		
code		Total hours: 45T	3	0	0	0	0	0	3		
Pre- requisite	Nil	Co-requisite		1		N	Nil				
Programm e	B.Tech Civil Emgineering										
Semester		Fall/ V semester of T	hird yea	ar of the	e progr	amme					
Course Objectives	1. 1. Mechanics analysis.	of Materials gives the stu	ident b	asic to	ols for	stress,	strain a	and deforr	nation		
(Minimum 3)	Methods for dare presented.	etermining the stresses, s	trains a	nd def	ormati	ons pro	oduced	by applied	lloads		
	3. Engineering design concepts are integrated throughout the course										
201											
CO1	Learn fundamenta	l concepts of Stress, Stra	n and d	leform	ation o	f solid	s with a	application	ıs to		

	bars, beams and thin cylinders.									
CO2	Infer the mechanism of load transfer in bea deformations.	ms, the in	duced stress resultants and							
CO3	Estimate the load carrying capacity of colur various theories for failure of material.	umns, stresses due to unsymmetrical bending and								
CO4	Explain the effect of torsion on shafts and s	springs.								
CO5	Analyze plane trusses using method of join	t and the n	nethod of section.							
Unit-No.	Content	Contact Hour	Learning Outcome	KL						
I	Deformation and Strain covering description of finite deformation, Infinitesimal deformation: Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder; Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.	9	To be able to describe and differentiate between finite and infinitesimal deformation in materials.	1,2						
П	Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses	9	Understand the principles of momentum balance in the context of mechanical structures.	1,2						
Ш	Force-Stress-Equilibrium covering Multiaxial Stress and Strain Displacement – Strain covering Multiaxial Strain and Multiaxial Stress-strain Relationships Elasticity and Elasticity Bounds covering Stress-strain-temperature	9	Analyze stress-strain- temperature relationships and their implications in thin-walled pressure vessels.	1,2						

	Relationships and Thin-walled Pressure Vessels, Stress and strain Transformations and Principal Stress, Failure of Materials			
IV	Stress and Strains; Deflections and Torsion covering Pure Bending, Moment-curvature Relationship, Beam Deflection, Symmetry, Superposition, and Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting, Thermo elasticity, Energy methods, Variational Methods; Strain energy, elastic, complementary and total strain energy, Strain energy of axially loaded bar, Beam in bending, shear and torsion; General energy theorems, Castigliano's theorem, Maxwell Bettie's reciprocal theorem; Virtual work and unit load method for deflection, Application to problems of beams and frames	9	Analyze pure bending in beams and derive the moment-curvature relationship.	1,2
V	Structural stability: Stability of columns, Euler's formula, end conditions and effective length factor, Columns with eccentric and lateral load; Plasticity and Yield Design covering 1D-Plasticity — An Energy Approach, Plasticity Models, Limit Analysis and Yield Design	9	Apply limit analysis and yield design principles to ensure the structural integrity and safety of materials and structures.	1,2

- 1. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004. ISBN: 9780131913455
- **2.** Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979. ISBN: 9780070662308

Reference Books:

1. Gere, J. M. Mechanics Of Materials. 2Ed (Pb 2004)

CO PO Mapping

SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.	1,3 & 4
2	Infer the mechanism of load transfer in beams, the induced stress resultants and deformations.	1,2
3	Estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.	7,9,10
4	Explain the effect of torsion on shafts and springs.	5,7
5	Analyze plane trusses using method of joint and the method of section.	5,8

		SEMESTE	R - V							
Course Title		Struct	ural Ana	lysis I						
Course	22BTCE313R	Total credits: 3	L	T	P	S	R	O/F	C	
code		Total hours: 45T	2	1	0	0	0	0	3	
Pre- requisite	Nil	Co-requisite		I	ı	N	il	l		
Programm e	B.Tech Civil Emgineering									
Semester	Fall/ V semester of Third year of the programme									
Course Objectives (Minimum 3)	5. Students will design and ar 6. Hands-on design	•	heories ment an e gainec	and cond syst	oncepts em lev earned	s of boels.	oth con	ocrete and	steel	
CO2	Distinguish the varyi	ng materials and diffe	rent loa	ding sy	stems	in a st	ructure	<u>.</u>		
CO3	Classify structures an on it.	nd explain their behav	iour by	drawii	ng its co	ompor	ients ar	nd forces a	cting	
CO4	Apply the design con-	cepts to develop a R.C	.C. mem	bers.						
CO5	Explain the basic con	cepts of special struct	ures.							
Unit-No.	Conte	nt	Contac Hour		L	earning	g Outco	me	KL	

I	Introduction- concepts of energy principles, safety, sustainable development in performance; what makes a structure; principles of stability, equilibrium; what is a structural engineer, role of engineer, architect, user, builder; what are the functions' what do the engineers design, first principles of process of design	9	Understand the basic concepts of energy principles, safety, and sustainable development in structural performance.	1,2
II	Planning and Design Process; Materials, Loads, and Design Safety; Behaviour and Properties of Concrete and Steel; Wind and Earthquake Loads	9	Comprehend the behavior and properties of concrete and steel, and understand the impact of wind and earthquake loads on structures.	1,2
III	Materials and Structural Design Criteria: Introduction to the analysis and design of structural systems. Analyses of determinate and indeterminate trusses, beams, and frames, and design philosophies for structural engineering. Laboratory experiments dealing with the analysis of determinate and indeterminate structures;	9	To be introduced to the analysis and design of structural systems, focusing on determinate and indeterminate trusses, beams, and frames.	1,2
IV	Design of Structural Elements; Concrete Elements, Steel Elements, Structural Joints; Theories and concepts of both concrete and steel design and analysis both at the element and system levels. Approximate Analysis Methods as a Basis for Design; Design of Reinforced Concrete Beams for Flexure; Design of Reinforced Concrete Beams for Shear; Bond, Anchorage, and Serviceability; Reinforced Concrete Columns; Reinforced Concrete Slabs; Introduction to Steel Design; Tension Members and Connections; Bending Members; Structural Systems	9	Apply design principles to reinforced concrete beams and columns, and gain an introduction to steel design, focusing on tension members, connections, and bending members.	1,2
V	System Design Concepts; Special Topics that may be Covered as Part of the Design Project Discussions; Cable Structures; Prestressed Concrete Bridges; Constructability and Structural Control; Fire Protection	9	Explore system design concepts, including cable structures, prestressed concrete bridges, and structural control.	1,2

- Design Of Structures S. Ramamrutham., DhanpatRai Publishing Co Pvt Ltd
 Design Of Steel Structures N. Subramanian

Reference Books:

1. Analysis of Indeterminate Structures by C.K. Wang.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate their knowledge of structural mechanics in addressing design problems of structural engineering.	1,3 & 4					
2	Distinguish the varying materials and different loading systems in a structure.	1,2					
3	Classify structures and explain their behaviour by drawing its components and forces acting on it.	7.9,10					
4	Apply the design concepts to develop a R.C.C. members.	5,7					
5	Explain the basic concepts of special structures.	5,8					

		SEMESTER	. – V							
Course Title	Transportation Engineering									
Course code	22BTCE314R	Total credits:3 Total hours: 45T+30P	L 2	T 0	P 2	S 0	R 0	O/F 0	C 3	
Pre- requisite	Nil	Co-requisite		•		N	il		•	
Programm e	B.Tech Civil Emgineering									
Semester		Fall/ V semester of T	hird yea	r of th	e progra	amme				
Course Objectives (Minimum 3)	 To explain the To describe ab To describe experiments. 	he students about diffe students about differer out traffic characteristi about different paver out different design ph	nt geom cs and t ment n	netric for craffic of nateria	eatures control ls, the	of hig device ir pro	hways s perties	and labo	oratory	
CO1	Describe different typ	oes of roads, its admini	stratio	n and l	highwa	ay surv	ey tech	niques		
CO2	Determine ideal road alignment in different topographies and design different geometric features of flexible and rigid pavement.									
CO3	Perform traffic survey	y to collect data requir	ed for t	raffic	regulat	tions a	nd cont	rol		
CO4	Discuss about differen	nt materials and their	suitabil	lity to	be used	d in co	nstructi	ion of roa	d.	

CO5	CO5 Design various components of flexible and		ments as per the latest code of prac	tice.	
Unit-No.	Content	Content Contact Learnin			
I	Highway development and planning Classification of roads, road development inIndia, Current Road projects in India; highway alignment, Highway Survey, and project preparation	9	Understand the classification of roads and the historical and current road development projects in India.	1,2	
II	Geometric design of highways Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems	9	Learn the principles of geometric design, including the cross-section elements of highways and sight distance requirements.	1,2	
III	Traffic engineering & control Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems	9	Design road intersections, parking facilities, and highway lighting, and learn traffic regulation and control techniques.	1,2	
IV	Highway Materials and Construction Material requirement for pavements – Soil classification for Highway – Soil tests – CBR and Plate Load Test, Aggregate – materials testing and specification, Bitumen – material testing and specification – Concrete Mix Design, construction of bituminous and rigid pavements, Highway Maintenance – Material recycling	9	Understand the componen functions, and design principl of rigid pavements, and sol design problems as per listandards.		
V	Design of pavements- Introduction; flexible pavements, factors affecting design and performance; stresses in flexible pavements; design of flexible pavements as per IRC; rigid pavements-components and functions; factors affecting design and performance of CC pavements; stresses in rigid pavements; design of concrete pavements as per IRC;	9	To be introduced to the factors affecting the design and performance of flexible pavements, including stress analysis and IRC design standards	1,2	

problems.		

- 1. S.K.Khanna, C.E.G.Justo, (2001) "Highway Engineering", Nem Chand & Bros, Roorkee.
- **2.** Rao.G.V., (2005) "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co.

Reference Books:

- 1.L.R.Kadiyali, (2003) "Principles and Practice of Highway Engineering", Khanna Publishers.
- 2. ParthaChakroborthy, Animesh Das, (2005) "Principles of Transportation Engineering", Prentice-Hall of India.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Describe different types of roads, its administration and highway survey techniques	1,3 & 4					
2	Determine ideal road alignment in different topographies and design different geometric features of flexible and rigid pavement.	1,2					
3	Perform traffic survey to collect data required for traffic regulations and control	7.9,10					
4	Discuss about different materials and their suitability to be used in construction of road.	5,7					
5	Design various components of flexible and rigid pavements as per the latest code of practice.	5,8					

SEMESTER – V									
Course Title		Hydrology and Wat	er Res	ource l	Engine	ering			
Course	22BTCE315R	Total credits: 3	L	T	P	S	R	O/F	C
code		Total hours: 45T	2	1	0	0	0	0	3

Pre-	Nil	Nil Co-requisite Nil							
requisite Programi	m	B.Tech Civ	 vil Emgine	ering					
e Compostor		Fall/Mannastan of The		f Al. a mana awa awa a					
Semester Course	To study occur	Fall/ V semester of Thi		on of water that is a prime resource	e for				
Objective	development o		aistributio	on or water that is a prime resource	C 101				
(Minimur	n '		a the hyd	Irological information, which is esse	ntial				
3)		surface and ground water	•	·	iitiai,				
		•	•	ground water and properties of gro	ound				
	water flow.		Brown made, and properties of Bro	0 00.					
CO1	-		es, hydro	logical processes and their integrat	ted				
	behavior in catchment	ts.							
CO2	Apply the knowledge of	of hydrological models	to surfac	e water problems including basin					
	characteristics, runoff								
CO3	Explain the concept of	hydrological extremes	s such as	flood and drought and its managem	1ent				
	strategies	nyurological extremes	sucii as	nood and drought and its managen	10111				
G0.4									
CO4	Apply the concepts of	groundwater for water	r resourc	es management					
CO5 Understand the importance of spatial analysis of rainfa				fall and design water storagereserv	oirs				
Unit-No.	Conten	t	Contact	Learning Outcome	KL				
			Hour						
I	Introduction: hydrolog			Understand the components and processes of the hydrologic cycle					
	budget equation, histo world water balance,	applications in	9	and apply the water-budget	1,2				
	engineering, sources of d			equation to various scenarios.					
II	Precipitation: forms			Apply depth-area-duration					
	characteristics of preci	pitation in India,		relationships, analyze maximum					
	measurement of precipi	tation, rain gauge		intensity/depth-duration-					
	network, mean precipita			frequency relationships, and estimate probable maximum					
	deptharea-duration	relationships,		precipitation (PMP).					
		ity/depth-duration-		,					
		hip, Probable							
	Maximum Precipitation								
	data in India, evap evaporimeters, analytic	•							
		tion, reservoir	9		1,2				
	evaporation and method								
	evapotranspiration, n								
	evapotranspiration,								
	equations, potential								
	over India, actual								
	interception, depres	ssion storage,							
	infiltration, infiltration	* *							
	measurement of infilt								
	infiltration capacity,	classification of							

	infiltration capacities, infiltration indices			
III	Runoff: runoff volume, SCS-CN method of estimating runoff volume, flowduration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.	9	Estimate runoff volume using methods like the SCS-CN method and analyze flow-duration and flow-mass curves.	1,2
IV	Ground water: forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.	9	Analyze well hydraulics, including steady-state flow in wells, equilibrium equations for confined and unconfined aquifers, and conduct aquifer tests.	1,2
V	Dam and Spillway: embankment dams: Classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site	9	Analyze forces on gravity dams, causes of failure, and stress analysis, and understand the design of arch and buttress dams, components of spillways, and reservoir management, including sedimentation and economic considerations.	1,2

- 1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- 2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.

Reference Books:

- 1.K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- 2. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill
- 3. G L Asawa, Irrigation Engineering, Wiley Eastern

CO PO Mapping

SN	Course Outcome (CO)	Mapped Program Outcome
1	Remember the key drivers on water resources, hydrological processes and their integrated behavior in catchments.	1,3 & 4
2	Apply the knowledge of hydrological models to surface water problems including basin characteristics, runoff and hydrograph	1,2
3	Explain the concept of hydrological extremes such as flood and drought and its management strategies	7.9,10
4	Apply the concepts of groundwater for water resources management	5,7
5	Understand the importance of spatial analysis of rainfall and design water storagereservoirs	5,8

		SEMESTER	$\mathbf{R} - \mathbf{V}$						
Course Title	Construction Engineering& Management								
Course	22BTCE316R	Total credits:3	L	T	P	S	R	O/F	С
code		Total hours: 45T	3	0	0	0	0	0	3
Pre- requisite	Nil	Co-requisite		1	1	N	il		<u> </u>
Programm e		B.Tech Civil Emgineering							
Semester		Fall/ V semester of T							
Objectives (Minimum 3)	Construction 1To prepare the management pTo continual opportunities	 To train the students with the latest and the best in the rapidly changing fields of Construction Engineering, Technology and Management. To prepare the students to be industry leaders who implement the best engineering and management practices and technologies in the construction industry. To continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry. To conduct research to develop advanced technologies and management approaches 							
CO1	Proficiently apply construction planning principles to systematically choose technologies, define tasks, and estimate activity durations.								
CO2	Proficiently plan and organize construction sites by mastering resource allocation, aggregation, and leveling strategies for optimal project efficiency.								
CO3	Apply PERT, CPM, an and determine proje	d GERT techniques to ct durations.	analyze	proje	ct netw	orks, i	dentify	critical pa	aths,
CO4	Analyze and manage	construction contracts	s, encon	npassi	ng a co	mpreh	ensive	understar	nding

	of construction costs considerations.			
CO5	Proficiently apply cost analysis techniques, incorporating quality and safety considerations in construction projects.			
Unit-No.	Content	Contact Hour	Learning Outcome	KI
I	INTRODUCTION; Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.	9	Learn to define work tasks, precedence relationships among activities, estimate activity durations, resource requirements, and use coding systems effectively.	1,2
II	PLANNING AND ORGANIZING CONSTRUCTION SITE AND RESOURCES: Resource allocation, resource aggregation and resources levelling	9	Apply resource leveling methods to optimize the use of resources on construction sites.	1,2
Ш	PERT CPM AND GERT NETWORKS: concepts of PERT, CPM and GERT, analysis of network and determining the critical path and duration of the network.	9	Understand the concepts of PERT, CPM, and GERT for project scheduling and management.	1,2
IV	CONTRACTS MANAGEMENT BASICS AND CONSTRUCTION COSTS: Make up of construction costs including capital costs operational costs and life cycle cost	9	Comprehend the components of construction costs, including capital, operational, and life cycle costs.	1,2
V	COST ANALYSIS TECHNIQUES: Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Methods – Statistical Quality Control with Sampling by Attributes – Statistical Quality Control with Sampling by Variables – Safety.	9	Apply statistical quality control methods, including sampling by attributes and variables, and learn total quality control techniques to ensure high standards in construction projects.	1,2

- 1. Saurabh Kumar Soni (2013), "Building construction and management", S.K Kataria and Sons.
- 2. Denis Lock (2010), "Project management in construction", Pearson Education,
- 3. Sidney M. Levy (2009), "project control and Practice", Pearson Education,

Reference Books:

- 1. Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.
- 2. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.
- 3. Chris Hendrickson and Tung Au, "Project Management for Construction Fundamental Concepts for Owners, Engineers", Architects and Builders, Prentice Hall, Pittsburgh, 2000.

- 4. Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.
- 5. Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Proficiently apply construction planning principles to systematically choose technologies, define tasks, and estimate activity durations.	1,3 & 4				
2	Proficiently plan and organize construction sites by mastering resource allocation, aggregation, and leveling strategies for optimal project efficiency.	1,2				
3	Apply PERT, CPM, and GERT techniques to analyze project networks, identify critical paths, and determine project durations.	7.9,10				
4	Analyze and manage construction contracts, encompassing a comprehensive understanding of construction costs considerations.	5,7				
5	Proficiently apply cost analysis techniques, incorporating quality and safety considerations in construction projects.	5,8				

		SEMESTER	- V						
Course Title	Hydraulics Engineering								
Course	22BTCE317R	Total credits: 2	L	T	P	S	R	O/F	C
code		Total hours: 30T	2	0	0	0	0	0	2
Pre- requisite	Nil Co-requisite Nil								
Programm e	B.Tech Civil Emgineering								
Semester	Fall/ V semester of Third year of the programme								
Course Objectives (Minimum 3)	To introduce the importance of study of open channel flow, to give brief description on different types of flows and channels and hydraulic design principles of channels.								
3)	 To learn the fundamentals of Uniform and Non-Uniform flow in open channels. To understand about the concepts of specific energy, critical flow and their applications. 								
	_	dea about the graduall computations.	y varie	ed flov	v and	rapidly	varied	l flow and	their

CO1	- Cummunity one countainy my or unary one unary corporations								
CO2	Illustrate the flow occurring in open chann	Illustrate the flow occurring in open channel and velocity distribution.							
CO3	Assess energy equation and momentum eq	uation wit	h respect to uniform flow.						
CO4	Summarize characteristics of surface profiuniform flow.	le by graph	nical and numerical approach in nor	1-					
CO5	Compile models related to hydraulic jump resource engineering	and web b	asedmodeling in water						
Unit-No.	Content	Contact Hour	Learning Outcome	KL					
I	Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Turbulent Flow- Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram. Boundary Layer Analysis-Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; Laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.	6	Comprehend the transition from laminar to turbulent flow, define turbulence, and analyze its effects using Prandtl's mixing length theory, Reynolds stresses, and Moody's diagram.	1,2					
П	Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.	6	Analysis of laminar and turbulent boundary layers on a flat plate, understand local and average friction coefficients, and learn about boundary layer separation and control.	1,2					

	Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.			
Ш	Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n" Most economical section of <i>ch</i> annel. Computation of Uniform flow, Normal depth.		Application of dimensional homogeneity using Rayleigh and Buckingham's Pi methods, and understand the formation and application of dimensionless groups.	
	Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method	6		1,2
IV	Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel, length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation,	6	Comparison of open channel flow with pipe flow, understand geometrical parameters and classification of open channels.	1,2
V	Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic	6	Application the continuity, energy, and momentum equations to characterize uniform	1,2

gradient line, Pipes in series, equivalent	flow using Chezy's and Manning's	
pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission	formulas, and compute normal depth.	
through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem.		

- 1. Open channel Flow, K. Subramanya, Tata McGraw Hill.
- 2. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House

Reference Books:

- 1. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- 2.Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Summarize the boundary layer analysis and their separation.	5, 7			
2	Illustrate the flow occurring in open channel and velocity distribution.	8			
3	Assess energy equation and momentum equation with respect to uniform flow.	7.9,10			
4	Summarize characteristics of surface profile by graphical and numerical approach in non-uniform flow.	11,12			
5	Compile models related to hydraulic jump and web basedmodeling in water	10			

resource engineering	

		SEMESTER	- V							
Course Title		Extra-curr	icular	Activ	ities					
Course code	22UBEC311	Total credits: 1	L	T	P	S	R	O/F	C	
		Total hours: 15P	0	0	0	4	0	0	1	
Pre-requisite	e Nil Co-requisite						il			
Programme		B.Tech Ci	vil Emgi	ineerii	ıg					
Semester		Fall/ V semester of third year of the programme								
Course Objectives	1. Equip students w	ith effective time manager	ment and	priori	tization	skills, f	ostering	leadership o	qualities	
(Minimum 3)		a commitment to their endeavors.								
	cultivating well-rounded in	Encourage exploration of interests beyond academics and participation in co-curricular activities, tivating well-rounded individuals capable of making meaningful community contributions.								
	3. Enhance students while integrating learning	d' abilities to express ideas experiences to practice tra	•			-			nalysis,	
CO1	Learn to a plan so that manage their time and p		ningful (contri	butions	, maint	tain a c	commitmen	it, and	
CO2	Transform passionate academics.	students who demonstr	rate lea	dershi	p and	pursue	intere	sts beyond	l their	
CO3	Learn to participate in development.	various co-curricular	activitie	es lead	ding to	their	multifa	ceted perso	onality	
CO4	Express their ideas, view	vs. In-depth evaluation a	and anal	vsis c	learly i	n the to	pic of th	neir interes	 t.	
CO5	Demonstrate and practic			•			_			
	transferable skills.								_	
Unit-No.	Conte	nt	Contact Hour	t	L	earning	Outcor	ne	KL	
I	AdtU encourages a ra	ange of activities		Pa	rticipa	te in d	iverse (club		
	outside the regular cur			ac	tivities	to dev	elop so	ocial and		
	to meet learner's interes	· ·		so	ft skill	s, achi	eve hol	istic		
	are aimed to develop the			de	velopn	nent, a	nd gair	l		
	skills and promote a hol	*		ex	posure	throug	gh worl	kshops		
	of the learners, Keeping			an	d com	petitio	ns led b	ру		
	degree learning method			ex	perts.					
	are engaged in differen				_					
	under different clubs v									
	photography, drama,	-								
	students are encouraged		15						1,2	
	regular club activit	_								
	competitions as per t									
	hobbies, The student									
	club are trained rep									
	various inter Univers	•								
	national level compe									
	personalities are inv									
	workshops that benefit									
	students by giving theilearn from experts i	-								
	fields.	n uic respective								
	neids.								1	

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	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5,7
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10

		SEMESTER	-V						
Course Title		CO-CURRICULAR ACTIVITIES							
Course code	22UBCC221	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 15P	0	0	0	4	0	0	1
Pre- requisite	Nil	Co-requisite	Nil						
Programme		B.Tech Ci	vil Em	gineerii	ng				
Semester		Fall/ V semester of T	nird yea	ar of th	e progr	amme			
Course Objectives (Minimum 3)	1. 1. Meeting the needs of the students and covering a broad/wide range of their abilities and talents.								
		2.To stimulate the interests in the students and provide equal opportunities to all the students to participate							

CO1 CO2 CO3	3.To enhance the learning experience developing their inner skills such skills etc. Apply foundational acclimatization principles to ada. Analyze environmental factors influencing acclimation adaptation mechanisms. Evaluate personal adaptability through practical executablenges.	h as leade pt effective zation, der	ership qualities, creative or innovatively in diverse environments and situations	. ng of
CO4	es, demonstrating creativity and flexilong critical thinking to address unforce			
Unit-No.	Content	Contac t Hour	Learning Outcome	KL
I	AdtUhas included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	15	Engage in mandatory co-curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing and participating in various programs and events.	1,2

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5,7
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8

3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7,9,10
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

		SEMESTE	R - V									
Course Title	Competent English for Engineers											
Course code	e 22UBPD314R	Total credits: 2	L	T	P	S	R	O/F	C			
		Total hours: 30P	0	0	4	0	0	0	2			
Pre-requisit	te Nil	Co-requisite				N	il	ı				
Programme	2	B.Tech Civil Emgineering										
Semester		Fall/ V semester of '	Third yea	r of th	e progra	amme						
Course Objectives (Minimum	 engineering concepts all constructing, and maintain 		ectronic a	pplica	tions in	civil	enginee	ring for de	signing,			
	improving students' chan	ces of securing employm	ent. are studer	nts for	job inte							
CO1	Demonstrate clear an incorporating industry-		communi	cation	in bo	th wr	itten a	nd oral fo	rmats,			
CO2	Develop expertise in crengineering qualification		letters, a	nd ted	chnical i	reports	s to effe	ectively sho	wcase			
CO3	Acquire proficiency in convey engineering cor	_		ctful	present	ations	, utilizii	ng visual a	ids to			
CO4	Cultivate effective inte conflict resolution, and	•				•	hasizing	g active list	ening,			
CO5	Prepare for engineering addressing both technic	• •	_	•		exper	iences,	and career	goals,			
Unit-No.	Conte	nt	Contac Hour				g Outco		KL			
I	Writing Skills i. Paragraph Writing & Narratives ii. Letter Writing iii. Technical Writing Pipe and cistern Develop proficiency in va forms of writing, incluparagraph and narr construction, letter writing, technical documentation.											

II	ii. Introduction of pipes and cistern iii.Solving different types of questions iv. Worksheet1 and Worksheet 2 Self-Management Skills i. SWOT Analysis ii. Goal Setting and Personal Hygiene Mixture allegation and Clock i.Introduction of basics ii.Solving questions on mixture and alligationion.	6	Gain competency in solving practical problems related to pipes and cisterns, mixtures and alligations, clocks, and profit, loss, and discounts through targeted practice and worksheets.	1,2
III	Vocabulary Development i.Understanding different aspects of a word (such as the use of say, tell, speak). ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement Iv. Worksheet1 and Worksheet 2	6	Enhance personal effectiveness through SWOT analysis, goal setting, and maintaining personal hygiene.	1,2
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Worksheet1	6	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt) Profit loss and discount	6	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving exercises in linear, circular, and	1,2

i.Introduction to basics	matrix arrangements.	
ii.Introduction to discount		
iii.Probems related on the topics		
Iv. Worksheet1 and Worksheet 2		

- 1.Barrett, Grant. 2016. *Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking*, Zephyros Press.
- 2.McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3.A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7								
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8								
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse	7,9&10								

	audiences.	
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

		SEMESTER	. – V								
Course	Techno Professional Skills-IV										
Title											
Course	22BTCE317R	Total credits: 2	L	O/F	C						
code		Total hours: 20P	0	0	2	0	0	0	1		
Pre-	Nil	Nil Co-requisite Nil									
requisite		D. T. J. G									
Programr e	n	B.Tech C	ivil Engi	neerin	g						
Semester		Fall/ V semester of f	irst vear	of the	nrogra	mme					
Course	Introduce students to	the fundamental principle					g graph	ics relevant	to civil		
Objective		viio ruiiouiiioiiiui priiioipii		· · · · · · · · · · · · · · · · · · ·	20 01 0112	,	8 8 mp.	100 1010 (4111	00 01/11		
(Minimun		ility to create accurate and	d detailed	l engin	eering di	rawings	using b	asic graphi	cal		
3)	tools.										
		alization skills and the abi	lity to in	terpret	enginee	ring des	signs thr	ough graph	ical		
001	representation.	. 1 1 1 1 6		1	•						
CO1	Understand the basic prin	ciples and standards of en	igineerin	g grapi	ncs.						
CO2	Develop proficiency in us	sing basic drawing tools a	nd techn	iques fo	or civil e	ngineer	ring app	lications.			
CO3	Create accurate and detail										
CO4	Interpret and visualize en					n.					
CO5	Apply engineering graphi	cs skills in practical civil	engineer	ing pro	jects.						
Unit-	Conte	nt	Conta	c	Lea	rning	Outco	me	KL		
No.			t Hou	r							
Ι	Introduction to Engine	ering Graphics:	6	Uı	ndersta	nd the	princi	ples and	1, 2		
	Overview of engineering			sta	ındards	of en	gineeri	ing			
	drawing standards, and d				aphics.		0	υ			
	Importance in civil engineering.										
II	Basic Drawing Tools and	•	6	De	Develop proficiency in using 2, 3						
	Introduction to drawing			basic drawing tools and							
	scales, and basic constru		techniques.								
	Use of lines, angles, and	-			1	- ·- •					
III	Orthographic Projection	· .	6	Cr	eate ac	curate	ortho	graphic	3, 4		

	orthographic projection, multi-view		projections and sectional	
	drawing, and sectional views.		views of civil structures.	
IV	Isometric and Perspective Drawing:	6	Interpret and visualize	4, 5
	Techniques for creating isometric and		engineering designs through	
	perspective drawings. Visualization of 3D		isometric and perspective	
	objects on 2D planes.		drawings.	
V	Practical Applications and Projects:	6	Apply engineering graphics	5
	Hands-on projects involving the creation		skills in practical civil	
	of detailed engineering drawings for civil		engineering projects.	
	engineering applications.			

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Understand the basic principles and standards of engineering graphics.	5, 7								
2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8								
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10								
4	Interpret and visualize engineering designs through graphical representation.	11,12								
5	Apply engineering graphics skills in practical civil engineering projects.	10								

MAPPING TABLE (5TH SEM)

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE311R	Environmental Engineering	3	3	2	2	2	2	3					
22BTCE312R	Mechanics of Materials	3	2	2	2	2	2	1					2
22BTCE313R	Structural Analysis I	3	2	3	1	1	1	1					3
22BTCE314R	Transportation Engineering	3	3	3	1	2	2	2					2
22BTCE315R	Hydrology and Water Resource Engineering	3	2	3	2	2		1					2
22BTCE316R	Construction Engineering& Management	3	3	2		2	2						3
22BTCE317R	Hydraulics Engineering	3	2	2	2	3	3	2					2
22UBPD314R	Competent English for Engineers	3	2	3	2	2		1					2
22UBCC311	Co-curricular	3	3	2		2	2						3
22UBEC311	Extra- curricular	3	2	2	2	3	3	2					2
22MOCE221R	MOOCS IV- Excel Skills for Business: Essentials	3	2	3	2	2		1					2
22BTCE317R	Techno- Professional Skills IV												

		S	EMESTE	R – VI						
Course T	itle		Design	of RC S	tructui	re				
Course co	ode 22BTCE321R To	otal cred	its: 3	L	T	P	S	R	O/F	C
	To	otal hour	s: 45T	2	1	0	0	0	0	3
Pre-requi	site Nil	Co-r	equisite					Nil		
Programi	me	Bachel	or of Tech	nology in	Civil E	Inginee	ring			
Semester			VI semest							
Course	The objective of the teacher is									
Objective					cepts in	the bel	navior	and		
(Minimu	n 3) design of reinforced concrete									
	2. Differentiate between work									
	3.Understand the basic concep		inforced co	oncrete sec	ctional d	lesign n	nainly	ın		
	accordance with ultimate stren		havior for	the design	of roin	forced o	onoros	o exet	ame	
	4. Assess the structural and ma and elements.	aciiai del	navior ior	me design	or rein	iorcea C	oncrei	e syste	Z111S	
CO1	Understand the general mecha	nical hel	navior of re	einforced (concrete	in acco	ordanc	e with		
	IS456:2000.	anicai oci	.iu v 101 01 10	Jiiioicca (in acc	, aunc	C WILLI		
	10 10 01 2 000 01									
CO2	Identify and apply the applical	ble indus	stry design	codes rele	evant to	the des	ign of			
	reinforced concrete members.						Ü			
CO3	Analyze and design reinforced	d concrete	e flexural ı	members v	vith det	ailing.				
CO4	Design and check for servicea	ibility (cr	ack and de	eflection) a	ınd ultir	nate lin	iit stat	e		
	conditions.									
CO5	Assess the stresses and design	vartical	and hariza	ntol choor	rainfor	aamant	in roi	nforce	.d	
COS	concrete members with detaili		and norizo	ilitai sileai	Tellifor	cements	s III I e I	morce	cu	
Unit-	Content	ing.	Contact		L	earning	Outco	me		BL
No.			Hour		_	···	0 4000			
I	Concepts of RC. Design - W			Upon c	omplet	ion of	the c	ourse	, studen	ts 1, 2
	Stress Method - Limit State me			•	•				applyin	
	Material StressStrain Curves -								d and th	
	factors - Characteristic values.		10			_			design o	
	Block parameters – IS – 456		10						includin	
	Beams: Limit state analysis			beams,						
	design of singly reinforced, d			,		,			_	
	reinforced, T and L beam section			G . 1						1.2.2
II	Limit state analysis and desi	_						•	and desig	
	section for shear and tors			reinforc		oncrete			for bot	
	concept of bond, anchorage		10	flexural				paciti		
	development length, I.S.	code							They wi	
	provisions. Design example	es in		also be	comp	etent i	n de	signin	g variou	1S

	simply supported and continuous beams, detailing; Design of canopy.		types of columns under axial loads, uniaxial bending, and biaxial bending scenarios.	
III	Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions.	8	By the end of the course, students will have acquired skills in detailing reinforced concrete elements such as beams and footings, ensuring compliance with design specifications and structural integrity requirements.	1, 2, 3, 4, 5
IV	Footings: Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.	7	Students will be capable of designing different types of footings (isolated, square, rectangular, circular, and combined footings) to support varying loads and soil conditions. They will also be proficient in designing one-way slabs, two-way slabs, and continuous slabs, considering IS coefficients and limit state design principles.	2, 3, 4
V	Design of one-way slab, Two-way slabs and continuous slab Using I S Coefficients Limit state design for serviceability for deflection, cracking and codal provision. Design of doglegged staircase.	10	Upon completion of the course, students will be able to assess and design reinforced concrete structures while ensuring compliance with safety factors, characteristic values, and codal provisions related to serviceability criteria such as deflection, cracking, and durability.	2, 3, 4, 5

- 1 Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill, New Delhi.
- 2. Limit state designed of reinforced concrete P. C. Varghese, Prentice Hall of India, New Delhi.
- 3. Limit state designed of reinforced concrete P. C. Varghese, Prentice Hall of India, New Delhi

Reference Books:

- 1. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
- 2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
- 3. Design of concrete structures Arthus H. Nilson, David Darwin, and Chorles W.

Dolar, Tata McGraw-Hill, 3rd Edition, 2005.

OTHER LEARNING RESOURCES:

<u>Design Of Reinforced Concrete Structures - Course (nptel.ac.in)</u>

	CO PO Mapping	1
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand the general mechanical behavior of reinforced concrete in accordance with IS456:2000.	1,3 & 4
2	Identify and apply the applicable industry design codes relevant to the design of reinforced concrete members.	1,2
3	Analyze and design reinforced concrete flexural members with detailing.	7.9,10
4	Design and check for serviceability (crack and deflection) and ultimate limit state conditions.	5,7
5	Assess the stresses and design vertical and horizontal shear reinforcements in reinforced concrete members with detailing.	5,8

		members with detail									
	Concrete	members with detail		STER – V	/T						
Cour	se Title		Engineering E			tion an	d Costi	ng			
	se code	22BTCE322R	Total credits: 2	L	Т	P	S	R	O/F		C
			Total hours: 30T	2	0	2	0	0	0		3
Pre-r	equisite	Nil	Co-requisite				N	Vil			
	ramme		Bachelor of	Technolog	y in Civ	il Engi	neerin	3			
Seme			Fall: Winter/ VI se								
Cour			the basic principal	and star	dard m	ethods	for v	vorki	ng out o	quant	tities in
	ctives	estimating.									
(Min	imum 3)		the detailed estima	ite of buil	dings aı	nd wor	kout ra	ate an	alysis of	f the	various
		items ofwork									
			he material require							_	
			valuation of buil			de pra	actical	kno	wledge	of s	tandard
		specification	s of items of building	ngs constr	uction.						
	CO1	Hove on idea of E	conomics in genera	1 Econor	nios of l	ndie n	ortion1	orly f	or public	2 5001	tor.
`			•		incs of i	пата р	articur	arry r	or public	Seci	.01
	CO2	•	ate sector businesse		· C			1 4_	1		1 6
	.02		stand the technical w they impact the co			vario	us wor	ks to	be perio	orme	d for a
	CO3		fy the worth of a s			oting a	nontiti	os of	constitu	onts	dorivo
`	.03		and build up the ov					CS 01	Constitu	iems,	uenve
	CO4		tand how competit					suhm	nit a com	netit	ive bid
)		proposal.	tana now competit	ive bladin	5 WOIR	, una n	10 W 10	Suon	nt a com	рси	110 010
(CO5		te of minor struc	ture and	derivi	ng an	appro	oxim	ate esti	mate	for a
			ouilding by appro			_					
		standard Governn				Г-	- F				F
Unit	-	Conter		Contact		Lea	arning (Outco	me		KL
No.				Hour							
I		*	Methodology of		ъ.		C'	•	. •		1, 2
Economics. Demand/Supply –					Demo		_	-			
		•	ent Policies and	5					various		
	App	lication. Theory	of the Firm and	3					nd activit		
	Marl	ket Structure.	Basic Macro-		using i	industr	y-stano	dard i	methods.	•	
	econ	omic Concep	ots (including								

	CDD/CND/NII/D: 11 I			
	GDP/GNP/NI/Disposable Income)			
	and Identities for both closed and			
	open economies. Aggregate demand			
	and Supply (IS/LM). Price Indices			
	(WPI/CPI), Interest rates, Direct and			
	Indirect Taxes. Public Sector			
	Economics –Welfare, Externalities,			
	Labour Market. Components of			
	Monetary and Financial System,			
	Central Bank – Monetary Aggregates;			
	Commercial Banks & their			
	functions; Capital and Debt Markets.			
	Monetary and Fiscal Policy Tools &			
	their impact on the economy -			
	Inflation and Phillips Curve			
II	Elements of Business/Managerial		Understand the importance and	1, 2,
	Economics and forms of		application of specifications in	3, 4
	organizations. Cost & Cost Control –		different types of construction	
	Techniques, Types of Costs,		projects.	
	Lifecycle costs, Budgets, Break even			
	Analysis,			
	Capital Budgeting, Application of			
	Linear Programming. Investment			
	Analysis – NPV, ROI, IRR, Payback			
	Period, Depreciation, Time value of			
	money (present and future worth of			
	cash flows). Business Forecasting –			
	Elementary techniques. Statements –	5		
	Cash flow, Financial.Case Study			
	Method. Indian economy - Brief			
	overview of post-independence			
	period – plans. Post reform Growth,			
	Structure of productive activity.			
	Issues of Inclusion – Sectors,			
	States/Regions, Groups of people			
	(M/F), Urbanization. Employment—			
	Informal, Organized, Unorganized,			
	Public, Private. Challenges and			
	Policy Debates in Monetary, Fiscal,			
	Social, External sectors.			
III	Estimation / Measurements for		Be capable of conducting rate	1, 2,
	various items- Introduction to the		analysis for accurate cost estimation	3, 4,
	process of Estimation; Use of		and budgeting.	5
	relevant Indian Standard			
	Specifications for the same, taking			
	out quantities from the given	10		
	requirements of the work,			
	comparison of different alternatives,			
	Bar bending schedules, Mass haul			
	Diagrams, Estimating Earthwork and			
	Foundations, Estimating Concrete			

	and Masonry, Finishes, Interiors, MEP works; BIM and quantity take-offs; adding equipment costs; labour costs; rate analysis; Material survey-Thumb rules for computation of materials requirement for different materials for buildings, percentage breakup of the cost, cost sensitive index, market survey of basic materials. Use of Computers in quantity surveying			
IV	Specifications-Types, requirements and importance, detailed specifications for buildings, roads, minor bridges and industrial structures. Rate analysis-Purpose, importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity	5	Gain practical skills in preparing tender documents, including bid price formulation and contract management.	2, 3, 4
V	Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management. Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights	5	Acquire knowledge of relevant legal aspects and Acts related to construction contracts and labor rights in the industry.	2, 3, 4, 5

- 1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
- 2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
- 3. Misra, S.K. and Puri (2009), Indian Economy, Himalaya
- 4. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers

Reference Books:

- 1. M Chakravarty, Estimating, Costing Specifications & Valuation
- 2. Joy P K, Handbook of Construction Management, Macmillan
- 3. B.S. Patil, Building & Engineering Contracts
- 4. Relevant Indian Standard Specifications.

OTHER LEARNING RESOURCES:

Engineering Economic Analysis - Course (nptel.ac.in)

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Have an idea of Economics in general,	1,3 & 4
	Economics of India particularly for public sector	
	agencies and private sector businesses	
2	Be able to understand the technical specifications	1,4
	for various works to be performed for a project	
	and how they impact the cost of a structure	
3	Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.	7.9,10
4	Be able to understand how competitive bidding works and how to submit a competitive bid proposal.	5,7
5	Detailed estimate of minor structure and deriving an approximate estimate for a multi-storeyed building by approximate methods and preparation of valuation report in standard Government form	5,8

		SEMESTER - Y	VI						
Course Title		Structural	Anal	ysis I	[
Course code	22BTCE324R	Total credits: 3	L	T	P	S	R	O/F	С
		Total hours: 45T	3	0	0	0	0	0	3
Pre-requisite	Nil	Co-requisite				ľ	Nil		
Programme		Bachelor of Technolog	gy in (Civil E	nginee	ring			
Semester		ll: Winter/ VI semester of							
Course		the ability to analyze stat							
Objectives		structures to withstand spec							
(Minimum 3)	- 1	oficiency in using Muller B		-	-	-			
		on understanding the distri	ibutior	of sh	ear for	ce, ber	nding	moment	, and support
	reactions.								
		ipped to analyze different							
		emperature effects, and the							
	11 7 1	ory to determine plastic mo	oments	s, plast	ic mod	luli, an	d loac	d factors	for statically
	indeterminate structur								
CO1		nalyze statically determinat				susing	influ	ence line	es, and design
	1	d loads by calculating critic							
CO2		eiency in analyzing indete							
	* *	e distribution of shear force							
CO3	_	of analyzing different types			-		-		_
	such as settlement, temper	ature effects, and the behavi	or of o	cables 1	under v	arious	loadir	ng condit	ions.

CO4	indeterminate structures, including the	determina	ding of plastic theory and its application tion of plastic moments, plastic moduli, and lo	ad factors.
CO5			ined to analyze and design structural systems to loads, environmental effects, and safety cons	
Unit- No.	Content	Contac t Hour	Learning Outcome	KL
I	Influence lines for reactions in statically determinate beams – Influence lines for shear force and bending moment – Calculation of critical stress resultants due to concentrated and distributed moving loads – absolute maximum bending moment - influence lines for member forces in pin jointed plane frames.	5	Upon completing the course, students will demonstrate proficiency in deriving and interpreting influence lines for reactions, shear force, bending moment, and member forces in determinate and indeterminate beams and pin-jointed plane frames.	1, 2
П	Muller Breslau's principle— Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams	10	Students will be able to analyze various types of arch structures, including three-hinged, two-hinged, and fixed arches, considering settlement and temperature effects, and applying equilibrium principles specific to arch geometry.	1, 2, 3, 4
III	Equilibrium of cable – length of cable - anchorage of suspension cables – stiffening gird	5	By the end of the course, students will understand the principles governing cables and suspension bridges, including the equilibrium of cables, determination of cable length, and the role of stiffening girders in suspension bridge design.	1, 2, 3, 4, 5
IV	Equilibrium of cable – length of cable – anchorage of suspension cables – stiffening girders – cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders	5	Students will gain proficiency in plastic analysis techniques for statically indeterminate structures, including determining plastic moment of resistance, plastic modulus, and understanding the behavior of plastic hinges and mechanisms under loading conditions.	2, 3, 4
V	Plastic theory - Statically indeterminate structures - Plastic moment of resistance - Plastic modulus - Shape factor - Load factor - Plastic hinge and mechanism - collapse load - Static and kinematic methods - Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.	5	Upon completion, students will be able to apply theoretical concepts such as Muller Breslau's principle, plastic theory, and influence line analysis to solve practical engineering problems related to structural analysis, including beams, arches, cables, and suspension bridges.	2, 3, 4, 5

1.Structural Analysis, S.S. Bhabikatti

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - Structural Analysis II

					C	O PO Map	pping	
SN	Course Ou	tcome	(CO)					Mapped Program Outcome
1	Students	will	be	able	to	analyze	statically	1,2

	determinate beams and frames using influence	
	lines, and design them to withstand specified	
	loads by calculating critical stress resultants.	
2	Students will gain proficiency in analyzing	1,2, 3, 4
	indeterminate beams and frames using Muller	
	Breslau's principle, understanding the	
	distribution of shear force, bending moment, and	
	support reactions.	
3	Students will be capable of analyzing different types of	7.9,10
	arches and suspension systems, considering factors such as	
	settlement, temperature effects, and the behavior of cables	
	under various loading conditions.	
4	Students will develop a thorough understanding of plastic	5,7
	theory and its application to statically indeterminate	
	structures, including the determination of plastic moments,	
	plastic moduli, and load factors.	
5	Students will be able to apply the knowledge gained to	5,8
	analyze and design structural systems under realistic	
	conditions, incorporating factors such as dynamic loads,	
	environmental effects, and safety considerations.	

	env	rironmental effects, and s									
			\$	SEMESTE	R – VI						
Course T	itle '			Pav	ement Ma	terials					
Course co	ode	22BTCE324E	Total cred	lits: 3	L	T	P	S	R	O/F	С
			Total hou	rs: 45T	3	0	0	0	0	0	3
Pre-requ	isite	Nil	Co-ı	requisite				I	Vil		
Program	me			elor of Tec							
	Semester Fall: Win			·/ VI semes							
Course			rstanding di								
Objective										carried	out on soils,
(Minimu	m 3)	aggregate and b								., .	
		3. To us superpave design		na enable	students t	to carr	y out o	iesign	oi b	ituminoi	us mixes and
		superpave desig	311								
CO	1	Classify different type	s of soil an	d differen	t laborato	rv test	to estir	nate s	oil st	rength	
	_	classify different type	5 01 5011 411		t idoordto.	ij test	to estin	iiiii s	011 50	ong.	
CO2	2	Explain different tests	related to	characteriz	zation of a	ggrega	ates				
CO3 Describe different types of bitum				inous mat	erial and t	heir ch	naracte	rizatio	n		
CO ₄	CO4 Explain different characteris									s mixe	s for various
		condition									
COS	5	Explain different comp	position of	super pav	e						
Unit-		Content		Contact		Lear	rning O	ıtcome			KL
No.				Hour							
I	Soil:				Students						1, 2
		,	erization,		classifyii						
		nation of soil strength-s		5	aggregat						
		Test, Plate load test	, Triaxial		methods		aluate	their	mech	anical	
	test				propertie						
II		regate:			By com						1, 2, 3, 4
		ce, Characterization,			will be a					• •	
		egate-Crushing streng			of bitumen, understand their						
	Abrasion Test, Impact				propertie						
	Soundness test, Shape Test, Specific			10	assess th		tability	for c	onstr	uction	
		ty and water absorp			applicati	ons.					
			Aggregate								
			ggregates,								
	Cem	ent Concrete									

Ш	Bitumen: Source, Characterization, Cutback bitumen, Bitumen emulsion, Tests on bituminous binder-viscosity, ductility, specific gravity, durability, purity, safety	8	Upon completion, students will demonstrate competence in designing bituminous mixes, applying rheological models, and optimizing bitumen content to meet specified performance criteria.	1, 2, 3, 4, 5
IV	Bituminous mixes: Mix volumetric, Rheological models for asphalt mix- Two component models, Maxwell model, Kelvin model ,Three component models , Generalized models, Linear viscoelasticity , Time-temperature superposition,Selection of Optimum bitumen content, Marshall method, Numerical examples, Mix Specification, Stiffness modulus and fatigue performance of bituminous mix	10	Students will learn to apply Superpave concepts in asphalt mix design, including binder and aggregate selection, volumetric analysis, compaction methods, and performance evaluation.	2, 3, 4
V	Concept of Superpave: Components, Binder Selection, Aggregate selection, Superpave volumetrics, Compaction, Evaluation of mix performance	7	This lesson aims to integrate theoretical knowledge with practical applications, preparing students for effective utilization of soil, aggregate, bitumen, and bituminous mixes in civil engineering projects.	2, 3, 4, 5

- 1. Principles of Transportation Engineering- Partha Chakroborty, Animesh Das
- 2. Pavement Analysis and Design-Yang H Huang
- 3. Analysis of Pavement Structures- Animesh Das

Reference Books:

- 1. Principles of Pavement design- Yoder and Witezak
- 2. IRC: 37-2012 and IRC: 58-2011

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - NOC:Pavement Materials (Under Pavement Engineering)

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				

1	Classify different types of soil and different laboratory test	1, 4
	to estimate soil strength	
2	Explain different tests related to characterization of	2, 3
	aggregates	
3	Describe different types of bituminous material and their	7.9,10
	characterization	•
4	Explain different characteristics of bituminous mixes and	5,7
	design bituminous mixes for various condition	·
5	Explain different composition of super pave	5,8

	SEMESTER – VI Course Title BUILDING CONSTRUCTION PRACTICE												
										,	1		
Course code		22BTCE324E	Total credits: 2 Total hours: 30T		I	$\begin{bmatrix} L & T \\ 2 & 0 \end{bmatrix}$		P 0	S 0	R	0/F 0		<u>C</u>
Pre-req	nicita	Nil		requisite		2 0	,	U		Nil	U		
Prograi		1111		or of Tech	nology	in Civi	l Fı	nginee		111			
Semeste		Fa	ll: Winter							nme			
Course		The course should enable t				na yea	0	r the p	105141				
Objecti	ves	I. Develop knowledge of n	naterial scie	nce and be	havior o	f variou	ıs b	uilding	g mater	ials u	sed in co	onstru	ction.
(Minim		II. Identify the construction							4 1:			_4_	
		III. Provide procedural kno IV. List the requirements a				ietnous	01	cemen	t, iiiie	and c	oncrete	eic.	
СО		Recognize the various p				e resid	ent	ial and	l comi	nerci	al cons	tructio	on.
СО		Identify and use correct industry.	ly a wide v	variety of	hand an	d pow	er	tools a	ssocia	ited v	vith the	cons	truction
CO		Understand current con	struction i	ndustry tr	ends ar	nd bec	om	e fam	iliar v	vith s	tandard	ls for	quality
		construction and trends		•				.,	•				1
CO		Understand construction				ponent	ts						
CO		Understand the proper						age c	of dif	feren	t mate	rial ı	ised in
		construction.		l a				• -					
Unit- No.		Content		Contact Hour		L	ear	ning O	utcome				KL
I	Introd	luction- Objectives, Rec	uirements	Hour	Unders	standing	<u>g</u>	the	objec	tives	and		1, 2
	Of F	oundation, Aim Of Supe	rstructure,		require						tion.		,
		s Of Construction, Aim		5									
		ction, Laying Out The Bui	lding Plan										
II		te For Foundation TII CONSTRUCTION PRA	ACTICES		Describ	hing	the	aims	and	typ	es of	1	2, 3, 4
		fications, details and sec			superst					цур	C 5 O 1	1,	2, 3, 4
		ties and construction co-or											
		Clearance – Marking – Ea											
		nry – stone masonry –											
		nry - concrete hollow block poring — damp proof of											
		ruction joints – mover		10									
	expan	nsion joints - pre cast par	vements -	10									
		ing foundations - base											
		orary shed – centering and											
		forms – scaffoldings – de- s – Fabrication and erection											
		es – frames – braced dome											
	brick	- weather and water pro	oof – roof										
		es – acoustic and fire prote	ction.										
III		TIII SUB STRUCTURE			Imm1 - ·	nonti	. cer	Continue	oito :	nost.	on.	1, 2	, 3, 4, 5
		STRUCTION niques of Box jacking – Pi	ne Iacking		Implen technic	_	en	ecuve	sue ins	specti	JII		
		r water construction of o			Coming	lucs							
	walls	and basement-Tunneling	techniques										
		ing techniques - well and		5									
		ng cofferdam - cable anchoring and											
		ting-driving diaphragm walls, sheet s - shoring for deep cutting - well											
		s -Dewatering and stand											
	equip												
		ration.											
IV	UNIT		UCTURE	_							out of	2	, 3, 4
		STRUCTION ching girders, bridge decks	off shore	5	buildin constru				rounda	tions	at a		
	Laun	anng gnucis, blidge decks	, on shore	<u> </u>	Constitu	iction S	πc.					<u> </u>	

platforms – special forms for shells - techniques for heavy decks – in-situ prestressing in high rise structures, Material handling – erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors -Erection of articulated structures, braced domes and space decks.			
V UNIT V CONSTRUCTION EQUIPMENT Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers - Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunnelling.	5	Applying specifications and coordinating activities for efficient construction practices	2, 3, 4, 5

- 1 Building construction: metric volume 1 by WR McKay.
- 2 Fundamentals of building construction: materials and methods by Edward Allen and Joseph Iano.

Reference Books:

1 Building materials and construction book with reference to B.C.Rangawala, Sushil Kumar, B.P.Bindra, A.Kamala.

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - Civil Engineering - Building materials and Construction

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Recognize the various phases associated with simple residential and commercial construction.	1,3 & 4						
2	Identify and use correctly a wide variety of hand and power tools associated with the construction industry.	1,2						
3	Understand current construction industry trends and become familiar with standards for quality construction and trends in building technology.	7.9,10						
4	Understand construction procedure of different components	5,7						

Ī	5	Understand the property, use, advantage and disadvantage	5,8
		of different material used in construction.	

	SEMESTER – VI									
Course Title CORPORATE PROFICIENCY FOIl							RS	_		
Course cod		Total credits: 2	L	T	P	S	R	O/F	C	
		Total hours: 30P	0	0	4	0	0	0	2	
Pre-requisi		Co-requisite				Ni	<u>il</u>			
Programm	e	B.Tech Civ								
Semester Course		Fall/ VI semester of th	ıra year	of th	e progr	amme				
Objectives		abilities in technical wr								
(Minimum	3) engineering concepts and constructing, and maintaining		ronic ap	plicat	ions in	C1V1l	enginee	ring for de	sıgnıng,	
	constructing, and maintaining	ng mirastructure.								
	2. Focus on crafting r	professional resumes and	cover let	ters ta	ilored f	or engir	eering 1	positions, im	proving	
	students' chances of securin							,	F8	
	_	ork abilities and prepare s			intervi	ews thro	ough pra	actical exerc	ises and	
	targeted training, enhancing	their readiness for engine	eering ca	reers.						
CO1	Demonstrate clear and	concise technical co	mmunic	ation	in bo	oth wr	itten a	nd oral fo	rmats	
	incorporating industry-sp					****	4		,	
CO2	Develop expertise in cra		tters, ar	nd tec	hnical	reports	to effe	ectively sho	wcase	
	engineering qualification					_				
CO3	Acquire proficiency in			ctful	present	ations,	utilizii	ng visual a	ids to	
		convey engineering concepts to diverse audiences.								
CO4		Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.								
005			on within engineering contexts. articulating qualifications, experiences, and career goals,							
CO5						, exper	iences,	and career	goals,	
Unit-No.	addressing both technical Content		Contact Learning Outcome					KL		
OIII-140.	Content		Hour		L	carming	Guico	1110	KL	
I	Writing Skills			Develop proficiency in various for						
	i. Paragraph Writing & Narra	tives						ragraph and		
	ii. Letter Writing							tter writing,		
	iii. Technical Writing			an	d techni	cai doct	ımentatı	ion.		
	Ding and sistana		7						1,2	
	Pipe and cistern iii. Introduction of pipes and c	ristern								
	iii.Solving different types of q									
	iv. Worksheet1 and Workshee									
	G 10.15									
II	Self-Management Skills				in comp oblems			ng practical pipes and	l l	
	i. SWOT Analysis			cis	terns,	mixture	s and	alligations,		
	ii. Goal Setting and Personal I	Hygiene						nd discounts		
	Mixture allegation and Cloc	k	7		ough orksheet	targete	a pra	ctice and	1,2	
	i.Introduction of basics		,	l wc	'I KSHCCI	٥.			1,2	
	ii.Solving questions on mixtur	re and alligationion.								
	iii.Worksheet1 and Worksheet	_								
	OTHER OF THE THE PROPERTY OF THE PROPERTY	- =								
III	Vocabulary Development			En	hance	perso	nal e	ffectiveness		
	i.Understanding different aspe	ects of a word (such as						goal setting,		
	the use of say, tell, speak).	J. II OTO (Sucil us	7					hygiene.	1,2	
	ii. Learning strategies to devel	lop vocabulary								
		Tr . otac aim j							1	

	iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement Iv. Worksheet1 and Worksheet 2			
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Worksheet1	7	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt) Profit loss and discount i.Introduction to basics ii.Introduction to discount iii.Probems related on the topics Iv. Worksheet1 and Worksheet 2	7	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving exercises in linear, circular, and matrix arrangements.	1,2

- 1.Barrett, Grant. 2016. *Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking*, Zephyros Press.
- 2.McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3.A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3.General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7					
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8					
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10					
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12					
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10					

	SEMESTER – VI								
Course Title	CO-CURRICULAR ACTIVITIES								
Course code	22UBCC321	Total credits: 1 Total hours: 30P	L	Т	P	S	R	O/ F	С
			0	0	0	4	0	0	1s
Pre- requisite	Nil	Co-requisite	Nil						
Programme		B.Tech Civil Emgineering							

Semester	Fall/ VI semester of third year of the programme								
Course Objective (Minimum 3)									
	2.To stimulate the interests in the all the students to participate		and provide equal opportunities	es to					
	3.To enhance the learning exper and developing their inner s innovative skills etc.		e students and help in recogniz as leadership qualities, creativ	•					
CO1	Apply foundational acclimatization principles situations.	s to adapt	effectively in diverse environmen	ts and					
CO2	Analyze environmental factors influencing understanding of adaptation mechanisms.	acclimatiza	ation, demonstrating a compreh	ensive					
CO3	Evaluate personal adaptability through prac acclimatization challenges.	tical exerci	ses, fostering a proactive approa	ach to					
CO4		Synthesize acclimatization strategies for varying contexts, demonstrating creativity and							
CO5		Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen							
Unit-No.	Content	Contact Hour	Learning Outcome	KL					
I	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	30	Engage in mandatory co- curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing and participating in various programs and events.	1, 2					

CO PO Mapping						
SN	Course Outcome (CO)		Mapped Program Outcome			

1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5, 7
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7.9,10
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

		SEMESTER	R – VI									
Course Title		Extra-cur	ricular	Activ	ities							
Course code	22UBEC321	Total credits: 1	L	T	P	S	R	O/F	С			
		Total hours: 30P	0	0	0	4	0	0	1s			
Pre-requisite	Nil	Co-requisite				N	il					
Programme		B.Tech Civil Emgineering										
Semester		Fall/ VI semester of	third yea	er of the	e progra	amme						
Course Objectives (Minimum 3)		Equip students with effective time management and prioritization skills, fostering leadership qualities and a commitment to their endeavors.										
	 Encourage exploration of interests beyond academics and participation in co-curricular activities, cultivating well-rounded individuals capable of making meaningful community contributions. Enhance students' abilities to express ideas clearly and engage in in-depth evaluation and analysis, while integrating learning experiences to practice transferable skills across various activities. 											
CO1	Learn to a plan so that manage their time and p		ningful	contril	butions	, main	tain a	commitme	nt, and			
CO2	Transform passionate academics.	students who demons			_							
CO3	Learn to participate in development.	various co-curricular	activiti	es lead	ding to	their	multifa	ceted pers	onality			
CO4	Express their ideas, view	ws, In-depth evaluation	and ana	lysis c	learly in	n the to	pic of t	heir interes	t.			
CO5	Demonstrate and practic transferable skills.			•			•					
Unit-No.	Conte	nt	Contac Hour		L	earning	g Outco	me	KL			

I	AdtU encourages a range of activities		Participate in diverse club		1
	outside the regular curriculum intended		activities to develop social and		
	to meet learner's interest, These activities		soft skills, achieve holistic		
	are aimed to develop the social and soft		development, and gain		
	skills and promote a holistic development		, ,		
	of the learners, Keeping in mind the 360		exposure through workshops		
	degree learning methodology the students		and competitions led by		
	are engaged in different activities headed		experts.		
	under different clubs viz. Dance, music,				
	photography, drama, literary etc., The				
	students are encouraged to participate in				
	regular club activities, workshops,				
	competitions as per their interest and	30		1,2	
	hobbies, The student members of the				
	· · · · · · · · · · · · · · · · · · ·				
	club are trained represent AdtU in various inter University student and				
	national level competitions, Renewed				
	personalities are invited to conduct				
	workshops that benefit the members and				
	students by giving them the platform to				
	learn from experts in the respective				
	fields.				
					ı

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7						
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8						
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10						
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12						

5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10
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MAPPING TABLE

Subject Code	Course	РО	РО	РО	РО	PO	PO	РО	PO	PO	PO1	PO1	PO1
	Name	1	2	3	4	5	6	7	8	9	0	1	2
22BTCE321 R	Design of RC Structure	3	2	3	1	1	1	1					1
22BTCE322 R	Engineerin g Economics , Estimation and Costing	3	3	3	2					1		1	1
22BTCE324 R	Structural Analysis II	3	3	2	2	2				1			3
22BTCE324E	Pavement Materials	2	2	1	1	1	1	1					
22BTCE325E	Building Constructio n Practice	2	2	1	1	3	1	1	1				1
22UBPD324 R	Corporate Proficienc y for Engineers								1	1	1	1	
22UBCC321	Co- curricular									1	1		1
22UBEC321	Extra- curricular									1	1		1

	SEMESTER – VII									
Course Title		Design of Steel Structure								
Course code	22BTCE411E	Total credits: 2	L	T	P	S	R	O/F	C	
		Total hours: 30T	2	0	0	0	0	0	2	
Pre-requisite	Nil	Co-requisite		Nil						
Programme		B.Tech C	ivil Emg	gineerin	ıg					

Semester	Fall/ VII semester of	fourth year	of the programme					
Course Objectives (Minimum	 This course provides students with learning about different types of steel structures, their formation characteristics, and practical applications in various industries. The course covers the design of welded and bolted connections, focusing on efficiency and reliabiling in structural design. 							
	3. By studying Students gain insights into justifying the selection and design of steel bear structures.							
CO1	Explain the steel structures, their types and formation	ons.						
CO2	Analize and design welded and bolted connections							
CO3	Elustrate tension members and compression members	ore.						
CO4	Justify steel beams and industrial beams	218						
CO5								
Unit-No.	Design and justify plate girders Content	Contact Hour	Learning Outcome	KL				
I	General principles of design: Types of structural steel, Mechanical properties, codes and specifications, Basis of structural design. Welded connections, advantage, types and properties, Design of weld, Simple joints, moment resistant connections.	6	Understand the types, properties, and specifications of structural steel and the basics of structural design, including welded and bolted connections.	1,2				
п	Bolted joints and Bolted connections in frames: Bolted connections, Centrally and eccentrically loaded connection Welded joints and Welded connection in frames: Types of welded joints, various types of butt and fillet joints, strength and efficiency of welded joints. Welded brackets, moment resistant welded connections.	6	Learn the design principles and applications of centrally and eccentrically loaded bolted connections.	1,2				
III	Design of tension members: Design of tension members, splicing of tension members. Factors effecting the strength of tension member, angle under tension, other sections, modes of failure. Design of compression member and Design of beams: Classification of cross section, Elastic buckling of slender compression member, effective length, compression member composed with two components back to back. Simple laterally restrained and un-restrained beams. Design of Industrial Building: Structural layout of industrial building, Various types of trusses andtheirelection, effect of wind loads on purlin and trusses, bracing systems, columns, foundations, gantry girder – static and moving loads, selection & design of section.	6	Gain proficiency in designing various types of welded joints, focusing on strength, efficiency, and moment-resistant connections.	1,2				
IV	Design of plate girders: Modes of failure: Elastic buckling, bending in the plane of web, Local buckling, buckling in the plane of web, Vertical	6	Develop skills to design tension and compression members, classify cross-sections, and understand the behavior	1,2				

	buckling of the compression flange, Shear buckling.		of slender compression members and beams.	
V	Introduction to Plastic Analysis: Introduction to plastic method of analysis, Design of continuous beams and portal frame using plastic design approach.	6	Acquire knowledge on the structural layout and design of industrial buildings, including trusses, wind load effects, bracing systems, columns, foundations, and gantry girders.	1,2

- 1. Design Of Steel Structures S. Ramamrutham, Dhanpat Rai Publishing Co Pvt Ltd,
- 2. Design Of Steel Structures N. Subramanian, OUP India,2016
- 3. Design Of Steel Structures S K Duggal

Reference Books:

1. Design Of Steel Structures - Dr. N. R. Chandak

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Explain the steel structures, their types and formations.	1,3 & 4							
2	Analize and design welded and bolted connections	1,2							
3	Elustrate tension members and compression members	7.9,10							
4	Justify steel beams and industrial beams	5,7							
5	Design and justify plate girders	5,8							

SEMESTER – VII

Course Tit	Professional Elective-IV Concrete Technology								
Course cod	le 22BTCE415E	Total credits: 3	L	Т	P	S	R	O/F	С
		Total hours: 40T	3	0	0	0	0	0	3
Pre-requisi	ite Nil	Co-requisite		<u>I</u>		N	il	<u> </u>	
Programm	e	B.Tech C	ivil Emg	ineer	ing				
Semester		Fall/ VII semester of f	ourth ye	ar of	the prog	ramme			
Course Objectives (Minimum CO1 CO2	concrete performance Learn the principles of the durability and str Explore various type concretes, and their structures. Learn the constituents and	ntial properties of concrete. of concrete mix design, properties of concrete structure are of concrete, such as pecific applications in different their roles in concrete, in proportioning concrete ing	oduction s. normal serent concluding of	techn streng nstruct cemen	iques, and th, high ion proje t, aggrega	d quality strengt ects. ates, wa	control h, lightv	I measures to weight, and admixtures.	ensure special
CO3		n conducting tests to assess	s fresh an	d hard	lened cor	ncrete p	operties	J.	
CO4	Integrate eco-friendly pra	ctices like alternative mate	erials and	effici	ent curin	g metho	ds in co	ncrete techno	ology.
CO5		maintain industry standard			fe constr	uction p	ractices	•	
Unit-No.	Conte	ent	Contac Hour	t	Learning Outcome				
I	Basics: Historical backgr concrete, general note of recent practice and future tr	n strength mechanism,	Gain an understanding of the historical background, composition, strength mechanisms, recent practices, and future trends in concrete technology.						1,2
П	composition, hydration, her structure, various types cement as per Indian sta Utility in concrete, cla geometry & texture, properties, moisture cont bulking of sand, deleter analysis, various grading ar sampling & testing as per Water - General Requirement impurities. 4. Admixture admixtures, types, necessi admixture - Fly ash, silication and other pozzolanical	roperties, moisture content, water absorption, alking of sand, deleterious substances, sieve nalysis, various grading and grading requirements, ampling & testing as per Indian Standards. 3. Vater - General Requirements & limiting values of appurities. 4. Admixtures - Additives and almixtures, types, necessity and benefit Mineral almixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical almixtures - Accelerator, retarder, water reducing ements, plasticizer and super-plasticizer, their				of c	ement,	ies, testing, aggregates, in concrete	1,2
III	Fresh concrete: Methods and placing of concrete. V and requirement, factors various tests as per IS and bleeding, stiffening, n	Vorkability – Definition affecting workability,	7	tr ce a:	ansportir	ng, pla along workabi	cing, a	of mixing, and curing the factors methods to	1,2

	necessity and various methods, micro-cracking.			
IV	Hardened concrete: Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and non-destructive tests with their limitations, test methods as per IS and ASTM. 5 Durability and permeability of concrete: Definitions, causes, carbonation, cracking.	9	Develop knowledge of the strength properties of hardened concrete, factors affecting its strength, and various destructive and non-destructive testing methods.	1,2
V	Concrete in aggressive environment: Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.	8	Explore the definitions, causes, and impacts of durability and permeability, including the effects of aggressive environments on concrete structures.	1,2

- 1. M S Shetty; Concrete Technology, S.Chand Publication New Delhi 2. P Kumar Mehta, Monteiro;
- 2. Concrete Technology, Indian Concrete Institute

Reference Books:

- 1. A.M.Neville ; Properties of Concrete , Pearson Education
- 2. M L Gambhir; Concrete Technology, Tata McGraw Hill
- 3. IS 456-2000 7.
- 4. IS 269-1989
- 5. IS 516-1959 9
- 6. IS 1786-1985 10
- 7. IS 1893-2002
- 8. IS 12269-1987
- 9. IS 9103-1999
- 10. IS 8112-1989

CO PO Mapping		
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn the constituents and their roles in concrete, including cement, aggregates, water, and admixtures.	1,3 & 4

2	Develop proficiency in proportioning concrete ingredients for desired properties like strength, workability, and durability.	1,2
3	Develop practical skills in conducting tests to assess fresh and hardened concrete properties.	7.9,10
4	Integrate eco-friendly practices like alternative materials and efficient curing methods in concrete technology.	5,7
5	Learn to conduct tests to maintain industry standards and ensure safe construction practices.	5,8

			SEME	STER – VII							
Course Title			Professiona	l Elective	IV Surface H	lydrolo	gy				
Course code		22BTCE414E	Total cred	dits: 3	L	Т	Р	S	R	O/F	С
			Total hou	ırs: 45T	3	0	0	0	0	0	3
Pre-requisite		Nil	Co	-requisite		ı		Nil			1
Programme		Bachelor of Technology in Civil Engineering									
Semester		Fall:	Winter/ VII sen	nester of fo	ourth year o	f the p	rogram	me			
Course Objectives (Minimum 3)		 Understand Hydrological Processes and Modeling: Gain knowledge in hydrology, including precipitation, stream flow measurement, hydrograph analysis, storm runoff, flood estimation, and modeling techniques. Explore the Hydrologic Cycle: Examine how components like precipitation and runoff affect water availability across different regions over time. 									
	6.	for effective water flood control.	and environmen	tal manage							
CO1	Explain	the different concep	ts in hydro-meti	rology.							
CO2		s the key aspects of h	ydrology, along	with a mo	re applied ap	precia	tion of	monito	ring a	nd mod	elling
CO3	General measure	lize knowledge on to ements, as well as raph analysis, storm 1	more detailed	investigati	ons into pro	ecipitat	ion, st				
CO4	Explain tempora	the relevance of va al distribution of water	rious componer er availability in	nts of hydi any region	ologic cycle n.	, whic	h are r	_		_	
CO5		p students' in-depth n support system for				inciple	s can	be app	lied to	supple	ement
Unit- No.	•	Content		Contact Hour		Learr	ning Out	tcome			KL

		I		
	Hydrometeorology: Hydrologic cycle – Global water budget – Practical applications – Hydrometeorology – Constituents of atmosphere – Vertical structure of the atmosphere – general circulation, – Air mass – Air front – cyclones – Formation of precipitation – Types and forms of precipitation – Climate and Weather – Meteorological Observations.	10	Students will demonstrate a comprehensive understanding of the hydrologic cycle and global water budget, including its practical applications in various contexts. They will be able to analyze the constituents and vertical structure of the atmosphere, interpret general circulation patterns, and differentiate between air masses, air fronts, and cyclones. Additionally, students will identify the processes involved in the formation of precipitation, recognize different types and forms of precipitation, and comprehend the relationships between climate and weather. They will also be proficient in conducting and interpreting meteorological observations essential for understanding and predicting weather patterns and phenomena.	1, 2
II	Precipitation: Measurement of rainfall – Rain gauges – Radar Measurement of rainfall - Rainfall Hyetograph – Intensity Duration and Frequency analysis – Consistency – Missing data – Rain gauge network – Average depth of rainfall analysis.	10	By the end of this unit on precipitation, students will be able to effectively measure rainfall using both traditional rain gauges and radar technology. They will learn to analyze rainfall data using techniques such as creating rainfall hyetographs, conducting Intensity Duration Frequency (IDF) analysis, assessing data consistency, and handling missing data. Students will also gain proficiency in designing and managing rain gauge networks to collect accurate precipitation data and perform analysis to determine average depths of rainfall over specified periods.	2, 3, 4
III	Abstractions: Water losses - Initial losses - Interception and depression storage - Evaporation - Evaporimeters - Estimation of Evaporation - Evapotranspiration - Field Measurement - Empirical Equations - Infiltration - Infiltrometers - Infiltration Equations - Infiltration Indices.	10	Upon completion of this unit, students will demonstrate proficiency in understanding and applying concepts related to water losses and abstractions in hydrology. They will be able to analyze initial losses including interception and depression storage, evaluate methods of measuring evaporation using evaporimeters, and estimate evapotranspiration through empirical equations and field measurement techniques. Additionally, students will gain practical skills in assessing infiltration using infiltrometers and interpreting infiltration equations and indices, thereby developing a comprehensive understanding of the factors influencing water movement and losses in natural	1, 2, 3,4

			and engineered environments.	
IV	Streamflow Measurement: Stage and Velocity Measurement – Gauges – Current meter and Doppler flow velocity meter - Discharge measurement – Area Velocity method - Area Slope method – Discharge Measuring Structures - Dilution Technique – Stage Discharge relationship – Selection of a Stream Gauging Site	10	Upon completion of this unit on Streamflow Measurement, students will be able to demonstrate a comprehensive understanding of various methods and technologies used in the measurement of streamflow. They will proficiently describe and apply principles related to stage and velocity measurement using gauges, current meters, and Doppler flow velocity meters. Additionally, students will be able to calculate discharge using both the Area Velocity method and the Area Slope method, and identify appropriate Discharge Measuring Structures for different scenarios. They will also gain competence in applying the Dilution Technique and establishing Stage Discharge relationships. Furthermore, students will be capable of evaluating and selecting suitable stream gauging sites based on specific criteria and considerations relevant to hydrological studies and water resource management.	1, 2
V	Runoff and Water Conservation: Concept of catchment – Linear, Areal and Relief Aspects – Detailed study of Runoff process – Factors affecting Runoff – Hydrograph – Unit Hydrograph – Synthetic Hydrograph –Runoff estimation - Strange and SCS methods – Water Conservation – Rain water and Runoff Harvesting in Rural and Urban Areas - Reservoir Sedimentation.	5	By the end of this unit on Runoff and Water Conservation, students will be able to comprehensively understand the concept of catchment areas, including their linear, areal, and relief aspects. They will have detailed knowledge of the runoff process and the factors influencing it, as well as the ability to analyze hydrographs and apply methods such as Unit Hydrograph and Synthetic Hydrograph for runoff estimation. Furthermore, students will gain practical insights into water conservation strategies, including rainwater and runoff harvesting techniques applicable to both rural and urban environments, and grasp the challenges and methods related to reservoir sedimentation management.	2, 3, 4, 5

Text Books:

- 1 Chow V.T., Maidment D.R., Mays L.W., "Applied Hydrology", McGraw Hill Publications, New York, 1995.
- 2 Subramanya K., "Hydrology, Tata McGraw Hill Co., New Delhi, 1994.
- 3 Patra.K.C, "Hydrology and Water Resources Engineering", Narosa Publications, 2008, 2nd Edition, New Delhi.

Reference Books:

- 1 Jeya Rami Reddy.P, "Hydrology, Laxmi Publications, New Delhi, 2004".
- 2 Larry W. Mays, "Water Resources Engineering", Wiley Publication"

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Explain the different concepts in hydro-metrology.	3,2
2	Discuss the key aspects of hydrology, along with a more applied appreciation of monitoring and modelling hydrological processes.	1,2
3	Generalize knowledge on topics ranging from climatology, atmospheric circulation and meteorological measurements, as well as more detailed investigations into precipitation, stream flow measurement, hydrograph analysis, storm runoff and concepts in flood estimation and routing.	1,4
4	Explain the relevance of various components of hydrologic cycle, which are responsible for spatial and temporal distribution of water availability in any region.	7.9,10
5	Develop students' in-depth understanding on how hydrologic principles can be applied to supplement decision support system for water and environmental management.	5,7

		SEMESTER	– VII											
Course Title		Generic Elective II	Nano-scie	nce &	Techno	ology								
Course code	e 22BTCE414E	Total credits: 3	L	T	P	S	R	O/F	С					
		Total hours: 40T	3	0	0	0	0	0	3					
Pre-requisit	e Nil	Co-requisite				N	il							
Programme	!	B.Tech Civil Emgineering												
Semester		Fall/ VII semester of fourth year of the programme												
Course Objectives		ng of the core principles a				_								
(Minimum 3	nanoscale level.	unique and unexpected pr												
CO1	Learn about the basics of l	Nanotechnology.												
CO2	Understand the concepts of	f extraordinary properties	exhibit a	t nanos	scale.									
СОЗ	Learn different synthesis/	fabrication techniques of 1	nanomate	rials.										
CO4	Learn about different char	acterization methods of na	anomateri	als.										
CO5	Learn the software used for	or analysis of characterized	d data.											
Unit-No.	Conte	nt	Contact Hour		L	earning	Outcor	ne	KL					
ı	technology, History of Properties of Nano materia Bulk and Nanomaterial, Mo for nanostructure systems, and molecules - Particles a	significance, unique properties of nanomaterials, Molecular building blocks acture systems, Forces between atoms les - Particles and grain boundaries – molecular forces – Electrostatic and							1.2					
II	nanoparticles, nanotubes, nanowires, nanodots etc.; electronic and optical characteristic properties of nanoparticles, nanotubes, a							ls like bes, and lore their properties, f quantum	1,2					
III	Synthesis/fabrication technic Top down approach, Lithog and ion beam techniques, etching, Bottom up approach	graphy – electron beam Etching – wet and dry	7	nai	ttom-up nomater	ial s	pproach ynthesis	down and les for fabrication. lithography,	1,2					

	template based synthesis, other important synthesis methods like CVD, PVD etc.; Doping, Nucleation, Growth and Stability of colloidal nanoparticles, concept of self assembly.		etching, self-assembly, and methods like CVD and PVD.	
IV	Characterization methods: Transmission electron microscopy (TEM), Scanning electron microscopy (SEM), Atomic force microscopy (AFM) and X-ray diffraction Spectroscopy (XRD).	9	Master characterization methods for nanomaterials such as TEM, SEM, AFM, and XRD.	1,2
V	Applications: Nanosensors and nanoelectronics, Micro & Nano electromechanical systems, Photonic crystals, Nano pizotronics, Nanomedicine.	8	Discover applications of nanotechnology in various fields like sensors, electronics, MEMS/NEMS, photonics, pieztronics, and nanomedicine.	1,2

Text Books:

- 1. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanoscience, CRC Press.
- 2. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanotechnology, CRC Press.

Reference Books:

- 1. T. Pradeep, Nano: The essentials, McGraw Hill.
- 2. D. Maclurcan& N. Radywyl (Eds.), Nanotechnology and global sustainability, CRC Press.
- 3. E. Lichtfouse, J. Shwarzbauer, D. Robert, Environmental chemistry for sustainable world, vol.2, Springer verlag.

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Learn about the basics of Nanotechnology.	1,3 & 4								
2	Understand the concepts of extraordinary properties exhibit at nanoscale.	1,2								
3	Learn different synthesis/ fabrication techniques of nanomaterials.	7.9,10								
4	Learn about different characterization methods of nanomaterials.	5,7								
5	Learn the software used for analysis of characterized data.	5,8								

MAPPING TABLE (7th Semester)

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE411E	Design of												
	Steel	3	2	2	2	1		2					1
	Structure												
22BTCE415E	Concrete Technology	2	2	2	2	2		2					3
22BTCE415E	Surface Hydrology	3	2	2	2	1		2					1
22BTCE414E	Nano- science & Technology	2	2	2	3	2							1

	SEMESTER – VIII
Course Title	Professional Elective V- Soil Mechanics

Course	code	22BTCE421R Total credits: 2 L T P S R O/F C										
			Total hours: 3		2	0	0	0	0	0		2
Pre-req		Nil	Co-requ					N	il			
Prograi		- ,		f Technolog								
Semeste			: Winter/ VIII									
Course Objecti			an advanced un pratory testing,									
(Minim			onsolidation the					s, wit	n a	iocus o	on Su	iess
(1,111111	· · · · · · · · · · · · · · · · · · ·		ency in geotech	•		_	•	lations	slon	es and	retair	nino
			plying principle									
		-	ed geotechnical	concents by	integr	ating o	reosynt	hetics i	n rein	forced st	tructu	res
			ound improvem									
			plication of soil									
CO	1	To Conduct advanced so		and characte	rizatio	n, em	ploying	labora	tory-t	esting te	chnic	ues to
		determine soil properties	accurately.									
CO	2	To Analyze stress distrib						ettleme	nts th	rough co	onsoli	dation
CO	3	theory and assessing she To Design shallow and						aaring	cono	city and	so##1	lamont
	J	analysis, while also dem								city and	selli	CHICHI
CO	4	To Apply earth pressur								neads, in	corpo	orating
		reinforced soil structures	into geotechnic	al solutions.							-	
CO	5	To Demonstrate proficie										
		in the design and constr	ruction of reinfo	orced struct	ures, a	and ap	plying	ground	impr	ovement	tech	niques
Unit-		effectively Content		Contact			Loorn	ing Ou	toom	0		KL
No.		Content		Hour			Lain	ing Ou	ittoili	ıc		IXL
I		UNIT	1:							mprehen		1, 2
		RODCUTION Overview	of									
	Geot	echnical Engineering:								1 '	and	
	•	Definition,	scope, and							iliar with ntributor		
		importance of engineering.	geotechnical							ne esse		
		Historical	developments			ionshi		tween		ology	and	
		and key contributors			geot					tudents		
	•	Interrelation			gras		ındame		soil	mecha		
		geology and	geotechnical			cepts,						
		engineering.								ent, and olids, w		
		Basic Soil Mechanic								ll unders		
	•	Fundamenta soils (particle	l properties of size, soil	5				•	•	stress-st		
		classification, moistu	·	3						so cover		
	•		solids, water,							geotechr		
		and air.	,							sional et nonstrate		
	•		behavior and							enginee		
		stress-strain relations	_				gineerii			· chghice	5	
		Role of Geotechnica	l Engineer:				_	• • •				
	•	Professional responsibilities a	nd ethical									
		considerations.	nd cincar									
	•		s highlighting									
		the significance of										
		engineering in civil p										
					T.T		1	41	:4	414	:11	1.2
II		2: SHALLOW FO								students rstanding		1, 2, 3, 4
	AND	BEARING CAPACITY	Y	1.0	shal		founda			luding	an	5,4
		Types of Shallow Fo		10						ch as sp		
	•	3 / 61 / 16 //	of different		foot	ings a	nd mat	founda	ations	, along	with	
		types of shallow	foundations		crite	ria	for	selecti	ng	approp	riate	

	 (spread footings, mat foundations). Selection criteria based on soil conditions and structural requirements. Bearing Capacity Basics: Definition of bearing capacity. Factors influencing bearing capacity: soil strength, foundation geometry, and loading conditions. Ultimate and allowable bearing capacity. Terzaghi's Bearing Capacity Equation: Derivation and application of Terzaghi's bearing capacity equation. Practical considerations and limitations of the equation. 		foundation types based on soil conditions and structural requirements. They will grasp the concept of bearing capacity, factors influencing it, and the differentiation between ultimate and allowable bearing capacity. Additionally, students will learn the derivation and application of Terzaghi's bearing capacity equation, recognizing its practical considerations and limitations, thus equipping them with essential knowledge for assessing and designing shallow foundations in civil engineering projects.	
III	UNIT 3: BEARING CAPACITY THEORIES AND APPLICATION Other Bearing Capacity Theories: Introduction to other bearing capacity theories (Meyerhof, Hansen). Comparative analysis of different bearing capacity theories. Influence of Water Table: Effect of the water table on bearing capacity. Application of correction factors in bearing capacity analysis. Foundation Settlement: Causes and types of foundation settlement. Methods for predicting and mitigating settlement.	5	Upon completing Unit 3: Bearing Capacity Theories and Application, students will gain a comprehensive understanding of various bearing capacity theories, including those proposed by Meyerhof and Hansen, and will be able to conduct comparative analyses of these theories. They will learn how the presence of a water table influences bearing capacity and how to apply correction factors in such scenarios. Additionally, students will explore the causes and types of foundation settlement, and develop skills in predicting and mitigating settlement issues, enabling them to make informed decisions in geotechnical engineering practice.	1, 2, 3, 4, 5
IV	UNIT 4: SETTLEMENT OF FOOTING Immediate and Consolidation Settlement:	5	Upon completing Unit 4: Settlement of Footing, students will be able to distinguish between immediate and consolidation settlement, understanding the respective calculation methods for each. They will grasp the time-rate of settlement and its implications, predicting settlement behavior using both empirical and analytical methods. Through practical applications and case studies, students will analyze real-world examples of footing settlement in various construction projects, extracting valuable lessons from these case studies to enhance their understanding and application of settlement principles in geotechnical engineering.	2, 3, 4

construction projects. • Analysis of lessons learned from case studies.			
UNIT 5: SOIL EXPLORATION AND STABILITY ANALYSIS Methods of Soil Exploration: Overview of geotechnical site investigation techniques (boring, sampling, in-situ tests). Selection of exploration methods based on site conditions. Stability Analysis of Slopes: Slope stability analysis methods (infinite slope, circular failure). Factors affecting slope stability. Case Studies in Soil Exploration and Stability: Application of soil exploration data in slope stability analysis. Review of case studies demonstrating the importance of thorough soil investigation in stability assessments.	5	Upon completing Unit 5: Soil Exploration and Stability Analysis, students will be able to proficiently conduct geotechnical site investigations using various methods such as boring, sampling, and in-situ tests, selecting appropriate techniques based on specific site conditions. They will gain a comprehensive understanding of slope stability analysis methods, including infinite slope and circular failure, and will be able to identify and evaluate the factors affecting slope stability. Additionally, students will apply soil exploration data to practical slope stability assessments and critically review case studies that highlight the critical role of detailed soil investigation in ensuring stability and safety.	2, 3, 4, 5

Text Books:

- 1 "Principles of Geotechnical Engineering" by Braja M. Das,1994
- 2 "Foundation Design: Principles and Practices" by Donald P. Coduto, William A. Kitch, and Man-chu Ronald Yeung, $2001\,$

Reference Books:

- 1 "Soil Mechanics and Foundations" by Muni Budhu: 1999
- 2 "Geotechnical Engineering: Principles and Practices" by Donald P. Coduto, Man-chu Ronald Yeung, and William A. Kitch: 2005
- 3 "Introduction to Geotechnical Engineering" by Robert D. Holtz, William D. Kovacs, and Thomas C. Sheahan, 1981

OTHER LEARNING RESOURCES:

 $\underline{https://archive.nptel.ac.in/courses/105/101/105101084/}$

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	To Conduct advanced soil exploration and characterization,	1,3 & 4

	employing laboratory-testing techniques to determine soil properties accurately.	
2	To Analyze stress distribution in soils in three dimensions, predicting settlements through consolidation theory and assessing shear strength using critical state soil mechanics.	1,2
3	To Design shallow and deep foundations, applying principles of bearing capacity and settlement analysis, while also demonstrating competence in slope stability analysis and design.	7.9,10
4	To Apply earth pressure theories to design effective retaining walls and bulkheads, incorporating reinforced soil structures into geotechnical solutions.	5,7
5	To Demonstrate proficiency in incorporating geosynthetics into soil engineering practices, utilizing them in the design and construction of reinforced structures, and applying ground improvement techniques effectively	5,8

			SEMESTE	R – VIII						
Course	Title		ional Electiv	e V - Ear	thqua					
Course	code	22BTCE422R Total cree		L	T	P	S	R	O/F	C
_		Total hou		2	0	0	0	0	0	2
Pre-req		<u> </u>	requisite	<u> </u>	G1 17			Nil		
Prograi			elor of Tech							
Semeste Course		Fall: Winter 1. This course explores the be						gramn	ne	
Objecti		2. Students analyze SDOF an						d eartl	hauakes, st	udv stiffness
(Minim		damping, and lateral forces					tion un	a cara	iquanes, se	ady summes
`	,	3. They also learn ductile d					rthquak	e-resi	stant desig	n principles
		essential for creating resilie								
CO)1	Determine the response of SDOF &	MDOF struc	tural syst	em sub	jected	to vibr	ation i	ncluding e	arthquake.
CO	2	Discuss the concept of stiffness and	damping.							
CO		Determine the lateral forces generat			to eart	hquake				
CO		Apply the concept of ductile detailing	<u> </u>							
CO	5	Apply the concept of Earthquake Re	esistant Desig	n & conc	ept of	lateral	load di	stribut	ion on buil	dings.
Unit-		Content	Contact		I	Learni	ng Out	come		KL
No.			Hour						will have	a 1, 2
W. The state of th	seism tector eartho eartho Seism		e f f f 5	includir studying activities concept of far earthqu between such a understathem. A about the da worldw and mit	ng its g the es. The c of pla ults, akes. S n the b as ma and the addition ne seis mages ide, er igate e	scop Earth ey will te tecto and Student basic pa agnitude e vario nally, mic zo cause nhancin arthqua	e and 's inte l be al onics, the s will l aramete le and us scale they we ones in ed by ng thei ake-rela	I sign rior a ble to he natuconsece earn ters of dinters used ill gain past rabilitated ri	o distingui earthquake ensity, a d to measu n knowled and analy earthquak ity to asse sks.	in nic he es of sh ees, and are ge es ess
II	Vibra Static control system buildi v/s buildi like damp buildi Respo	ified single degree of freedom, mathematical modelling of ings, natural frequency, resonance increased response, responses of ings to different types of vibration free and forced, damped and unded vibration, response of ing to earthquake ground motion onse to multi degree (maximum of freedom systems up to model.)	e e e e e e e e e e e e e e e e e e e	worldwide, enhancing their ability to assess and mitigate earthquake-related risks. Upon completing the unit on Fundamentals of Earthquake Vibrations of Buildings, students will be able to understand and distinguish between static and dynamic loads, including force and displacement control mechanisms. They will gain proficiency in simplifying complex structures into single degree of freedom (SDOF) systems and mathematically modeling buildings to analyze their vibrational characteristics. Students will be able to determine natural frequencies and recognize the phenomena of resonance and increased response. They will learn to evaluate the responses of buildings to various types of vibrations, including free, forced, damped, and undamped vibrations. Additionally, they will be capable of analyzing the response of buildings to earthquake ground motions and understand the behavior of multi-degree (up to three degrees) of freedom systems, including						nts 4 sh ng ng ns. ng of lly nal to ze ed he of nd ill of nd to

TTT	T		Dry the and of this main start of the	1 2 2
III	Design Philosophy: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875(Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to Response spectrum, IS code provisions.	5	By the end of this unit, students will have a comprehensive understanding of the philosophy behind earthquake-resistant design, distinguishing it from earthquake-proof design. They will learn the critical attributes of earthquake-resistant structures, namely strength, stiffness, ductility, and configuration, and how these contribute to a building's resilience. The unit will cover the principles of seismic structural configuration and introduce key Indian Standards (IS: 1893 Part I and IS: 875 Part V) relevant to seismic design. Students will gain practical knowledge of calculating seismic loads using the Seismic Coefficient Method, including determining base shear and its vertical distribution. Additionally, they will be introduced to the concept of the response spectrum and the associated IS code provisions, equipping them with the necessary skills to design structures that can withstand seismic forces effectively.	1, 2, 3, 4, 5
IV	Lateral Loads on Buildings: Lateral Load Distribution (SDOF): Rigid diaphragm effect, centers of mass and stiffness, torsionally coupled and uncoupled system. Lateral Load Analysis: Analysis of frames using approximate methods like portal & cantilever methodsdrawing of small residential buildings.	5	By the end of this unit on "Lateral Loads on Buildings," students will be able to analyze the behavior of buildings under lateral loads. They will understand the principles of lateral load distribution in structures with rigid diaphragms, including the effects of centers of mass and stiffness. Students will be proficient in distinguishing between torsionally coupled and uncoupled systems and will be capable of conducting lateral load analysis of frames using approximate methods such as portal and cantilever methods. Additionally, they will be able to apply these concepts to draw preliminary designs for small residential buildings.	2, 3, 4
V	Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions.	5	By the end of this unit on Ductile Detailing, students will demonstrate a proficient understanding of detailing principles for structural components based on IS: 13920 specifications. They will be able to apply these concepts effectively to ensure ductile behavior and enhance the structural integrity of reinforced concrete elements. Students will be capable of interpreting and implementing the guidelines for detailing reinforcement in beams, columns, slabs, and other structural elements, thereby contributing to safer and more resilient structural designs in accordance with established standards.	2, 3, 4, 5

Text Books:

1. Manish Shrikhande & Pankaj Agrawal; Earthquake resistant design of structures, PHI Publication, New Delhi.

Reference Books:

- 1. A.K.Chopra; Dynamics of structures , Pearson, New Delhi
- 2. Clough & Penzin; Dynamics of structures
- 3. C V R Murthy Earthquake Tips, NICEE

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Determine the response of SDOF & MDOF structural system subjected to vibration including earthquake.	1,2 & 4				
2	Discuss the concept of stiffness and damping.	1,3				
3	Determine the lateral forces generated in the structure due to earthquake.	7.9,10				
4	Apply the concept of ductile detailing in RC structures.	5,6				
5	Apply the concept of Earthquake Resistant Design & concept of lateral load distribution on buildings.	5,7				

	SEMESTER – VIII Course Title Railway and Airport Engineering											
		Airport Engineering										
Course	code	22BTCE423R	Total credits Total hours:		L 3	T 0	P 0	S 0	R	O/F 0		<u>C</u>
Pre-rea	re-requisite Nil Co-requisite Nil								3			
Prograi		111		r of Technol	logy in	Civil I	Engine		1 111			
Semeste		Fal	l: Winter/ VI						amm	e		
Course		5. The course "Railwa									compre	ehensive
Objecti		understanding of the										
(Minim	um 3)	6. It focuses on equip					s and	knowle	edge	needed	to add	ress the
CO	\1	challenges and innov					1 .4					
CO	71	Describe different compo- construction and engineering			ieir Tun	ictions	ana it	s opera	ation	system	with re	spect to
CO	2	Identify different failures of			nt wheel	l and a	xis arra	ngeme	nts.			
CO		Design different geometric		-				8				
CO		Design different types of R			r							
CO		Explain essential features a				s of sig	naling	and int	erlocl	king syste	em.	
Unit-	1	Content	1	Contact	71			ing Ou				KL
No.		Content		Hour			Learn	ing Ot	ittoili	ıc		KL
	Development Development Complex Complex Rails rails, faster sleepelopment Complex Rails rails, faster sleepelopment Complex Rails rails, faster sleepelopment Complex Rails rails, faster sleepelopment Complex Rails ra	WAY ENGINEEIRNG: lopment of railways anent way and rail onents, different gauges ing of wheels, Functions bonents - Rails, Sleepers - types of rails, rail section creep of rails, rail frings, rail joints and weld ers – types, spacing and der pes, advantages and dirade – Requirement, emban	in India, way track in India, of various and Ballast, as, defects in ixtures and ing of rails, asity, Ballast sadvantages,	10	components such as rails, sleepers, and ballast, detailing their types, spacing, and densities. They will analyze the advantages and disadvantages of various types of ballast and understand the requirements for subgrade and embankment construction. Additionally, students will be able to identify common rail defects, understand rail creep, and explain the				India, by and e able auges anning be the key allast, sities. and et and be and on ally, on rail in the elding			
П	trains defici wider Switce of T crossis and resists sleeper Point crossidiame Railw classi Railw in ya objec	ents, grade compensation on curves, super eleva ency, negative super eleva	a, speed of vation, cant tion, curves, ok layouts, ngs, Layout at, Diamond lway station and track rack – rails, as, switches, ypes, splits, crossovers. as, facilities, ps, sidings. d equipment ol system –	10	principles behind rail joints and welding techniques. Upon completing this unit on the geometric design of railway tracks, students will be able to analyze and design railway track layouts incorporating gradients, grade compensation speed considerations for curves, and principles of super elevation to enhance safety and efficiency. They will understand the concepts of cant deficiency and negative super elevation, applying them appropriately to track design. Furthermore, students will gain proficiency in designing and implementing various track layouts including switches crossings (such as diamond and scissors crossings), and turnouts (including double turnouts). They will comprehend the				e able ayouts sation, ciples and acepts super ly to I gain enting tches, issors louble the design yards, stress epers,	1, 2, 3, 4		

	1		fundamentals of signaling and according	
			fundamentals of signaling and control systems, their objectives, classifications, and the principles of interlocking signals and points to ensure safe railway operations.	
III	AIRPORT ENGINEERING: General: History, development, policy of air transport, aircrafts, aerodromes, air transport authorities, air transport activities, air crafts and its characteristics, airport classifications as per ICAO. Airport Planning: Regional planning-concepts and advantages, location and planning of airport as per ICAO and FAA. Airport Master plan, Airport site selection, Zoning laws, Airport Elements - airfield, terminal area, zoning laws, classification of obstructions, approach zone, turning zone, airport capacity, runway capacity, estimation of future air traffic, development of new airport, requirements of an ideal airport layout.	10	The learning outcome of the unit on air transport and airport planning encompasses a comprehensive understanding of the historical evolution, regulatory frameworks, and operational aspects of air transport systems worldwide. Students will gain knowledge of aircraft types and their characteristics, aerodrome classifications, and the roles of air transport authorities. They will develop proficiency in airport planning principles according to international standards (ICAO and FAA), covering regional planning concepts, airport master planning, site selection criteria, zoning laws, and the design and classification of airport elements such as airfields and terminals. Additionally, students will learn to assess airport and runway capacities, estimate future air traffic demands, and apply principles for developing new airports, culminating in the ability to conceptualize ideal airport layouts.	1, 2, 3, 4, 5
IV	Run Way Design: Wind rose and orientation of runway, wind coverage and crosswind component, factors affecting runway length, basic runway length and corrections to runway length, runway geometrics and runway patterns (configurations), Runway marking, threshold limits cross section of runway. Taxiway Design: Controlling factors, taxiway geometric elements, layout, exit taxiway, location and geometrics, holding apron, turnaround facility. Aprons locations, size, gate positions, aircraft parking configurations and parking systems, hanger-site selection, planning and design considerations, Fuel storage area, blast pads. Wind direction indicator. LCN system of Pavement Design, Airfield Pavement – Failures, Maintenance and Rehabilitation	10	Upon completion of this unit on Airfield Design and Planning, students will be able to demonstrate comprehensive knowledge and skills in various critical aspects of airfield infrastructure. They will understand the principles of runway design, including the influence of wind orientation and coverage on runway orientation and length requirements, as well as factors affecting runway length determination and geometric configurations. Students will be proficient in designing taxiways, considering geometric elements, layout, and exit strategies, as well as planning apron locations, sizes, and configurations for efficient aircraft parking and turnaround operations. Additionally, they will grasp the essentials of pavement design using the LCN system, comprehend common airfield pavement failures, and formulate strategies for maintenance and rehabilitation. This unit will equip students with the necessary expertise to contribute effectively to the planning, design, and operational efficiency of airfield facilities.	2, 3, 4
V	Terminal Area: Elements and requirements, terminal building functions, space requirements, location planning concepts, vehicular parking area and circulation network, Grading and Drainage: Airport grading-importance, operations, airport drainage aims, functions, special characteristics, basic requirements, Deign of drainage - surface and subsurface drainage systems, Air Traffic Control and Visual Aids: Need of Air traffic control, Air traffic	5	By the end of this unit, learners will demonstrate a comprehensive understanding of terminal area planning and design within an airport context. They will be able to analyze and apply the fundamental elements and requirements of terminal buildings, including functional spaces and spatial requirements. Students will also grasp essential concepts in vehicular parking area design and circulation networks, incorporating considerations for efficient operations and user experience.	2, 3, 4, 5

control network, Air traffic control aids - landing information system, airport	Furthermore, they will comprehend the significance of airport grading and drainage	
markings and lighting.	systems, understanding their roles in ensuring	
	operational safety and efficiency.	

Books:

- 1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
- 2. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.
- 3. Transportation Engineering, Volume-II- Railways, Airports, Docks and Harbours, Bridges and Tunnels by C. venkatramaih, Universities Press
- 4. Air-port Engineering by S.K.Khanna and M.G.Arora

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Describe different components of the rail track, their functions and its operation system with respect to construction and engineering applications.	1,3 & 5				
2	Identify different failures of rails and explain different wheel and axis arrangements.	1,4				
3	Design different geometric features of railway track	7.9,10				
4	Design different types of Railway Point and Crossing	5,8				
5	Explain essential features and requirements of different types of signaling and interlocking system.	5,7				

Course Title Economics for Engineers			SEMESTER –							
Pre-requisite Nil Co-requisite Nil Co-requisite Nil Co-requisite Nil Co-requisite Nil	Course Titl	le	Economics	s for E	ngin	eers				
Pre-requisite Nil Co-requisite Nil Bachelor of Technology in Civil Engineering	Course cod	e 22BTCE424E				P			O/F	
Programme Bachelor of Technology in Civil Engineering		Total hours: 36T 3				0	0		0	3
Semester			_							
Course Dipertives (Minimum 3) 3. To understand the basics of Economics in Engineering (Minimum 3) 3. To understand the Industrial Laws		e	Bachelor of Technol		Civi	l Eng	ineerir	ng		
Objectives (Minimum 3) 3. To understand the Industrial Laws				VII						
CO1										
CO2 Apply the concepts of Economics in Engineering problems CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy CO5 Appraise the financial aspects of projects Unit-No. Content Content Hour I Introductory Macroeconomics: What is Macroeconomics, Basic concepts in macroeconomics: significance of economics, LPG meaning, demand and supply. Law of demand, law of supply. Difference of macroeconomics and microeconomics and microeconomics (GPP) and Net Domestic Product (GNP), Net National Product (NNP), Gross Domestic Product (GPP) and Net Domestic Product (NDP). Fixed, Variable, Marginal & Average Costs, Recurring and Nonrecurring Costs, Break Even Analysis, ROI, Payback period II Industrial Statistics: Measures of central tendency, Relation between mean, median and mode, Measure of dispersion, moments, skewness, Kurtosis, Probability distribution, Binomial distribution, Poisson distribution, Test of hypothesis, Chi-square distribution, application of chi square test, ANOVA test, Level of confidence, Regression model, Simple linear regression analysis, coefficient of correlation, correlation coefficient, Mean absolute deviation (MAD), Mean squared error(MSE) IV Industrial laws: Laws related to Industrial Relations and Industrial Disputes: Industrial to Indust				ing						
CO2 Apply the concepts of Economics in Engineering problems CO3 Explain the rights to comprehend the working hour and over duty CO4 Illustrate the ways to mitigate the hurdles to Indian Economy CO5 Appraise the financial aspects of projects Unit-No. Content Contact Hour I Introductory Macroeconomics: What is Macroeconomics, Basic concepts in macroeconomics: significance of economics, LPG meaning, demand and supply. Law of demand, law of supply. Difference of macroeconomics and microeconomics II Economic Indexes: Aggregates related to National Income: Gross National Product (GNP), Net National Product (NNP), Gross Domestic Product (GDP) and Net Domestic Product (NDP). Fixed, Variable, Marginal & Average Costs, Recurring and Nonrecurring Costs, Break Even Analysis, ROI, Payback period III Industrial Statistics: Measures of central tendency, Relation between mean, median and mode, Measure of dispersion, moments, skewness, Kurtosis, Probability distribution, Binomial distribution, Poisson distribution, Test of hypothesis, Chi-square distribution, application of chi square test, ANOVA test, Level of confidence, Regression model, Simple linear regression analysis, coefficient of correlation, correlation coefficient, Mean absolute deviation (MAD), Mean squared error(MSE) IV Industrial laws: Laws related to Industrial Relations and Industrial Disputes: Industrial III Ustrate the ways to mitigate the hurdles to Indian Economy										
CO3	COI	Officerstand the principles	or economics							
CO4	CO2	Apply the concepts of Eco	nomics in Engineering pr	oblem	S					
CO4	CO3	Explain the rights to comp	rehend the working hour	and ov	er du	tv				
CO5						· cy				
Unit-No. Content Contact Hour										
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Relations and Industrial Disputes: Industrial to Indian Economy		<u> </u>								
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disputes act, 1947: definition and authorities,		•								
		awards, settlement, strike lockouts, lay off,								
retrenchment and closure. The Trade Union Act,			•							
1926, Laws related to health, safety and welfare: 8			•	8						
The Workmen's Compensation Act, 1923		•								
Provisions, and Social Legislation: Employee State		=								
Insurance Act 1948: Definition, employees'										
provident fund. Miscellaneous Provision Act 1948:		-								
Schemes, Administration and determination of		Schemes, Administration	and determination of							

	dues, Laws related to compensation management:		
	The payment of Wages Act 1948: Objectives,		
	Definition, and Authorised Deductions.		
V	Challenges in Indian Economy: Poverty- Main		Appraise the financial aspects of projects
	programmes for poverty alleviation, Human Capital		
	Formation: How people become resource; Role of		
	human capital in economic development;		
	alternative farming - organic farming Employment:		
	Growth and changes in work force participation	8	
	rate in formal and informal sectors; Energy and		
	Health: Sustainable Economic Development:		
	Meaning, Effects of Economic Development on		
	Resources and Environment, including global		
	warming.		

TEXT BOOKS:

- 1 Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
- 2 V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill

REFERENCE BOOKS:

1: M Chakravarty, Estimating, Costing Specifications & Valuation

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Understand the principles of economics	1,3				
2	Apply the concepts of Economics in Engineering problems	1,2				
3	Explain the rights to comprehend the working hour and over duty	7,9				
4	Illustrate the ways to mitigate the hurdles to Indian Economy	6,7				
5	Appraise the financial aspects of projects	8.10				

SEMESTER – VIII										
	·			d Engine		1		1		
Course co	ode 22BTCE425E	Total credits: 3	L					C		
D		Total hours: 36T						3		
	Pre-requisite Nil Co-requ			risite Nil Fechnology in Civil Engineering						
Programme Bachelor of To Semester			nnology in VIII	i Civil En	iginee	rıng				
Course		of critical reflection,		al curios	eits/ t	olarai	nca of	ambio	nity	scholarly
Objective	_		menecu	iai cuitos	sity, t	oiciai	icc of	amorg	uity,	scholarry
(Minimu		nd tools to inquire into	to the histo	ory and p	hiloso	phy o	of engi	neering	educ	ation, and
Ì	develop skills for usin	g these tools		-				_		
		ls to problematize diffe								
	_	oneself and others abo	out the na	ature of	engine	ering	educ	ation, a	nd er	ngineering
	education									
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CO1	Students will understand the and in modern period	ne Beginning and Deve	elopment i	ın differei	it field	of sc	ience	ın ancıeı	nt, me	edieval,
CO2	Students will study the	biography of differen	rent scien	tist like	Band	havar	. Ars	ahhtatta	. Br	ahmounta
	Bhaskaracharya, Varaham		501011	IIIO IIRO	Daud	yuı	,y		, 110	gapia,
CO3	Student will study the vari		ion lilea D	DDO CC	מז מו	C IC	DO at			
CO ₄	Students will be able to stu									
CO5	It explores how science an	_ ·			•				trol it	i.
Unit-	Content		Contact		Learı					KL
No.	Content		Hour		Lear	iiig (Jucos			IXL.
I	Historical Perspective: The			Students	wi	11	unders	stand	the	
	and technology, Roots	of science and		Beginnii				pment		
	technology in India, Scien	ce and society,	5	different					ent,	1,2
	Scientists and society, Science	and Faith and the		medieva	I, and	ın mo	dern p	eriod		
	rise of applied sciences.									
II	Science and Technology-	The Beginning:		Students						
	Development in different bran	ches of Science in		different scientist like Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira,						
	Ancient India: Astronomy	y, Mathematics,								
	Engineering and Medicine 2.	-	5	Nagarju		a,	va	гананин	ııra,	1,2
	metallurgy: Use of Copper, B	ronze and Iron in		rvagarjui	na cic.					
	Ancient India. 3. Developme	nt of Geography:								
	Geography in Ancient Indian I									
III	Developments in Science an	•••		Student	will	stu		ne vari		
	Medieval India: 1. Scientific a	· ·		research				ke DRI	טט,	
	Developments in Medieval In			CSIR, II	XC, 13.	KO EI	.			
	the Islamic world and Euro	-								
	maktabs, madrasas and kark	_	10							1,2
	Developments in the fields		-							- ,—
	Chemistry, Astronomy and									
	Innovations in the field of a	_								
	crops introduced new technic	ques of irrigation								
137	etc.	d Tashralası :-		Ctridant		ha -	hla +		tha	
IV	Developments in Science an	•••		Students Medical				•		
	Colonial India: 1. Early Euro			(Ayurve				ciciit II	iuia	
	Colonial India- Surveyors, B			(12) 411		- 55u)				1.0
	under the Company's Ser		8							1,2
	Response to new Scientific Kr	•								
		dern India 3.								
	Development of research of	rganizations like								

	CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.			
V	Prominent scientist of India since beginning and their achievement: 1. Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna 2. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali 3. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabhai.	8	It explores how science and technology have been used to make sense of the world, and to control it.	1,2

TEXT BOOKS:

- 1. Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi $-\,58$
- 2. Srinivasan, M., Management of Science and Technology (Problems & Prospects), East-West Press (P) Ltd., New Delhi.

REFERENCE BOOKS:

1. Ramasamy, K.A., and Seshagiri Rao, K., (Eds), Science, Technology and education for Developlemnt, K., Nayudamma Memorial Science Foundation, Chennai -8

CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Students will understand the Beginning and Development in different field of science in ancient, medieval, and in modern period	1,3 & 4			
2	Students will study the biography of different scientist like Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna etc.	1,2			
3	Student will study the various research organization like DRDO, CSIR, IRC, ISRO etc.	7.9,10			
4	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga)	5,7			
5	It explores how science and technology have been used to make sense of the world, and to control it.	5,8			

MAPPING TABLE (8th Semester)

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCE421E	Soil Mechanics-II	3	3	1	1	1		1					1
22BTCE422E	Earthquake Engineering	2	3	2	1	1	1	1					1
22BTCE423R	Railway and Airport Engineering	3	3	1	1	1		1					1
22BTCE424E	Economics for Engineers											2	1
22BTCE425E	History of Science and Engineering		1										2



Curriculum and Syllabus

Bachelor of Technology in Civil Engineering - Construction Management

OUTCOME BASED EDUCATION FRAMEWORK
CHOICE BASED CREDIT SYSTEM

Version: 2.0

FACULTY OF ENGINEERING AND TECHNOLOGY

July, 2022

Preamble

Assam down town University is a premier higher educational institution which offers Bachelor, Master, and Ph.D. degree programmes across various faculties. These programmes, collectively embodies the vision and mission of the university. In keeping with the vision of evolutionary changes taking place in the educational landscape of the country, the university has restructured the course curriculum as per the guidelines of National Education Policy 2020. This document contains outline of teaching and learning framework and complete detailing of the courses. This document is a guidebook for the students to choose desired courses for completing the programme and to be eligible for the degree. This volume also includes the prescribed literature, study materials, texts, and reference books under different courses as guidance for the students to follow.

Recommended by the 13th Board of Studies (BoS) meeting of the Faculty of Engineering and Technology held on dated 17/06/2022 and approved by the Emergent Academic Council (AC) meeting held on dated 30/07/2022

Chairperson

Board of Studies

Academic Council

Vision

To become a Globally Recognized University from North Eastern Region of India, dedicated to the Holistic Development of Students and Making Society Better

Missions

- 1. Creation of curricula that address the local, regional, national, and international needs of graduates, providing them with diverse and well-rounded education.
- 2. Build a diverse student body from various socio-economic backgrounds, provide exceptional value-based education, and foster holistic personal development, strong academic careers, and confidence.
- 3. Achieve high placement success by offering students skill-based, innovative education and strong industry connections.
- 4. Become the premier destination of young people, desirous of becoming future professional leaders through multidisciplinary learning and serving society better.
- 5. Create a highly inspiring intellectual environment for exceptional learners, empowering them to aspire to join internationally acclaimed institutions and contribute to global efforts in addressing critical issues, such as sustainable development, Climate mitigation and fostering a conflict-free global society.
- 6. To be renowned for creating new knowledge through high quality interdisciplinary research for betterment of society.
- 7. Become a key hub for the growth and excellence of AdtU's stakeholders including educators, researchers and innovators
- 8. Adapt to the evolving needs and changing realities of our students and community by incorporating national and global perspectives, while ensuring our actions are in harmony with our foundational values and objectives of serving the community.

Programme Details

The professional practise of designing and developing infrastructure projects is known as civil engineering. This can be done on a large scale, such as the construction of national transportation systems or water supply networks, or on a smaller scale, such as the construction of individual roads or buildings.

I. Specific Features of the Curriculum

The Program Specific Outcomes (PSOs) for Civil Engineering in Construction Management graduates focus on three main areas. First, graduates should excel in research and reasoning, capable of identifying, formulating, reviewing literature, and analysing complex Civil Engineering in Construction Management problems using logical and critical thinking and scientific principles. Second, they should demonstrate techno-professional efficiency by applying multidisciplinary concepts and interdisciplinary approaches to serve mankind. Lastly, graduates should exhibit global competency by addressing interdisciplinary Civil Engineering in Construction Management issues and enhancing their expertise through international certification courses.

II. Eligibility Criteria: Minimum 45% in 10+2 with Physics, Chemistry & Mathematics. 5% relaxation for SC/ST, EWS, and Especially able candidates.

III. Program Educational Objectives (PEOs):

PEO-1: To understand and incorporate the ability to apply, update, extend, and build deep knowledge through a flexible, research-intensive programme tailored to suit current academic and industry demands.

PEO-2: Establish professional integrity and an ethical attitude while being aware of global and national competencies, and consider the social implications of their job, particularly its impact on safety, health, and the environment for long-term growth.

PEO-3: Participate in individual and team-oriented, open-ended activities promoting productive thinking to provide opportunities for students to manage and work on multidisciplinary projects through interaction with their peers in the industry

IV. Program Specific Outcomes (PSOs):

PSO1: Research and Reasoning: Identify, formulate, review literature, and analyze complex Civil Engineering in Construction Management problems reaching substantial conclusions using logical and critical thinking, and scientific principles.

PSO2: Techno-Professional Efficiency: Apply the understanding of multidisciplinary concepts of Civil Engineering in Construction Management with interdisciplinary approaches in the service of mankind.

PSO3: Global Competency: Demonstrate global competency in addressing interdisciplinary Civil Engineering in Construction Management issues through international certification courses.

V. Program Outcome:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

VI. Total Credits to be Earned: 185

VII. Career Prospects:

When it comes to graduate programmes in India, Civil Engineering in Construction Management remains at the top of the list because of its flexibility and capacity to adapt to changing requirements, as well as providing students with the required information and skills for a successful career.

Some of the opportunities for Civil Engineering in Construction Management graduates are:

- Construction manager
- Geotechnical engineer
- Environmental engineer
- Public Health engineer
- Transportation engineer
- Urban planning engineer.

EVALUATION METHODS

The student performance shall be evaluated through In-semester (Sessional) and semester-end examinations. A weightage of 40% or as prescribed by the programme shall be added to the score of the end-semester examination.

1. INTERNAL ASSESSMENT:

The teacher who offers the course shall be responsible for internal assessment by conducting in-semester (Sessional) examination and evaluating the performance of the students pursuing that course. The components for internal assessment are illustrated in the table given below.

SN	Components/ Examinations	Marks
		Allotted
1.	In-Sem Exam – I (ISE-I) (Written Examination) *	30
2.	In-Sem Exam – II (ISE-II) (Written Examination) *	30
3.	Assignment	10
4.	Presentation (SP)	10
5.	Quiz	5
6.	Class Performance based score*	5

^{*}are compulsory

Note: Total Internal assessment should be out of 40

INSTRUCTION

- 1. If a student fails to appear in the any of the component without any valid reason, he/she shall be marked zero in that component. However, the course teacher at his discretion may arrange for the missed test on an alternate date for the absentee students after determining ground with genuine/valid reasons for the absent.
- 2. The report of evaluation of an activity towards the in-semester (Sessional) component of a course shall be duly notified by the concerned course teacher within a week of completion.
- 3. The program coordinators should upload the in-semester marks to the ERP and forward acknowledgement of all the courses of the program to the Controller of Examinations before the start of the End-semester examination.

2. SEMESTER END EXAMINATION:

Time table for end semester examination is published at least 25 days prior to the start of Examination.

I. Pre-Examination:

Eligibility Criteria for a student to appear in University Examinations:

The student shall only be allowed to appear in a University Examination, if:

- i) He/ She is a registered student of the University;
- ii) He/ She is of good conduct and character;
- iii) He/ She has completed the prescribed Programme of study with minimum percentage of attendance as laid down in the Regulations of the Programme concerned.

Under special cases, a student may be allowed to appear for an examination without being registered in the University but the result of the said student will be kept on hold till the registration of the concerned student is completed.

II. Admit Card:

Admit card for the examination may be downloaded through ERP where the system will generate a Unique ID Cards through online.

The University shall have the right to cancel admission for examination of any candidate on valid grounds.

III. Pattern of Question Papers:

The question paper shall follow the principles of Bloom's Taxonomy. Table

S. N.	Level	Questions /verbs for test			
1	Remember	List, Define, tell, describe, recite, recall, identify, show who, when, where, etc.			
2	Understand	Describe, explain, contrast, summarize, differentiate, discuss, etc.			
3	Apply	Predict, apply, solve, illustrate, determine, examine, modify			
4	Analyze	Classify, outline, categorize, analyze, diagrams, illustrate, infer, etc.			
5	Evaluate	Assess, summarize, choose, evaluate, recommend, justify, compare etc.			
6	Create	Design, Formulate, Modify, Develop, integrate, etc.			

Note: No course is to be evaluated on basis of all 6 knowledge levels.

The format of the question paper across all the program follows a unique pattern and the total marks is 60

Table 1: Question paper pattern for End semester examination

Sl no	Question pattern	Total marks
1	MCQs (10 Questions)	10
2	2 Marks questions (10 Questions)	20
3	4 Marks questions (5 Questions)	20
4	10 Marks questions (1 Question)	10

IV. Examination Duration:

Each paper of 60 marks shall ordinarily be of two hours duration.

V. Practical Examinations, Viva-Voce etc.:

- i) Practical examination shall be conducted in the presence of one external expert and one or more internal examiners.
- ii) Viva-Voce, Oral examinations of the Project report, Dissertation etc. shall be undertaken by a Board of Examiners constituted by the respective Dean of Program with the advice of Supervisor(s).

VI. Procedure of Expulsion:

If any candidate is found to be using any unfair-means during the examination, the invigilator may cease his/her answer sheet and report it directly to the Officer-in-Charge. The Office-in-Charge of the center may take appropriate decisions as per the rules and procedure of the examination. The Officer-in-Charge may allow the students to write the exam with new answer sheet or may expel the student from appearing the paper depending on the nature of unfair-means. In case of Computer based test, the students may be directed to write an apology letter and sign in the prescribe expulsion form. The student may not be allowed to write that examination.

VII. Instruction to the Students:

(i) The students shall not bring to the Examination Hall, any electronic gadget used as a means of communication or record except electronic calculator, if required.

- (ii) The students shall not receive any book or printed or hand written or photo copy (Xerox) or blank-paper from any other person while he/she is in the examination-room or in laboratory or in any other place to which he/she is allowed to have access during course of examination.
- (iii) The students shall not communicate with any other candidate in the examination room or with any other person in and outside the examination-room.
- (iv)The students shall not see, read or copy anything written by any other candidate, nor shall he/she knowingly or negligently permit any other candidate to see, read or copy anything written by him/her or conveyed by him/her.
- (v) The students shall not write anything on the Question Paper or in other paper or materials during the examination, or pass any kind of paper to any other candidate in the examination-room, or to any person outside the room.
- (vi)The students shall not disclose his/her identity to the examiner by writing his/her name or putting any sign / symbol in any part of his answer-script.
- (vii) The students shall not use any abusive language or write any objectionable remark or make any appeal to examiner by writing in any part of his answer-script.
- (viii) The students shall not detach any page from the answer-script or insert any authorized or unauthorized loose sheet into it. He /she shall also not insert any other answer-script / loose sheet by removing the pins of the origin answer-scripts and re-fixing it.
- (ix)The students shall not resort to any disorderly conduct inside the examination-room or misbehave with the invigilator or any other examination official.

VIII. Provision for an Amanuensis (writer):

- (i) A candidate may be provided with an Amanuensis (writer) to write down on dictation on his / her behalf on ground of his / her physical disability to write down by himself / herself due to accident or any other reason. The amanuensis may be provided till he / she recovers from the physical disability. The physical disability to write down by himself / herself must be supported by Medical Certificate from a competent Medical Officer.
- (ii) The qualifications of the amanuensis so provided must not be equal or higher than that of the candidate. This is also to be supported by Certificate from the Faculty of Study where the Amanuensis is provided.

(iii) Such candidates are to be accommodated in a separate room under the supervision of an invigilator so that the fellow candidates are not disturbed in the process.

3. Credit Point:

It is the product of grade point and number of credits for a course, thus, $CP = GP \times CR$

i. Credit:

A unit by which the course work is measured. It determines the number of hours of instructions required per week. 'Credit' refers to the weightage given to a course, usually in terms of the number of instructional hours per week assigned to it. Credits assigned for a single course always pay attention to how many hours it would take for an average learner to complete a single course successfully.

ii. Grade Point:

Grade Point is a numerical weight allotted to each Grade Letter on a 10-point scale.

iii. Letter Grade:

Letter Grade is an index of the performance of students in a said paper of a particular course. Grades are denoted by letters O, A+, A, B+, B, C, P, F and Abs. Student obtaining Grade F / Grade Abs shall be considered failed/ absent and, will be required to appear in the subsequent ESE. The UGC recommends a 10-point grading system with the following (Table: 1) Letter Grades:

- (i) A Letter Grade shall signify the level of qualitative/quantitative academic achievement of a student in a Course, while the Grade Point shall indicate the numerical weight of the Letter Grade on a 10-point scale.
- (ii) There shall be 08 (eight) Letter Grades bearing specific Grade Points as listed in Table 1, where the Letter Grades 'O' to 'P' shall indicate successful completion of a course.
- (iii) Apart from the 08 (eight) regular Letter Grades listed in Table 1, there shall be 03 (three) additional Letter Grades, which shall be awarded if a Course is withdrawn or spanned over the next Semester or remains incomplete as stated in Table 2.

Table 2: Letter Grades and Grade Points

Letter Grade	Grade Points	Description
0	10	Outstanding
A+	9	Excellent
A	8	Very Good
B+	7	Good
В	6	Above Average
С	5	Average
P	4	Pass
F	0	Fail
Abs	0	Absent
UFM	0	Unfair Means

iv. Grade Point Average:

a. SGPA (Semester Grade Point Average)

The SGPA of a student in a Semester shall be the weighted average of the Grade Points secured by the student in all the Credit Courses (both Core and Elective Courses) he/she registered in that Semester, irrespective of whether he/she could or could not complete the Courses. More specifically, the calculation of SGPA shall take into account the Courses graded with Letter Grades 'O' to 'F' as given in Table 1.

$$SGPA = \frac{\sum_{i=1}^{n} C_{i}G_{i}}{\sum_{i=1}^{n} C_{i}}$$
 (1.1)

The SGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.1) up to two decimal places, where n is the total number of Credit Courses registered by the student in that Semester, Gi is the Grade Point secured in the ith registered Course and Ci is the Credit (weight) of that Course.

b. CGPA (Cumulative Grade Point Average)

(i) The CGPA of a student in a Semester of a Programme shall be the accumulated weighted average of the Grade Points secured by the student in all the Credit

Courses (both Core and Elective Courses) he/she registered and successfully completed so far starting from the enrollment in the Programme. In other words, taking into account all the Courses graded with 'O' to 'P' as given in Table 1.1, generally the CGPA of a student shall be calculated starting from the first Semester of his/her enrolled Programme, while the CGPA of a lateral-entry student shall be calculated starting from the Semester of his/her enrollment.

(ii) The CGPA of a student in a Semester shall be calculated on a 10-point scale using Equation (1.2) up to two decimal places, where N is the total number of Credit Courses registered and successfully completed so far by the student, Gi is the Grade Point secured in the ith completed Course and Ci is the Credit (weight)of that Course.

CGPA =
$$\frac{\sum_{i=1}^{N} C_{i}G_{i}}{\sum_{i=1}^{N} C_{i}}$$
 (1.2)

(iii) The CGPA shall be convertible into equivalent percentage of marks using Equation Conversion of CGPA to percentage marks: = CGPA*10

4. Post-Examination

i. Transcript or Grade Card or Certificate:

A marking certificate shall be issued to all the registered students after every Semester. The Semester mark sheet will display the course details (code, title, number of credits, grade secured) along with total credit earned in that Semester.

ii. Grievance Readdress Mechanism:

Students with any dissatisfaction or grievance regarding the marks awarded in any of the Papers / Courses may appeal to the Controller of Examinations for remedial action such as Re-evaluation within 10 days of the declaration of result.

(i) A student has options to appeal for re-evaluation of his /her answer script to the Controller of Examination.

- (ii) Application for re-evaluation / re-scrutiny of answer scripts shall be made in the definite proforma available with the Examination Office through the head of the respective departments within 10 days of declaration of the results of the respective examinations.
- (iii) The Controller of Examination may appoint an examiner for re-evaluation and will consider and recognize the evaluation done by a university appointed examiner.
- (iv) There shall be no provision for re-evaluation of the Practical Papers, Project Work, and Dissertation etc. However, the students fail in practical examination or viva voce and wish to appear again may apply to be evaluated can do so with the next schedule.
- (v) After screening the application for re-evaluation, the CoE may send the answer scripts of the student to the examiners appointed by the CoE with the approval of Vice Chancellor.
- (vi) The marks/grades achieved by the students after the re-evaluation shall be final and binding.
- (vii) Fresh Marks sheets / Grade Card shall be issued only if the candidate secures pass marks / passing grade in the re-evaluated paper.
- (viii) Revaluation of answer scripts shall be deemed to be an additional facility provided to the students with a view to improving upon their results at the preceding examination result for any reason whatsoever shall not confer any right upon them for admission to next higher class which matters always be regulated in accordance with the relevant rules or regulations framed by the University.
- (ix) If as a result of revaluation of the candidate attracts the provision of condonation of deficiency, the same may be applied to his/her only for fresh attempt.

INSTRUCTION TO TEACHERS AND STUDENTS

(Teaching and Learning Methods)

In all the courses the teacher has to select topics for teacher-method which should not be less than 20 percent. The approach will be direct classroom teaching through a series of lectures delivering concepts using ITC facilities, white or blackboard. Notes may also be circulated to the students; however, the students are to be involved in the preparation of the notes. The teacher will be responsible for selecting the best note for circulation. The teacher-centric methodology has recently fallen out of favour because this strategy for teaching is seen to favour passive students.

1. Student- centric / Constructivist Approach:

The topics of the courses may be selected at the start of the class and assigned one topic to each of the students for studying by themselves, prepare presentations, notes, etc., and present at respective class time after consultation and discussion with the course teachers. The teacher facilitates the learning of the students by guiding and providing input and explaining concepts. 60 percent of the course contents may be selected for this purpose. To avoid behaviour problems, teachers must lay a lot of groundwork in student-centric classrooms. Typically, it involves instilling a sense of responsibility in students. In addition, students must learn internal motivation.

- **a. Project-Based Learning:** The teacher may select 5 percent of topics for the purpose and may conduct visits to the laboratory for experiments or field surveys. The selection of the topic may be done considering the available facility for the purpose. However, in the final semester of each of the programme the student has to undergo project-based learning at least 4 months duration. This approach will help the student to think critically, evaluate, analyse, make decisions, collaborate and more.
- **b. Inquiry-Based Learning:** The teacher/students are supposed to list at least five questions in each contact hour and student solve these question or search for answer which becomes the home work for the students "question-driven" learning approach. The teacher may look for the correctness of the solution or the best possible answer and discuss in the successive class. This will help in the preparation for various competitive examinations and develop a habit for search for solutions.

- c. Flipped Classroom: About 10 percent of the course content has to be completed by this method. In this approach the students are asked to watch video or lecture prepared by the teacher or any video available (relevant to the course). A set of questions may be given to the students for searching answers by the students. The idea is that students should have more time in-classroom focusing on achieving these higher levels of thinking and learning. The Flipped classroom is also an acronym. The letters FLIP represent the four pillars included in this type of learning: Flexible environment, Learning culture shift, Intentional content, and Professional educator. As you can see, the second pillar refers to a culture shift from the traditional approach where students are more passive to an approach where students are active participants. As a result, this approach is also a student-centric teaching method.
- **d. Cooperative Learning:** The remaining five percent has to be completed by cooperative learning approach. In this approach, the students are allotted problems. During library hours the students along with the teacher visit the library and search for probable solutions for the assigned problem. The same has to be done in groups so that the students discuss among themselves for the appropriate answers. Essentially, cooperative learning believes that social interactions can improve learning. In addition, the approach recreates real-world work situations in which collaboration and cooperation are required.

The percentage categorization for the completion of a theory course

Teacher-centric or Direct Classroom Teaching: Delivery by series of lectures	20%
Student-centric Approach, Students present and deliver lectures in the presence of	
teacher and supervised by teacher	60%
Students visit fields or perform experiments or teachers perform demonstration	05%
Flipped Classroom approach	10%
Cooperative learning approach	05%

Inquiry-based approach has to be followed in all of the classes

Teacher has to distribute the topics to be considered for teaching by the above-mentioned approaches and prepare a lesson plan for execution and maintain a file.

Curriculum Framework: Breakdown of Credits (for 2022-23 Syllabus)

Sl. No	Category	Total number of Credits
1	University Core (UC)	47
2	University Elective (UE)	21
3	Program Core (PC)	68
4	Program Elective (PE)	42
5	Faculty Elective (FE)	07
	Total number of credits	185

Breakdown by category of courses (for 2022-23 Syllabus)

Sl.	Category	Credits	Percentage %
No			
1	Engineering	150	81.08%
2	Science	22	11.98%
3	Computer Technology	4	2.1%
4	Humanities	8	4.3%
5	Commerce and Management	1	0.54%
	Total number of credits	185	100%

SEMESTER WISE COURSE DISTRIBUTION

	S. N.	Course Code	Course Title	Course		En	gag	gem	ent	t		Maximum Marks for			
	110			Category	L	T	P	S	R	0	C	IA*	SEE*	PE*	Total
	1	22BTCM111R	Engineering Mathematics I	UC	3	1	0	0	0	0	4	40	60	0	100
r I	2	22BTCM112R	Introduction to Basic Mathematics, Logic and Coding	UC	2	1	2	0	0	0	4	40	60	100	200
este	3	22BTCM113R	Engineering Physics	UC	2	1	2	0	0	0	4	40	60	100	200
Semester	4	22BTCM114R	Basic Electrical Engineering	PE	2	1	2	0	0	0	4	40	60	100	200
	5	22BTCM115R	Workshop/Manufact uring Practices	PE	1	0	4	0	0	0	3	40	60	100	200
	6	22UBPD114R	Introductory English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	7	22UBEC111	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
		То	tal		10	4	14	4	0	0	22	200	300	600	1100

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maxim	um Ma	rks for	
	No.	course coue	Course Title	Category	L	Т	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCM121R	Engineering Mathematics II	UC	3	1	0	0	0	0	4	40	60	0	100
	2	22BTCM122R	Engineering Chemistry	UC	2	1	2	0	0	0	4	40	60	100	200
	3	22BTCM123R	Programming for Problem Solving	PE	3	0	2	0	0	0	4	40	60	100	200
	4	22BTCM124R	Engineering Graphics and Design	PC	1	0	4	0	0	0	3	40	60	100	200
Semester II	5	22UBPD12R	Effective English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
mes	6	MOOCSCECE1	MOOCS I	FE	0	0	0	0	0	0	2	0	0	100	100
Se	7	22UBCC121	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	8	22UBEC121	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22BTCM125R	Techno- Professional Skills I	PC	0	0	2	0	0	0	1	0	0	100	100
	10	22UUHV102R	Universal Human Values (UHV) + Professional Ethics	UC	1	0	2	0	0	0	2	40	60	100	200
	11	22UUDL103R	Computational Systems and Digital World	UC	0	0	2	0	0	0	1	0	0	100	100
		Tota	l		10	2	18	8	0	0	25	200	300	1000	1500

	S.	Course Code	Course Title	Course		Er	ıgaş	gen	nen	t		Maxim	um Ma	rks for	
	No.	course coue	Course Title	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCM211R	Engineering Mechanics	PC	2	1	0	0	0	0	3	40	60	0	100
	2	22BTCM212R	Engineering Geology	PC	1	0	2	0	0	0	2	40	60	100	200
	3	22BTCM213R	Biology for Engineers	FC	2	1	0	0	0	0	3	40	60	0	100
	4	22BTCM214R	Computer Aided Design (CAD)	PC	0	0	4	0	0	0	2	0	0	100	100
	5	22BTCM215R	Introduction to Civil Engineering	PC	2	0	0	0	0	0	2	40	60	0	100
er III	6	22BTCM216R	PDE and transform mathematics	PC	2	1	0	0	0	0	3	40	60	0	100
Semester III	7	22BTCM217R	Techno- Professional Skills II	PC	0	0	2	0	0	0	1	0	0	100	100
	8	22BTCM218R	Material Testing and Evaluation	PC	1	1	2	0	0	0	3	40	60	100	200
	9	22UBPD213R	English for Employabilityfor Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	10	22UBCC211	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	11	22UBEC211	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	12	22UULS212R	Basic Life Saving Skills	UC	0	0	2	0	0	0	1	0	0	100	100
	13	22UUFL213R	Personal Financial Planning	UC	0	0	2	0	0	0	1	0	0	100	100
	14	22MOCE211R	MOOCS II	FE	0	0	0	0	0	0	2	0	0	0	100
		Tota	ĺ		10	4	18	8	0	0	27	240	360	900	1600

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maxim	um Ma	rks for	
	N.	course code	Course Title	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCM221R	Solid Mechanics	PC	3	0	0	0	0	0	3	40	60	0	100
	2	22BTCM222R	Introduction to Fluid mechanics	PC	2	0	2	0	0	0	4	40	60	100	200
	3	22BTCM223R	Surveying and Geomatics	PC	3	0	2	0	0	0	4	40	60	100	200
	4	22BTCM224R	Geotechnical Engineering	PC	3	0	2	0	0	0	4	40	60	100	200
IV	5	22BTCM225R	Basic Electronics for Civil Engineering Application	PC	2	0	2	0	0	0	3	40	60	100	200
Semester IV	6	22BTCM226R	Environmental Science	UC	2	0	0	0	0	0	2	40	60	0	100
Ser	7	22UBPD223R	English Language Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	8	22UBCC221	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22UBEC221	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22BTCM227R	Techno- Professional Skills III	PC	0	0	2	0	0	0	1	0	0	100	100
	12	22MOCE221R	MOOCS III	FE	0	0	0	0	0	0	1	0	0	100	100
	14	22UULS221R	Basic Acclimatizing Skills (BAS)	UC	0	0	2	0	0	0	1	0	0	100	100
	,	Total			15	0	16	8	0	0	27	240	360	1100	1600

	S. No.	Course Code	Course Title	Course		Er	ıga	gen	nen	ıt		Max	imum N	Marks	
	110.			Category	L	T	P	S	R	0	C	IA*	SEE*	PE*	Total
	1	22BTCM311R	Environmental Engineering	PC	2	0	2	0	0	0	3	40	60	100	200
	2	22BTCM312R	Mechanics of Materials	PC	3	0	0	0	0	0	3	40	60	0	100
	3	22BTCM313R	Construction Engineering & Management	PC	2	1	0	0	0	0	3	40	60	0	100
	4	22BTCM314R	Transportation Engineering	PC	2	0	2	0	0	0	3	40	60	100	200
ster V	5	22BTCM315R	Hydrology and Water Resource Engineering	PC	2	1	0	0	0	0	3	40	60	0	100
Semester V	6	22BTCM316R	Construction Engineering& Management	PC	3	0	0	0	0	0	3	40	60	0	100
	7	22BTCM317R	Hydraulics Engineering	PC	2	0	0	0	0	0	2	40	60	0	100
	8	22UBPD314R	Competent English for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	9	22UBCC311	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22UBEC311	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	11	22BTCM317R	Techno- Professional Skills IV	PC	0	0	2	0	0	0	1	0	0	100	100
		MOOCSCECE4	MOOCS IV	FE	0	0	0	0	0	0	1	0	0	0	100
		Total	l		16	2	10	8	0	0	26	280	420	600	1400

	S. No.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Max	imum N for	Marks	
	110.			Category	L	T	P	S	R	o	С	IA*	SEE*	PE*	Total
	1	22BTCM321R	Design of RC Structure	PC	2	1	0	0	0	0	3	40	60	0	100
	2	22BTCM322R	Estimation and Costing	PC	2	0	2	0	0	0	3	40	60	100	200
	3	22BTCM323R	Structural Engineering	PC	3	0	0	0	0	0	3	40	60	0	100
	4	22BTCM324R	Professional Elective I	PE	3	0	0	0	0	0	3	40	60	0	100
· VI	5	22BTCM326R	Professional Elective II	PE	3	0	0	0	0	0	3	40	60	0	100
Semester VI		22BTCM328R	Professional Elective III	PE	3	0	0	0	0	0	3	40	60	0	100
Se	6	22OE321	Generic (Open) Elective I	UE	2	0	0	0	0	0	2	40	60	0	100
	7	22UBPD324R	Corporate Proficiency for Engineers	UE	0	0	4	0	0	0	2	0	0	100	100
	8	22UBCC321	Co-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	9	22UBEC321	Extra-curricular	UC	0	0	0	4	0	0	1	0	0	100	100
	10	22BTCM323R	Techno- Professional Skills V	PC	0	0	2	0	0	0	1	0	0	100	100
	11	MOOCSCECE5	MOOCS V	FE	0	0	0	0	0	0	1	0	0	100	100
		Total		15	1	8	8	0	0	26	240	360	600	1200	

	S. N.	Course Code	Course Title	Course		Er	ıga	ger	nen	ıt		Maxim	um Mai	rks for	
	14.	334135	000130 11010	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
	1	22BTCM411R	Construction Safety and Risk Management	PC	2	0	0	0	0	0	2	40	60	0	100
VII	2	22BTCM415R	Professional Elective IV	PE	3	0	0	0	3	3	3	40	60	0	100
Semester	3	22BTCM414E	Generic Elective II	UE	3	0	0	0	3	3	3	40	60	0	100
me	4	22BTCM412R	Project I	PC	0	0	12	0	6	6	6	0	0	100	100
Š	5	22BTCM413R	Industrial Mock Viva	PC	0	0	0	0	0	0	0	0	0	100	100
	6	22BTCM414R	Techno-Professional Skills VI	PC	0	0	2	0	1	1	1	0	0	100	100
	7	22UBCC411	Co-curricular	UC	0	0	0	4	1	1	1	0	0	100	100
		То	tal		8	0	14	4	14	14	16	120	180	400	700

	S.	Course Code	Course Title	Course		Er	ıga	gen	nen	t		Maxim	um Ma	rks for	
	N.	334130 3340	000130 11010	Category	L	T	P	S	R	O	С	IA*	SEE*	PE*	Total
VIII	1.	22BTCM423R	Railway and Airport Engineering	PC	3	0	0	0	0	0	3	40	60	0	100
Semester V	2	22BTCM421E	Professional Elective V	PE	3	0	0	0	0	0	3	40	60	0	100
eme		22BTCM424E	Generic Elective III	UE	2	0	0	0	0	0	2	40	60	100	200
Š		22BTCM425E	Generic Elective IV	UE	2	0	0	0	0	0	2	40	60	100	200
	4	Project II	22BTCM422R	PC	0	0	12	0	0	0	6	0	0	100	100
		To	tal		10	0	12	0	0	0	16	160	240	300	700

	Professional Elective-I										
Sl. No	Subject Name	Code									
1	Pavement Materials	PEC-CEEL101									
2	Railway Engineering	PEC-CEEL102									
3	Traffic Engineering and Management	PEC-CEEL103									
4	Geometric Design of Highways	PEC-CEEL104									
	Professional Elec	etive-II									
1	Construction Project Management	PEC-CEEL201									
2	Building Construction Practice	PEC-CEEL204									
	Open Electiv	e-I									
Sl. No	Subject Name	Code									
1	Positive Psychology	OEEL101									

	Professional Elective-III							
Sl. No	Subject Name	Code						
1	Water Quality Engineering	PEC-CEEL501						
2	Surface Hydrology	PEC-CEEL502						
3	Solid and Hazardous Waste Management	PEC-CEEL503						
	Professional El	ective-IV						
1	Engineering Risk and Uncertainty	PEC-CEEL601						
2	Concrete Technology	PEC-CEEL602						
	Open Elective II							
1	Introduction to Nanotechnology	OEEL201						

	Professional Elective-V								
Sl. No	Sl. No Subject Name Code								
1	Foundation Engineering	PEC-CEEL701							
2	Soil Mechanics-I	PEC-CEEL702							
	Open Elective-III								
Sl. No	Subject Name	Code							
1	Economics for Engineers	OEEL301							
	Open Elective-IV								
Sl. No	Subject Name	Code							
2	History of Science and Engineering	OEEL401							

SEMESTER – I												
Course	Eng	ineering	Math	emati	cs I							
Title				1				1	_			
Course	22BTCM111R Total credits		L	T	P	S	R		C			
code	Total hours:		3	1	0	0	0	0	4			
Pre-	Nil Co-requisite		Nil									
requisite		7 1 1	<u> </u>	<u> </u>	г .	•						
Program me	Bachelor of Technology in Civil Engineering											
Semester	r Fall: Winter/ I se	Fall: Winter/ I semester of first year of the programme										
Course	1. To make understand to evaluate								e some			
Objectiv					_			iom mes	c some			
es	2. To provide the application of diff						•					
(Minimu	3. To make understand the converge			-			nd se	ries				
m 3)					1							
CO1	Enabling solving skills of definite and	improper	integr	als.								
CO2	Understand the consent of colorius or	d lincom of	aahaa									
CO2	Understand the concept of calculus and				1,1,0							
CO ₃	Understand the application of different					f waat	0# 0	100100	and calva			
CO4	Evaluate functions of multiple var optimization problems using Lagrange			пеоге	111S O	ı vect	oi C	aicuius,	and solve			
CO5	Analyze complex functions, perform c			ion. a	nd anı	nlv con	verge	ence tests	s and series			
	representations.	P	8	,		r-J	8-					
Unit-	Content	Conta	Lear	ning	Outco	ome			KL			
No.		ct										
		Hour										
	Unit 1:Techniques of integration: Integration by parts, trigonometric integrals, and hyperbolic functions; Application of integration to solve differential equations: Separable and exact equations; Improper integrals and their convergence criteria; Numerical methods for integration: Trapezoidal rule, Simpson's rule, and Romberg integration; Applications of integration in physics and engineering: Center of mass, moments of inertia, and fluid pressure.	5	Upon will techn integ integ They meth diffe evalu deter Addi skills techn rule, integ stude pract problem of the contest of th	us ng nic ns. on nct nd nd nd na. re on lal rg ps in ng								
]]] i	UNIT 2: Unit 2. Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; ndeterminate forms and L'Hospital's rule; Maxima and minima.	10	Stude unde theor Theo Theo	ents rstancems i brem	ling n calc and as w	gain of culus, ir the vell as	nclud Mea Tay	thorough ndament ing Rolle un Valu vlor's au emainde	al 3, 4			

		1	Γ=-	I
			They will learn to handle indeterminate forms using L'Hospital's rule and develop the ability to find the maxima and minima of functions. This unit strengthens the students' grasp of the theoretical underpinnings of calculus and enhances their problem-solving skills in optimization.	
III	UNIT 3: Complex numbers and functions: Analyticity and Cauchy-Riemann equations; Complex integration: Cauchy's theorem and Cauchy's integral formula; Power series and Laurent series; Classification of singularities: Poles and essential singularities; Residue theorem and applications to evaluating complex integrals; Convergence tests for series: Ratio test, root test, and comparison test; Representation of functions using series: Taylor and Laurent series	5	In this unit, students will explore the realm of complex numbers and functions, focusing on concepts such as analyticity and the Cauchy-Riemann equations. They will delve into complex integration through Cauchy's theorem and Cauchy's integral formula. The unit covers power series and Laurent series, classification of singularities, and the residue theorem, providing students with the tools to evaluate complex integrals. Furthermore, students will learn various convergence tests for series and how to represent functions using Taylor and Laurent series, equipping them with a solid foundation in complex analysis.	1, 2, 3, 4, 5
IV	UNIT 4: Limit, continuity, and partial derivatives; directional derivatives, total derivative, tangent plane and normal line, Maxima, minima, and saddle points, Method of Lagrange multipliers, Gradient, curl, and divergence, Multiple integrals and their applications (double and triple integrals), Line integrals and surface integrals, Green's theorem, Stokes' theorem, and the Divergence theorem	5	Students will become adept at handling functions of multiple variables, learning about limits, continuity, and partial derivatives. They will understand directional derivatives, total derivatives, and the geometric interpretations of the tangent plane and normal line. The unit covers methods for finding maxima, minima, and saddle points, and introduces the method of Lagrange multipliers for constrained optimization. Students will also study vector calculus concepts, including the gradient, curl, and divergence, and apply multiple integrals in various contexts. The unit concludes with an exploration of line and surface integrals, and key theorems such as Green's, Stokes', and the Divergence theorem.	2, 3, 4
V	UNIT 5: Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of	5	This unit equips students with a comprehensive understanding of linear algebra concepts, focusing on the inverse and rank of a matrix, and the rank-nullity theorem. Students will learn to solve systems of linear	2, 3, 4, 5

matrices; Cayley-Hamilton Theorem,	equations and explore properties of
and Orthogonal transformation	symmetric, skew-symmetric, and
	orthogonal matrices. The unit covers
	determinants, eigenvalues, and
	eigenvectors, and teaches students
	how to diagonalize matrices and apply
	the Cayley-Hamilton theorem.
	Additionally, students will learn about
	orthogonal transformations, gaining
	skills crucial for various applications
	in mathematics and related fields.

- 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 3. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2010.

REFERENCE BOOKS:

- 1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
- 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

CO	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Progra Outcome	ım						
1	Enabling solving skills of definite and improper integrals.	1,2							
2	Understand the concept of calculus and linear algebra.	3,5							
3	Understand the application of differential and integral calculus.	6,9,10							
4	Evaluate functions of multiple variables, apply theorems of vector calculus, and solve optimization problems using Lagrange multipliers.	5,9							
5	Analyze complex functions, perform complex integration, and apply convergence tests and series representations.	4,1,11							

SEMES	STER – I										
Course		Tathemat	ics, Logic	and Co	ding						
Title											
Course	22BTCM112R	Total cr		L	T	P	S	R	O/F	C	
code		Total hours: 60T			1	2	0	0	0	4	
Pre-	Nil	Co-requ	isite	N	il			_			
requisit											
Progra											
Semest		r of first y	ear of th	e progra	mme						
Course					,				c .1		
Objecti										matics	
(Minim		•	•	_			_	-			
3)	3. To become confi		-	emancs,	logic, i	easom	ng and	coun	ng to an	laryze and sorve	
CO1	problems in real- 1. The students will			onstrata	tho o	hility	to ur	doret	and the	a concents of	
COI	mathematics, logic, re				uie a	Diffity	to ui	ideisi	and the	e concepts of	
CO2	2. Students will be al				ns of	COnce	nts in	Other	· discin	llines such as	
002	engineering, computer	•		• •	110 01	Conce	pus III	Julei	aiscip	ames such as	
CO3	3. Solve and devise so				ntary 1	eal-we	orld nr	ohlen	ns in m	athematics and	
	programming		a range (inary 1	- Jul 11 (. P1	551011	111 111	cmunes und	
CO4	4. Explore and apply key	concepts	in logical	thinking	to bus	iness r	oroblen	ns.			
CO5	5. Enable students to c								vidence	and construct	
	reasoned arguments	<i>y</i>	J					_			
Unit-	Content		Conta	Learni	ng Out	tcome				KL	
No.			ct		Ü						
			Hour								
I	Basics of Set Theory and Fur			Studen		_	in a		dament		
	Sets : Basic definitions, cardin	•						-	includir	-	
	set, principle of exclusi			basic		itions,		dinali	•	nd	
	inclusion, combination of set								s unio		
	intersection, difference, con	_							nplemer		
	etc., De Morgan laws, Venn I Cartesian Products and Re			•					exclusio		
	Basic Definitions, binary relati						-		, and ho diagram		
	 composition and inverse 								cts, bas		
	relation on a set : prop							_	perties		
	reflexive, irreflexive, symmet							-	eflexivit		
	•	iivalence							ymmetr		
	relations, partial order relation				•	•	•		ons, ar	•	
	Functions: Basic definition,		5						litionall		
	and co-domain, image and	l range,		student	s will	exp	lore t	he b	asics	of	
	identity function, one-to-one								odomai		
	3	acteristic		_	_		•		injectiv	· ·	
	function, composition of f			surjecti			bijecti		function		
	inverse of a function, opera			charact							
	sets: unary operators – iden		inverse of functions, and operations on sets involving unary and binary operators.								
	binary operators – asso	cialivity,		sets inv	orving	unary	and bi	пагу С	perator	8.	
	Number systems: Natural	numbara									
	Number systems: Natural whole numbers, integers,										
	numbers, real numbers, opera										
	_	otraction,									
	multiplication and division	Jacon On,									
<u> </u>	maniphenton and artiston		l	ı							

II	Introduction to Mathematical Logic	Ι	This unit introduces students to various	1, 2, 3, 4
**	and Induction:		number systems such as natural numbers,	1, 2, 3, 7
	Mathematical Logic: Truth values of		whole numbers, integers, rational	
	mathematical statements, formulas in		numbers, and real numbers, along with	
	mathematical logic, logical operators -		their basic operations: addition,	
	AND, OR, NOT etc, De Morgan		subtraction, multiplication, and division.	
	Laws, Truth values of formulas, Truth		In the realm of mathematical logic,	
	tables Propositional Logic: Constants,		students will learn about truth values,	
	variables, assignment of variables in a	10	logical operators (AND, OR, NOT), De	
	formula, tautology, contradiction and	10	Morgan's laws, and how to construct and	
	satisfiability, truth table of a formula,		interpret truth tables. The unit covers	
	equivalence of formulas, proving		propositional logic, including constants,	
	formulas and equivalences by truth		variables, tautology, contradiction,	
	table method		satisfiability, and equivalence of formulas.	
	Mathematical Induction: Principle of		Students will also learn to prove formulas	
	mathematical induction –		and equivalences using truth tables.	
	induction basis and induction step,			
	examples			
III	Introduction to Logic and		Students will understand the principle of	
	Reasoning:		mathematical induction, learning to	5
	Alphanumeric series, Direction,		identify the induction basis and perform	
	Logical Reasoning, Data Sufficiency,		the induction step, with various examples	
	Ranking and order, Puzzle, Blood		to illustrate these concepts. The unit also	
	Relations, Analogy, Cube and Dice,	_	introduces basic logic and reasoning	
	Coding-Decoding	5	skills, including alphanumeric series,	
			directional reasoning, logical reasoning,	
			data sufficiency, ranking and ordering,	
			puzzles, blood relations, analogy, and	
			coding-decoding. These topics will develop students' problem-solving	
			abilities and logical thinking skills.	
IV	Introduction to Coding:	 	This unit introduces students to the	2, 3, 4
_ `	C Programming constructs:		fundamentals of C programming,	_, _, ¬
	Types of Programming Languages,		covering the types of programming	
	Evolution of 'C' Language, Structure		languages and the evolution of the C	
	of a 'C' Program, Executing and			
	Debugging a 'C' Program, 'C'		language. Students will learn the structure	
	Tokens: Keywords and Identifiers,		of a C program, and how to execute and	
	Operators, Constants, Variables, Data		debug it. The unit covers C tokens such as	
	Types, Precedence of Operators,		keywords, identifiers, operators,	
	Scope and Lifetime of Variables,	5	constants, variables, data types, and	
	Arithmetic Expressions, Evaluation	"	operator precedence. Students will	
	of Expressions.		understand the scope and lifetime of	
	Control Statements:		variables, arithmetic expressions, and	
	Decision Making using if statement,		their evaluation. Control statements will	
	Types of ifelse block, Switch case		be covered, including decision-making	
	Block, GOTO statement.		using if statements, types of ifelse	
	Looping:		blocks, switch case blocks, and the GOTO	
	Concept of Loop, For loop, While		statement.	
	loop, Do- while loop, jumping in			
~ ~	Loop, break and continue statement		G. I	2.2
V	Introduction to Arrays, Strings and	_	Students will delve deeper into C	2, 3, 4, 5
	Functions	5	programming, focusing on control	
1	Arrays:	1	structures such as loops (for, while, do-	ı l

One Dimensional Arrays, Two-	while) and how to manage loop execution
Dimensional Arrays,	using break and continue statements. The
Multidimensional Arrays, Dynamic	unit introduces arrays, covering one-
Arrays.	dimensional, two-dimensional,
Strings:	multidimensional, and dynamic arrays.
Implementing String Variables,	Students will also learn about strings,
String handling Functions.	including how to implement string
Functions:	variables and use string handling
Concept of Functions, user-defined	functions. The concept of functions is
Functions, System-defined Functions,	explored, differentiating between user-
passing in Functions.	defined and system-defined functions, and
	understanding how to pass parameters to
	functions. This unit provides a
	comprehensive understanding of essential
	programming constructs and prepares
	students for more advanced coding tasks.

- 1. Schaum's Outline of Programming with C by Byron Gottfried, Third Edition
- 2. Programming in ANSI C by E. Balaguruswamy, Eight Edition
- 3. Discrete Mathematics by Lipschutz, Lipsonand and Patil, Revised Third Edition
- 4. A Textbook on Discrete Mathematics by Sastry and Nayak

REFERENCE BOOKS:

- 1. A Modern Approach To Verbal & Non Verbal Reasoning by R S Agarwal, Revised Edition
- 2. Analytical and Logical Reasoning by Sijwali B S, Revised Edition
- 3. The C Programming Language, by Brian W. Kernighan and Dennis M. Ritchie, Second Edition
- 4. 2000 Solved Problems in Discrete Mathematics by Lipschutz and Lipson

OTHER LEARNING RESOURCES:

https://www.javatpoint.com/discrete-mathematics-tutorial

https://www.khanacademy.org/test-prep/lsat/lsat-lessons/logical-reasoning/a/logical-reasoning-article--getting-started

https://www.javatpoint.com/c-programming-language-tutorial

COI	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	The students will be able to demonstrate the ability to understand the concepts of mathematics, logic, reasoning and coding	1,8								
2	Students will be able to apply of applications of concepts in other disciplines such as engineering, computer science, physics, etc.	3,7								
3	Solve and devise solutions to a range of elementary real-world problems in mathematics and programming	6,9,10								
4	Explore and apply key concepts in logical thinking to business problems.	5,9								
5	Enable students to critically analyze information in order to evaluate evidence and construct reasoned arguments	7,1,12								

SEMEST	CSTER – I										
Course			Engine	ering	g Phys	sics					
Title					1	1	1	ı		T	•
Course		otal cre			L	T	P	S	R	O/F	C
code			irs: 60T		2	1	2	0	0	0	4
Pre-	Nil	Co-requis	site		Nil						
requisite	Doob slow of Took wale on in										
Program me	Bachelor of Technology in Civil Engineering										
Semester	Fall: Winter/ I semester of	Fall: Winter/ I semester of first year of the programme									
Course	Tuni (vinter) I semester or	mst yeu	or the p	or ogr		<u> </u>					
Objectiv	1. To understand the the										
es	2. To apply the concepts in practical problems										
(Minimu	3. To understand the ph	ysics of a	any proce	SS							
m 3)											
	Develop a foundational unde	rstanding	g of the v	ector	rs and	scala	r repre	esentat	ion o	f force	s and nature
	of forces.										
	Illustrate conservative and no								-		
	Explain basics of non-inertial										field
CO4	Comprehend on oscillations a										_
CO5 Unit-	Understand the three dimensi	onai rigio						e mom	ent o	1 inerti	
No.	Content		Conta ct	Lea	arninş	g Out	come				KL
110.			Hour								
I			11041	By	the e	nd of	this i	ınit, s	tuden	ts will	1, 2
				_	nonstr		a			nensive	
				und	lerstar	nding	of the	e deve	elopn	nent of	
							India				
	Unit I: Electrostatics in Va						perm				
	Coulomb's law, electric				•		•			ey will	
	intensity, Gauss's law a									ince of	
	applications, electric potent									and the tudents	
	potential energy, conduct									nctions	
	•	ibrium,								onents	
		citance	10							ballast,	
	calculations.									g, and	
				den	sities.	. Th	ey w	ill a	nalyz	e the	
					antag			lisadva	_		
										erstand	
					-		ents f		_	e and	
					bankn		atudan			uction.	
						•	studen nmon			able to lefects,	
					-					ain the	
							hind		_		
				-	lding t				J		
II	Unit II: Magnetostatics							his u	nit (on the	1, 2, 3, 4
	Biot-Savart law, Ampère's l	aw and		_		•	_			tracks,	
	applications, magnetic	vector							-	ze and	
	potential, magnetic proper		10		ign		way			layouts	
	materials (diamag				orpora	_	_	adient		grade	
	paramagnetism, ferromagnet									rations	
	paramagnetism, refromagne			tor	curv	es, a	na pr	ıncıple	s of	super	

4, 5

- 1. Introduction to Electrodynamics. David Griffiths. Prentice Hall, Upper Saddle River, New Jersey, 07458
- 2. Basic Laws of Electromagnetism. IE IRODOV

REFERENCE BOOKS:

1. Principles of physics. Halliday Resnick

OTHER LEARNING RESOURCES:

1. https://www.sciencedirect.com/science/article/pii/S0951832022005142

CO	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Develop a foundational understanding of the vectors and scalar representation of forces and nature of forces.	1,2
2	Illustrate conservative and non-conservative forces, angular momentum and energy equations	3,5
3	Explain basics of non-inertial frames and acceleration and its application in engineering field	6,9,10
4	Comprehend on oscillations and its application in the field of engineering kinematics	5,9
5	Understand the three dimensional rigid body motion and determine the moment of inertia.	4,1,11

SEME	STER	- I										
Course		Basic Electrical Engi	neering									
Title												
Course	;	22BTCM114R	Total cred	its: 4	\mathbf{L}	T	P	S	R	O/F	C	
code			Total hour	s: 60T	2	1	2	0	0	0	4	
Pre-		Nil	Co-requisi	te	Nil							
	requisite											
Progra		Bachelor of Technology										
Semest		Fall: Winter/ I semes	ster of first	year of th	ne progr	amm	e					
Course		4 5 1		C		1	1	1 0			• .	
Object		1. Explain operat	• •				_		magn	ietic cir	cuits.	
(Minin	ıum	2. Classify and co	ompare ume	erent type:	s of Elec	zırıcaı	macm	nes.				
3) CO1		Understand the concep	at and theore	ame of ha	sic alact	ric an	d mag	natic c	ircuit	c for ar	alvzi	ing and
COI		designing electrical sys		cilis of ba	sic elect	iic aii	u mag	iletic c	iicuit	8 101 ai	iaiyzi	ing and
CO2		Analyze the working		f single-p	hase ac	circui	ts thre	e pha	se bal	lanced	circu	its star
		and delta connection e		Single p		J11 C U1	,	Pila	oc ou		J11 C U.	, 5141
CO3		Identify the magneti		nts and	efficien	cy o	f auto	-transf	orme	r and	three	e-phase
		transformer connection				•						•
CO4		Explain the working pr	riciples of co	ommon el	ectrica i	nstrur	nents a	nd the	ir cha	racteris	stics.	
CO5		Acquire skills in DC-I					rters, a	nd LT	Swit	chgear	comp	onents
		and and elementary ca	lculations fo									
Unit-	Cont	ent		Conta	Learn	ing O	utcom	e				KL
No.				ct								ļ
_	D 0			Hour	G. 1		11 1		1 .1			1.0
I		Circuits: Electrica								proper		1, 2
		elements (R,L,C), voltage and current source. Kirchoff's of electrical circuit elements (R, L, C) and the behavior of voltage and current										
		,	irchoff's		source		avioi	JI VOI	age a	ina cui	ıcııı	
		rent and voltage law,	-	10	Bource	٥.						
		± '	hevenin,									
	NOI	ton and										
	C											
TT		erposition theorem	· · · · · · · ·		C4 1	4	:11	1			- C	2 2
II		Circuit: Represent								oncepts ding p		
		usoidal waveforms, j	-		and	RMS		lues,	anc		asor	4
	rms	,	phasor		represe			iucs,	anc	, pin	4301	
		resentation, real	power,		repress		,,,,,					
		ctive power, apparer										
	-	ver factor, Analysis	_	10								
		se ac circuits cons	isting of									
	-	,C.RL,RC,RLC										
		nbination(series and	-									
		tage and current rel	auonsnip									
	in	and dolta connection										
III		and delta connection	anatic		Ctudos	to w	11 11114	oratora	1 the	nroner	tios	1 2
111			gnetic			nagne		erstand materia		proper and	the	1, 2, 3, 4
		terials, ideal and	-			_				ideal		٥, ᠇
		sformer, equivalent		10	practic			_	-11 01	1		
		ses in transformer, re	•									
	and	• /	auto									
	ırar	sformer,										

IV	three phase transformer connection Electrical Machines: Generation of rotating magnetic fields, construction and working of three phase induction motor, torque-slip characteristics, losses and efficiency, Single phase induction motor, working of synchronous generator	10	Students will understand the generation of rotating magnetic fields and the construction and working principles of three-phase induction motors.	1, 2
V	Power converter and electrical installation: DC-DC buck and boost converter, single phase and three phase voltage source inverter, Fuse, MCB, ELCB, MCCB, Earthing, wires and cables, types of batteries	5	Students will apply the principles of DC-DC buck and boost converters, and single-phase and three-phase voltage source inverters.	2, 3, 4, 5

1. D. P. Kothari and I. J.Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2010

REFERENCE BOOKS:

- D. C. Kulshreshtha, Basic Electrical Engineering, McGraw Hill ,2009
- E. Hughes, "Electrical and Electronics Technology", Pearson, 2010

OTHER LEARNING RESOURCES:

https://nptel.ac.in

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Understand the concept and theorems of basic electric and magnetic circuits for analyzing and designing electrical systems	1,2	
2	Analyze the working principles of single-phase ac circuits, three phase balanced circuits, star and delta connection etc.	3,10	
3	Identify the magnetic components and efficiency of autotransformer and three-phase transformer connections.	6,9,12	
4	Explain the working priciples of common electrica instruments and their characteristics.	5,9	
5	Acquire skills in DC-DC converters, voltage source inverters, and LT Switchgear components and and elementary calculations for energy consumption	4,1,7	

SEME	STER	. – I										
Course)		Int	roductory	English	for E	ngine	ers				
Title												
Course)	22UBPD114R	Total cr	edits: 2	\mathbf{L}	T	P	S	R	O/F	C	
code			Total ho	urs: 30T	0	0	4	0	0	0	2	
Pre-		Nil	Co-requ	isite	Nil							
requisi	te											
Progra	mme	Bachelor of Technolo										
Semest	ter	Fall: Winter/ I semes	ter of fir	st year of th	ie progr	amm	e					
Course		4 70 10 11				ъ.	F 1					
Object		To capacitate the state that th			•		_	_				
(Minin	num	2. To enable the		to communi	cate con	ıfiden	tly wit	h a fo	cus o	n listeni	ing	
3)		and speaking sl										
		3. With the help			onetics,	the s	student	s will	be a	ble to		
		pronounce wor		•								
	.1	4. To interact such					a 21	. 41		a.C	-1-	
CO	1	Understand and correct	•	•				_	•	•		
		auxiliary verbs, deter	nimers, a	mu degrees	or cor	nparn	son, to	cons	uct	uniere	nt ty]	pes of
CO	12	sentences. Analyze and comprehe	and writt	an tayta the	rough or	ampre	hansia	n ovo	roisos	domo	netrot	ing on
	4	understanding of senter				Juhie	TICHSIC	ıı exe	101868	, ucillo	115U äl	mg an
CO	3	Understand the process				liffere	ntiate	hetwe	en lie	tening s	and h	earing
		identify factors affecting	•	•	_					_		_
CO	4	Develop speaking ski										
	-	pronunciation through	•	•				_		•	_	_
		for self-reflection.	1	,	ر ا		r	.,		J 2000		
CO	5	Understand the fundar	nentals o	f communic	cation, i	nclud	ing its	types	, pur	oses, b	arriei	rs, and
		importance, and apply										
		and informal contexts.		-	-							
Unit- No.	Cont	tent		Contact Hour	Learn	ing O	utcom	ie				KL
I										master		1, 2
										nmar. T		
						-		_		of spee		
		Module 1 - Grammar				_		-		is, ve		
		D			adjecti			erbs,		epositio		
	1.	Parts of Speech			conjun		*	and		terjectio		
	i.	Articles		10	Unders		_				and	
	i.	Auxiliary Verbs		10						age wil		
	7.	Affirmative and N	Vegative		-					earn ab in form		
	Sente	ences				-				the mod	_	
										ne moc		
					affirma					senten		
								_		mmatic		
					correct	_			_		arry	
II								_		nodule v	will	2, 3,
		Module 2- Grammar			delve	_		ermine				4
										dents		-
	i.	Determiners		10						techniq		
	i.	Sentence Construction	on							senten		
	i.	2 1	entences							gative,		
	(Ass	ertive, Imperative, etc.)								the deg		
					•							

	y. Degree of Comparison		of comparison (positive, comparative,	
	v. Comprehension Exercises		and superlative) will be explored. The module will also include comprehension exercises designed to enhance students' ability to understand and interpret written texts effectively	
III	Module 3 - Listening Skills i. What is listening? i. The Process of Listening i. Factors that adversely affect Listening v. Difference between Listening and Hearing, v. Purpose and Importance of Effective Listening i. How to Improve Listening Process.	10	Students will be introduced to the fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	1, 2, 3, 4
IV	Module 4 - Speaking Skills i. Introducing yourself i. Self-discovery i. Basics of Phonetics, pronunciation v. Extempore speech v. Video Recording for Self reflection	10	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	Module 5- Communication Skills i. Introduction to Communication, ii. Importance of Communication Skills, ii. Purpose of Communication, ii. Types of Communication, ii. Formal and informal communication ii. Importance of Communication, ii. Barriers to Communication, ii. Barriers to Communication, ii. How to improve/ tips to improve Communication skills. ii. Responding to different questions in various situations	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of communication, distinguishing between formal and informal contexts. Students will learn about the importance of communication skills and the barriers that can impede effective communication. Tips and strategies to improve communication skills will be provided. The module will also include exercises on responding to different questions in various situations, enhancing students' adaptability and effectiveness in both formal and informal interactions.	2, 3, 4, 5

(formal/informal)		

Text Books:

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011.Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first edition, S. Chand & Delhi.

Reference Books:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2. Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Klett

Other Learning Resources:

- 1. https://youtu.be/bEB8-SWMYhI
- 2. https://youtu.be/-zZau_dttRY

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

CO	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Understand and correctly use various grammar elements, including parts of speech, articles, auxiliary verbs, determiners, and degrees of comparison, to construct different types of sentences.	1,2
2	Analyze and comprehend written texts through comprehension exercises, demonstrating an understanding of sentence construction and types.	3,5
3	Understand the process and purpose of listening, differentiate between listening and hearing, identify factors affecting listening, and implement strategies to improve their listening skills.	6,9,10
4	Develop speaking skills by introducing themselves, practicing self-discovery, improving pronunciation through phonetics, delivering extempore speeches, and using video recordings for self-reflection.	5,9
5	Understand the fundamentals of communication, including its types, purposes, barriers, and importance, and apply this knowledge to improve their communication skills in both formal and informal contexts.	4,1,11

SEMESTER – I

Course Title	e	Workshop/Manufac	turing Prac	tices								
Course	<u>.</u>	22BTCM115R	Total credi	its: 4	L	Т	P	S	R	O/F	С	
code			Total hour		1	0	4	0	0	0	3	
Pre-		Nil	Co-requisi		Nil	10		10	10	10		
requisi	ite	- 1 	o requisi		- '							
Progra		Bachelor of Technol	ogy in Civil	Engineeri	ng							
Semest		Fall: Winter/ I semes				amm	e					
Course	e	4.7	*11	. 1 1		1 .	1.1			C	1 1	
Object	ives	1.Learning this manufacturi		l lead you	to un	dersta	ind ba	sic co	ncept	s of wo	orksh	op and
		2. Apply fundam			•		nanufa	cturing	g in d	ay-to-da	ıy lif	e.
CO1		3. Recognize cor	nponents usi	ing differen	t mate	rials.						
COI		Infer about various ma	nufacturing	methods lil	ke cast	ing, f	orming	, macł	nining	etc		
CO2		Apply fitting oparation	and power	tools in ma	nufact	uring	works					
CO3		Demonstrate to Carper	•					n in inc	dustri	es		
CO4		Enhance skills in mach	nining operat	tions like m	aterial	cutti	ng and	prepar	ration	of mou	ld et	С.
CO5		Critique the different t	ypes of weld						pplica	ation.		
Unit-	Cont	ent		Contact	Lea	rning	Outco	me				KL
No.	<u> </u>	nufacturing Methods		Hour	-		***	•		prehens		1, 2
	Casti		ning, ethods	10	man casti joini the learn tech com adva focu Num addi gain mac prog CNC abou cove and	ing, ing p fund ning nique poner anced sing herica tive 1 an hining gramn C mad at ering	ring forming forming rocesses amenta about s used hts. The man on 1 Conmanufa over g prohing, sechines. addititits pripplication	ng, nes. The ses. The ses. The ses to sha e unit sufactured CN trol) cturing view cess, etup, a They we inciple	ods, nachiney w each mate pe an also uring C mach g. Stu of included included will man	ning, a ill explored ill explored introduced introduced introduced introduced introduced introduced introduced introduced integrated	ing and ore od, and ble ces ds, ater and will NC the of arn ng, ies,	
П	Ma: Over	C machining, Ad nufacturing view of CNC machining view of additive manuf		10	know oper fami and carp shap com fittir stud	wledgrations iliar v their entry oing, poner ng too ents	e in s. Stu with va uses, operat and nts. Th ols and how to	carpendents arious as we witions a seen unid oper o meas	ntry a wil carpo rell as such abling at also rations	entry to s comm as cutti	ing me ols non ng, den des ing cut,	2, 3, 4

			precision. These skills are fundamental for producing and maintaining high-quality mechanical systems and structures.	
Ш	Carpentry & Fitting operations Carpentry tools, carpentry operations, fitting tools, fitting operations	10	Students will delve into machining operations, focusing on turning and milling processes. They will learn the principles and techniques involved in turning, such as setting up the lathe, selecting cutting tools, and executing turning operations to produce cylindrical parts. The unit also covers milling processes, including the setup and operation of milling machines, and the selection of appropriate milling tools. Students will gain practical skills in producing components with complex shapes and precise dimensions.	1, 2, 3, 4
IV	Machining operations Turning, milling, turning processes, milling processes	10	In this unit, students will explore various welding techniques, with a focus on arc welding and gas welding. They will learn about the equipment, materials, and safety procedures involved in these welding methods. The unit also covers brazing, teaching students the principles and techniques for joining metals using a filler material that melts at a lower temperature than the base materials. Through hands-on practice, students will develop the skills needed to create strong, durable welds for a variety of applications.	1, 2
V	Welding Arc welding & gas welding, brazing	5	Students will gain an in-depth understanding of advanced manufacturing technologies, particularly CNC machining and additive manufacturing. The unit provides an overview of the CNC machining process, highlighting its precision, flexibility, and automation capabilities. Students will learn about the various types of CNC machines, programming techniques, and practical applications in industry. The unit also covers additive manufacturing, discussing its revolutionary impact on product design and production. Students will explore different additive manufacturing technologies, materials, and the wide range of applications, from prototyping to production of	2, 3, 4, 5

	complex, custom parts.	

1. Elements of Workshop Technology, Vol. I 2008 and Vol. II 2010, Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K Media promoters and publishers private limited, Mumbai.

Reference Books:

1. Workshop / Manufacturing Practices, Veeranna D. Kenchakkanavar Khanna Book Publishing Co. Pvt. Ltd , 1 Nov 2021

CO PO Mapping						
SN	Course Outcome (CO)	Mapped Outcome	Program			
1	Infer about various manufacturing methods like casting, forming, machining etc	1,3,5				
2	Apply fitting oparation and power tools in manufacturing works	2,4				
3	Demonstrate to Carpentry & fitting operations and its application in industries	6,8				
4	Enhance skills in machining operations like material cutting and preparation of mould etc.	7,10,12				
5	Critique the different types of welding, metal cassting and its field of application.	8,9				

	1 1										12		
Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM111R	Engineering Mathematics I	3	3	1	1	1		1					1
22BTCM112R	Introduction to Basic Mathematics, Logic and Coding	2	3	2	1	1	1	1					1
22BTCM113R	Engineering Physics	3	3	1	1	1		1					1
22BTCM114R	Basic Electrical Engineering	3	2	2	3	2	1				1		
22BTCM115R	Workshop/Manufacturing Practices			2	1	1	2	1	2	1			2

22UBPD114R	Introductory English for			1	1	2	3	2	2
	Engineers								

		SEMESTE							
Cours e Title		Engineering	Mather	natics	II				
Cours	22BTCM121R	Total credits: 4	L	T	P	S	R	O/F	C
e code		Total hours: 30T+30P	3	1	0	0	0	0	4
Pre-	Nil	Co-requisite			ı	N	il	-II	I
requisi									
te									
Progr		B.Tech Civ	il Emgi	neerin	g				
Semes	1	Fall/ II semester of fir	st vear	of the	nrogra	mme			
ter	,	di, ii semester of m	se year	or the	progra				
Cours	1 D 1 1		1	,•	1	1 41			
e	understanding con	ept of first order differe	ential eq	uation	and ap	pry the	m in		
Object		•							
ives (Mini	2. Apply the concept of ordinary differential equations of higher orders.								
mum	3. Analyze: To develop students' skills in basic probability and statistics, including the analysis								
3)	of probability distributions, measures of central tendency, and statistical parameters, and to								
	apply these concepts to real-world data and hypothesis testing.								
CO1	Apply complex variable and its differentiation in solving various complex problems.								
CO2	Understand the basic principles of probability and apply them in solving different complex problems.								
CO3	Apply the concepts of basic and applied Statistics. Apply complex variable differentiation techniques								
CO4	Calculate basic probability measures within probability spaces, including conditional probability, independence, and the behaviour of discrete random variables.								
CO5	Evaluate statistical parame normal distributions.	eters such as moments	, skewne	ess, an	d kurto	sis for	binom	ial, Poisson	, and
Unit-	Conte	nt	Conta		Lea	arning	Outco	me	KL
No.			ct			J			
			Hour					11.00	
I	First order ordinary difference Exact, linear and Bernoull	_			t-order		•	differential derstanding	
	equations, Equations no	_		_				inear, and	
	equations solvable for p, e							s well as	
	y, equations solvable for x	and Clairaut's type.						rigid body	
			7					also learn	
								of the first olvable for	1,2
				_		_		raut's type	
								es focus on	
				enha	ancing		cal and	d problem-	
				solv	-	skills	in	differential	
77	0.1				ations.		C		1
II	Ordinary differential equorders:	iations of higher					-	parameters.	1.2
	Second order linear differ	ential equations with						equation,	1,2
	Strong order inicul differ	equations with		501	- 1110	Juden	,	equation,	

	variable coefficients, method of variation of parameters, Cauchy-Euler equation.	9	which is a specific type of second- order linear differential equation useful in various applications.		
III	Complex variable-Differentiation: Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions(exponential, trigonometric, logarithm) and their properties.	8	Gaining proficiency in solving second-order linear differential equations with variable coefficients using techniques like the variation of parameters. Additionally, students will learn to solve the Cauchy-Euler equation, a particular type of second-order differential equation, and comprehend its applications and solution methods. This expertise prepares students to tackle complex differential equations found in various scientific and engineering contexts	1,2	
IV	Basic probability: Probability spaces, conditional probability, independence; Discrete random variables, Independent random variables, the multinomial distribution, Poisson approximation to the binomial distribution.	8	Understanding the foundational concepts of probability spaces and the ability to calculate conditional probability and determine the independence of events. Students will also learn about discrete random variables and how to analyze distributions involving independent random variables. Additionally, they will gain proficiency in working with the multinomial distribution and applying the Poisson approximation to the binomial distribution, equipping them with essential tools for solving a variety of probabilistic		
V	Basic and applied Statistics: Basic: Measures of central tendency: Moments, skewness and Kurtosis- Probability distributions: Binomial, Poisson and Normalevaluation of statistical parameters for these three distributions, Correlation and regression. Applied: Test of significance: Large sample test for single proportion. Difference of proportions, single mean, difference of means and difference of standard deviations.	8	problems. Understanding and calculating measures of central tendency such as mean, median, and mode. Students will also learn to compute moments, and analyze skewness and kurtosis to describe data distribution shapes. Additionally, they will gain proficiency in working with key probability distributions (Binomial, Poisson, and Normal), including evaluating their statistical parameters. Furthermore, students will develop skills in correlation and regression analysis to examine relationships between variables.	1,2	

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 2. N. P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

REFERENCE BOOKS:

- 1. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
- 2. S. L. Ross, Differential Equations, 3rd Ed. Wiley India, 1984.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply complex variable and its differentiation in solving various complex problems.	1,2					
2	Understand the basic principles of probability and apply them in solving different complex problems.	3,4,8					
3	Apply the concepts of basic and applied Statistics. Apply complex variable differentiation techniques	6,8,10					
4	Calculate basic probability measures within probability spaces, including conditional probability, independence, and the behaviour of discrete random variables.	4,6					
5	Evaluate statistical parameters such as moments, skewness, and kurtosis for binomial, Poisson, and normal distributions.	7,11,12					

		SEMES	TER – I	[
Course		Engi	neering	Chem	istry				
Title						T ~			
Course	22BTCM122	Total credits: 5.5	L	T	P	S	R	O/F	C
code	R	Total hours: 30T	2	1	2	0	0	0	4
Pre-	Nil	Co-requisite				N	11		
requisite		D Too	 T	٠					
Program	B.Tech Civil Emgineering								
me Semester	Fall/ II semester of first year of the programme								
Course		ran/11 semester	or mst	ear or	the pr	ogram	ше		
Objective	1. To develor	a deep understandin	g of ato	mic ar	nd mole	ecular	structur	es. includir	ng the
S	_	of quantum mechanic	-					00, 111010011	-6
(Minimu	арричанон	or quartain inconanio	3 10 50111	Comp	ien pro	0101113.			
m 3)	2. To apply the	heoretical concepts to	real-wo	rld sc	enarios	. such	as prec	dicting mol	ecular
ĺ		and understanding spec				,	r	3	
	r	8 7	r		1				
	3. To foster of	3. To foster critical thinking and analytical skills necessary for interpreting complex							
	chemical phenomena.								
CO1	Apply the Schrödinger equation to predict the particle in a box solutions and analyze their								
	implications for conjugated molecules and nanoparticles.								
CO2	Evaluate the spatial variations of hydrogen atom wave functions through graphical							hical	
	representations and interpret their significance in atomic structure.								
CO3	•	lar orbitals of diatomi					orbital	s using qua	ntum
		tions and visualize the							
CO4		cept of aromaticity an		the p	i-mole	cular o	rbitals o	of butadien	e and
~~=	benzene using m	olecular orbital theory	<u>'. </u>					0. 1.1.1	
CO5		ergy level diagrams fo	r transıtı	on me	tal 10ns	using	crystal	field theory	y and
TT *4 NT		gnetic properties		<u> </u>		•	0.4		TZT
Unit-No.		ontent	Contac Hour		L	earning	g Outco	ome	KL
I	Atomic and mole	ecular etructure	Hour		moneti	rate	profici	ency in	
1	Atomic and more	ecular structure		Demonstrate proficiency solving quantum mechani				mechanical	
	Schrodinger equ	uation. Particle in a			_			tomic and	
	box solution ar	nd their applications			olecula			and and	
	for conjugated				01000100	302000			
		orms of the hydrogen							
		tions and the plots of							
	these functions	6							
		s. Molecular orbitals							
		lecules and plots of							
		orbitals. Equations							
		molecular orbitals.							
		agrams of diatomic. bitals of butadiene							
		l aromaticity. Crystal							
	and benzene and	i aromancity. Crystal							

	T 20 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		T	1
	field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures			
П	Spectroscopic techniques and applications Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterization techniques. Diffraction and scattering.	6	Analyze spectroscopic data to deduce molecular structures and dynamics.	2
III	Use of free energy in chemical equilibria Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.	6	Evaluate the impact of intermolecular forces on the physical and chemical properties of substances.	3
IV	Intermolecular forces and potential energy surfaces Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces. Periodic properties Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries.	6	Apply thermodynamic principles to chemical equilibria and electrochemical systems.	4
V	Stereochemistry Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity,	6	Interpret periodic trends and their implications on chemical behavior and reactivity.	5

absolute configurations and conformational analysis. Isomerism	
in transitional metal compounds	
Organic reactions and synthesis of	
a drug molecule	
Introduction to reactions involving	
substitution, addition, elimination,	
oxidation, reduction, cyclization and	
ring openings. Synthesis of a	
commonly used drug molecule	

Text Books:

- 1 University chemistry, by B. H. Mahan
- 2 Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
- 3 Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- 4 Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan

Reference Books:

- 1 Physical Chemistry, by P. W. Atkins
- Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition http://bcs.whfreeman.com/vollhardtschore5e/default.asp

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply the Schrödinger equation to predict the particle in a box solutions and analyze their implications for conjugated molecules and nanoparticles.	1,3					
2	Evaluate the spatial variations of hydrogen atom wave functions through graphical representations and interpret their significance in atomic structure.	3,4,7					
3	Analyze molecular orbitals of diatomic molecules and multicenter orbitals using quantum mechanical equations and visualize these orbitals through plots.	6,8,12					
4	Explain the concept of aromaticity and predict the pi-molecular orbitals of butadiene and benzene using molecular orbital theory.	4,6					

5	Illustrate the energy level diagrams for transition metal ions using crystal field theory and analyze their magnetic properties	7,11,12
	their magnetic properties	

		SEMESTE	R – II						
Course Title		Programmin	g for Pr	oblem	Solvin	g			
Course code	22BTCM123R	Total credits: 4 Total hours: 45T+30P	1 L 3	T 0	P 2	S 0	R 0	O/F 0	C 4
Pre- requisite	Nil	Co-requisite			I	N	il	1	l
Programm e		B.Tech	Civil Em	gineer	ring				
Semester		Fall/ II semester of	first vea	r of tl	ne prog	ramm	ne		
Course Objectives (Minimum 3)	2.To understand the 3.To learn the syntax 4.To learn the usage	mentals of computers. various steps in programate and semantics of C professional structured programmates.	m develo ogrammi ning appı	pment ng lan oach i	guage. n solvii	ng prol	blems		
CO1	solving computation								
CO2	Analyze and synthe appropriate preceden	esize variables and da ace rules.	ata types	to co	onstruct	arith	metic e	expressions	with
CO3	Evaluate conditional efficiency.	l statements and loop	s to con	trol pi	rogram	flow	and opt	timize algo	rithm
CO4	Create and impleme manipulate and store	nt algorithms using ar data effectively.	rays (1-I) and	2-D), c	haracte	er array	s, and strir	gs to
CO5		solutions using function.		cursic	on, inclu	ıding a	advance	d examples	such
Unit-No.	Con	ntent	Contac Hour		Le	arnin	g Outco	ome	KL
I	chart/pseudocode, Variables (including	data types)	11	Demonstrate proficiency					1,2
П	Arithmetic expressions and precedence, Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching, Iteration and loops. Apply knowledge of variables, data types, and arithmetic expressions with appropriate precedence in programming tasks.								
Ш		Character arrays and	10	an pr		ive str flow efficie	ructures and ency.	branching to control optimize	1,2
IV	Basic Algorithms: So Sorting Algorithms,		7		evelop anipulat	•	roficien arrays,	icy in character	1,2

	equations, idea of time complexity		arrays, and strings to manage and	
	Function and Recursion: Functions		process data effectively.	
	(including using built in libraries),			
	Recursion with example programs such as			
	Quick sort, Ackerman function etc.			
V	Structure and Pointers: Pointers,		Analyze and evaluate algorithm	
	Structures (including self referential		efficiency through the application	
	structures e.g., linked list, notional	7	of basic searching and sorting	1,2
	introduction)		techniques, understanding time	
	File handling		complexity implications.	
Practical				1,2,
		30		3,4

- 1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- 2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Apply programming concepts such as flowcharts and pseudocode to design algorithms for solving computational problems.	1,3				
2	Analyze and synthesize variables and data types to construct arithmetic expressions with appropriate precedence rules.	3,4,8				
3	Evaluate conditional statements and loops to control program flow and optimize algorithm efficiency.	6,8,12				
4	Create and implement algorithms using arrays (1-D and 2-D), character arrays, and strings to manipulate and store data effectively.	4,6				

5

		SEMEST	TER – IV					
Course		Engineerin	g Graphic	s and Desi	gn			
Title	22DTCM124D	Total credits: 3	T	тр	C	D C	\/E	<u> </u>
Course code	22BTCM124R	Total hours:	1 L	$\begin{array}{c c} T & P \\ \hline 0 & 4 \end{array}$)/F 0	<u>C</u>
couc		10T+40P	1	V 4	0	U	U	3
Pre-	Nil	Co-requisite	'	· ·	Nil	1	l.	
requisit								
e								
Progra		B.Tecl	ı Civil Eng	ineering				
mme				0.5				
Semeste		Fall/ II semester	of 1st year	of the pro	gramme	9		
r	1 70 1	. 1		1 . 1 .	C . 1	11.1 1 1		
Course		uce students to the pri	inciples and	i technique	es of trac	litional and	comp	uter-
Objecti ves		ineering graphics. students with the skills	nacaggary	to interpre	at aronta	and analys	zo toch	nicol
(Minim		and models.	s necessary	to interpre	i, create,	and analyz	ze tech	incai
um 3)		iarize students with	modern	engineering	o granhi	cs softwa	re and	l its
		ns in design and visual		8	5 8 wp			- 100
CO1		neering design and its pla		y.				
CO2	Exposure to the visu	al aspects of engineering	g design.					
CO3	Exposure to engine	ering graphics standards.						
CO4	Exposure to solid m	odelling.						
CO5	Exposure to comput	er-aided geometric desig	n					
Unit-No.	Co	ontent		L	earning (Outcome		KL
Unit-No.			Contact Hour				ourse,	KL
	Unit 1: Tradi				mpletion	Outcome of the co		KL
	Unit 1: Tradi Graphics: Princip	tional Engineering		Upon co students	mpletion will	of the co	e to	KL 1,2
	Unit 1: Tradi Graphics: Princip Graphics; Ortho Descriptive Ge	tional Engineering bles of Engineering	Hour	Upon co students	mpletion will rate the	of the co	e to	
	Unit 1: Tradi Graphics: Princip Graphics; Ortho	tional Engineering bles of Engineering graphic Projection;	Hour	Upon co students demonst orthogra	mpletion will rate the phic pr	of the co	e to on of using	
	Unit 1: Tradi Graphics: Princip Graphics; Ortho Descriptive Ge Principles.	tional Engineering bles of Engineering graphic Projection;	Hour	Upon co students demonst orthogra Descripti	mpletion will rate the phic pr ve Geom	of the control be able application	e to on of using ples.	
I	Unit 1: Tradi Graphics: Princip Graphics; Ortho Descriptive Ge Principles.	tional Engineering bles of Engineering graphic Projection; eometry; Drawing	Hour	Upon co students demonst orthogra Descripti Students	mpletion will rate the phic pr ve Geom will be a	of the control of the	e to on of using ples. erpret	
I	Unit 1: Tradi Graphics: Princip Graphics; Ortho Descriptive Ge Principles. Unit 2: Isometric Development; Per Drawing; Se	tional Engineering ples of Engineering graphic Projection; cometry; Drawing Projection; Surface respective; Reading a ectional Views;	Hour 3	Upon co students demonst orthogra Descripti Students	mpletion will rate the phic pr ve Geom will be a ate tech	of the combe able application of the combet	e to on of using ples. erpret	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthor Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seorge Dimensioning &	tional Engineering bles of Engineering Projection; Prawing Projection; Surface respective; Reading a ectional Views; Tolerances; True	Hour	Upon co students demonst orthogra Descripti Students and cre incorpora	mpletion will rate the phic pr ve Geom will be a ate tech	of the combe able application of the combet	e to on of using ples. erpret wings metric	
I	Unit 1: Tradic Graphics: Princip Graphics; Orthor Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seo Dimensioning & Length, Angle; i	tional Engineering ples of Engineering graphic Projection; cometry; Drawing Projection; Surface respective; Reading a ectional Views;	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section	of the complete application of the complete of	e to on of using ples. erpret wings metric	1,2
I	Unit 1: Tradi Graphics: Princip Graphics; Ortho Descriptive Ge Principles. Unit 2: Isometric Development; Per Drawing; Se Dimensioning & Length, Angle; in Distance.	tional Engineering ples of Engineering Projection; Projection; Drawing Projection; Surface respective; Reading a ectional Views; Tolerances; True ntersection, Shortest	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section	of the combe able application of the competition of	e to on of using ples. erpret wings metric , and	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthor Descriptive General Principles. Unit 2: Isometric Development; Per Drawing; Seneral Distance. Unit 3: Co	tional Engineering bles of Engineering Projection; Projection; Drawing Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; Reading a Projective; True Intersection, Shortest Projection; Shortest Projection; Projec	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension	of the combe able application of the cojection etry principable to internical dramical dramical dramical views oning.	e to on of using ples. erpret wings metric , and	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthon Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seo Dimensioning & Length, Angle; in Distance. Unit 3: Coordinate Coord	tional Engineering bles of Engineering Projection; Projection; Drawing Projection; Surface respective; Reading a ectional Views; Tolerances; True intersection, Shortest Enphics Software; -	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate Students in utilizi	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension	of the complete application of the complete of	e to on of using ples. erpret wings metric , and	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthor Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seorge Dimensioning & Length, Angle; in Distance. Unit 3: Coordinate Coordinate Graphical Transform	tional Engineering bles of Engineering graphic Projection; Drawing Projection; Surface respective; Reading a ectional Views; Tolerances; True ntersection, Shortest Enpire Software; - ations;	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projection accurate Students in utilizing software	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension will dev ng engin	of the complete application of	e to on of using ples. erpret wings metric , and ciency aphics patial	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthor Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seorge Dimensioning & Length, Angle; in Distance. Unit 3: Coordinate Coordinate Graphical Transform Orthographic Friedricks	tional Engineering bles of Engineering Projection; Projection; Drawing Projection; Surface respective; Reading a ectional Views; Tolerances; True intersection, Shortest Enphics Software; -	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate Students in utilizi software transforr	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension will dev ng engin finations,	of the combe able to interpreted by the combe able to interpreted	e to on of using ples. erpret wings metric , and ciency aphics patial ewing,	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthon Descriptive General Principles. Unit 2: Isometric Development; Per Drawing; Seneral Distance. Unit 3: Content of	tional Engineering bles of Engineering Projection; Projection; Drawing Projection; Surface respective; Reading a pectional Views; Tolerances; True intersection, Shortest Enphics Software; ations; Projections; Model	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate Students in utilizi software transforr and orth	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension will dev ng engin for	of the combe able application of the complex principal dramical dramical dramical views oning. Telop profice approach or some some some some some some some some	e to on of using ples. erpret wings metric , and ciency aphics patial ewing, ss.	1,2
I	Unit 1: Tradic Graphics: Princip Graphics; Orthon Descriptive George Principles. Unit 2: Isometric Development; Per Drawing; Seon Dimensioning & Length, Angle; in Distance. Unit 3: Control Engineering Graphical Transform Orthographic Form Viewing. Unit 4: Co-ordin	tional Engineering bles of Engineering graphic Projection; Drawing Projection; Surface respective; Reading a ectional Views; Tolerances; True ntersection, Shortest Enpire Software; - ations;	Hour 3	Upon co students demonst orthogra Descripti Students and cre incorpora projectio accurate Students in utilizi software transforr and ortho	mpletion will rate the phic pr ve Geom will be a ate tech ating n, section dimension will dev ng engin finations, ographic	of the combe able to interpreted by the combe able to interpreted	e to on of using ples. erpret wings metric , and ciency aphics patial ewing, s.	1,2

			ordinate systems and multi-view projection, and apply them effectively in technical drawings.	
V	Unit 5:Surface Modelling; Solid Modelling; Introduction to Building Information Modelling (BIM)	1	Students will be able to utilize surface and solid modeling techniques in BIM to design and visualize complex engineering structures.	1,2

- 1. Bhatt, N.D., Engineering Drawing, Charotar Publishing House Pvt. Ltd.
- 2. John, K.C. Engineering Graphics, Prentice Hall India Publishers.

Reference Books:

- 1. Anilkumar, K.N., Engineering Graphics, Adhyuth narayan Publishers
- 2. Agrawal, B. And Agrawal, C.M., Engineering Darwing, Tata McGraw Hill
 - 3. Varghese, P.I., Engineering Graphics, VIP Publishers

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Introduction to engineering design and its place in society.	1,3,6					
2	Exposure to the visual aspects of engineering design.	3,4,7					
3	Exposure to engineering graphics standards.	6,8,12					
4	Exposure to solid modelling.	4,6,8					
5	Exposure to computer-aided geometric design	7,11					

		SEMESTE	R – II						
Course		Effective E	nglish fo	r Engi	neers				
Title		T					Т		
Course	22UBPD12R	Total credits: 2	L	<u>T</u>	P	S	R	O/F	C
code	N7*1	Total hours: 40P	0	0	4	0	0	0	2
Pre- requisite	Nil	Co-requisite				N	11		
Program	B.Tech Civil Emgineering								
me		D.Tech C	71VII 12111§	giiieei .	ıng				
Semester		Fall/ II semester of	first vea	r of th	e progi	ramme	<u> </u>		
Course	To introduce studen	nts to fundamental gran						ysis technic	jues.
Objective		lary skills through the							•
S	3. To develop practical	al skills in reading com	nprehensi	on and	l inform	nation i	nterpre	tation.	
(Minimu m 3)									
CO1	Identify and classify di	fferent types of senten	ces using	gram	matical	rules a	and stru	ctures.	
CO2	Demonstrate proficience	cy in using synonyms	, antonyi	ns, an	d homo	nyms	appropi	riately in w	ritten
CO3	and spoken contexts. Apply effective reading	a tachniques such es C	03D to a	athon	and into	rnrot :	nformet	ion from di	VATOO
COS	texts.	s techniques such as 3	Car to 8	amer	and iiie	ipiet II	monnal	.1011 110111 (11	verse
CO4	Apply dress code eth	ics effectively by cho	oosing ar	pronr	iate att	ire for	intervi	ews and fo	ormal
001	meetings.			rr-					
CO5	Demonstrate effective	time management skill	ls by prio	ritizin	g tasks	and me	eeting d	leadlines.	
Unit-No.	Cont	ent	Contac Hour		Le	earning	g Outco	ome	KL
I	Module 1- Gramn	nar	11001	St an	d clas	sify d	ifferent	to identify types of	
	i. Interchange of Assertive Sentences	Interrogative and			ntences les and			rammatical	
	ii. Interchange of Assertive Sentences	Exclamatory and	3						1,2
	iii. Analysis of Se	ntences							
	iv. Types of Tense	es							
	v. Exercises on T	ense							
II	Module 2- Vocal	oulary		pr	udents oficiend	,	using	emonstrate synonyms,	
	i. Synonyms		2		itonyms	•		homonyms	1,2
	ii. Antonyms		_		propria	•		itten and	1,2
	iii. Homonyms			sp	oken co	ontexts	i.		
III	Module 3- Readi	ng Skills		re	_	echniq	ues suc	ch as SQ3R	
	i. Techniques of	Effective Reading		to	_	her	and	interpret	
	_	s and information	2	in	tormati	on fror	n diver	se texts.	1,2
	from a text		<u> </u>						1,4
	iii. The SQ3R Tec	hnique							
	iv. Interpret the te	-							
i	1								

IV	i. Introduction to Dress Code Ethics, ii. Purpose and Importance, iii. How to Make FIRST IMPRESSION iv. What to WearDuringInterviews or Any Other Formal Meetings – Male & Female Activity:	1	Students will apply dress code ethics effectively by choosing appropriate attire for interviews and formal meetings.	1,2
V	i. Introduction To Time Management, ii. Purpose And Importance of Time Management, iii. Basic Tips to Maintain Time. Activity: Problem solving activity: A situation will be given to the students and they will have to tell us how to handle the situation or solve the problem	2	Students will demonstrate effective time management skills by prioritizing tasks and meeting deadlines.	1,2

- 1 Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA.
- 2 Solid Mechanics by Dr. Utasv Chandra Kalita

Reference Books:

- 1 Mechanics of Materials Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf TMH 2002.
- 2 Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979
- 3 Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Students will be able to identify and classify different types of sentences using grammatical rules and structures.	1,3				
2	Students will demonstrate proficiency in using synonyms, antonyms, and homonyms appropriately in written and spoken contexts.	3,4,7				
3	Students will apply effective reading techniques such as SQ3R to gather and interpret information from diverse texts.	6,8				
4	Students will apply dress code ethics effectively by choosing appropriate attire for interviews and formal meetings.	4,6,8				
5	Students will demonstrate effective time management skills by prioritizing tasks and meeting deadlines.	7,12				

	SEM	ESTER -	– II						
Course Title	Universal Huma	n Values	(UHV) + P r	ofessio	nal Et	hics		
Course	22UUHV102R Total credits	: 2	L	T	P	S	R	O/F	C
code	Total hours: 45T+30P		1	0	2	0	0	0	2
Pre-	Nil Co-requi	site				N	il		
requisite		T. 1. C1							
Program	В.	Tech Civ	il Emg	ineer	ing				
me Semester	Fall/ II semes	ton of fin	at voor	of th	o nnom	nomm	<u> </u>		
Course	1. To help the students appreci							'VALUES	S' and
Objectiv									
S	all human beings	F F	Г	P	,,			r	
(Minimu	•	of a Hol	istic pe	erspec	tive an	ong st	udents	towards lif	e and
m 3)	profession as well as towards								
	of the Human reality and the i								
	of Universal Human Values at								
	3. To highlight plausible implic human conduct, trustful and a						_		
	interaction with Nature	nutually	141111111	ıg ilul	nan be	navior	anu III	utually Ellfl	cining
	interaction with ruttine								
CO1	Analyze the need and significance	of Value	Educ	ation,	under	standir	ng its	basic guide	lines,
	content, and processes.								
CO2	Evaluate the concepts of self-explo		atural	accept	tance,	and ex	perient	ial validati	on in
	achieving continuous happiness and pr								
CO3	Apply the principles of right understa	inding, re	lations	hip, a	nd phys	sical fa	acilities	to prioritiz	e and
CO4	fulfill basic human aspirations. Synthesize the knowledge of harmon	v vyithin t	ha galf	fomi	1, , , , ,	otri or	d notu	us and fam	loto
CO4	strategies to maintain this harmony.	y within t	ne sen	, raiiii	iy, soci	ety, ai	iu matui	ie, and ion	iuiaic
CO5	Create a framework for integrating	human v	alues	and r	rofessi	onal e	thics in	nto persona	1 and
	professional practices, ensuring the								
	technologies and systems.								1
Unit-	Content		Contac	t	Le	arnin	g Outco	ome	KL
No.	Course Introduction Need		Hour	C4		:11			
I	Course Introduction - Need, Guidelines, Content and Process	Basic for						stand the ion and its	l l
	ValueEducation	101						ntent, and	
	, macadada				ocess.		,	,	
				1					
	1. Understanding the need,	basic							
	guidelines, content and proces	s for							
	Value Education	:40							
	Self Exploration—what is it? content and process; 'N	atural	3						1
	Acceptance' and Exper		3						1
	Validation- as the mechanism for								
	exploration								
	3. Continuous Happiness and Prosp								
	A look at basic Human Aspiration								
	4. Right understanding, Relationshi	_							
	Physical Facilities the	basic							
	requirements for fulfillmen								
	aspirations of every human being	g with							

	thain agus at maiit			I
	their correct priority 5. Understanding Happiness and Prosperity correctly- A critical appraisal of the currentscenario 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.			
II	Understanding Harmony in the Human Being - Harmony in Myself! 1. Understanding human being as a coexistence of the sentient 'I' and the material 'Body' 2. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha 3. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) 4. Understanding the characteristics and activities of 'I' and harmony in 'I' 5. Understanding the harmony of I with the Body: Sanyam and Swasthya; correctappraisal of Physical needs, meaning of Prosperity in detail Programs to ensure Sanyam and Swasthya-Practice Exercises and Case Studies will be taken up in Practice Sessions.	3	Students will comprehend the concept of self-exploration, including its content and process, and the mechanisms of natural acceptance and experiential validation.	2
III	Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship 1. Understanding Harmony in the family — the basic unit of human interaction 2. Understanding values in human-human relationship; meaning of Nyaya and programfor its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship 3. t mea of Differ betw inten a Underst h ning ence een tion n anding e Vishwas; d compete nce t mea of Differ betw respe a 4. h ning ence een ct n Underst e Samman, d anding differentiation; the other salient values in relationship 5. Understanding the harmony in the society (society being an extension of family):	5	Students will gain insight into the basic human aspirations of continuous happiness and prosperity and how to achieve them through right understanding, relationships, and physical facilities.	3

	Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals 6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) - from family to world family!-Practice Exercises and Case Studies will be taken up in Practice Sessions.			
IV	Understanding Harmony in the Nature and Existence - Whole existence as Co-existence 1. Understanding the harmony in the Nature 2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature 3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting unitsin all-pervasive space 4. Holistic perception of harmony at all levels of existence-Practice Exercises and Case Studies will be taken up in Practice Sessions.	4	Students will recognize the importance of harmony in human relationships, family, society, and nature, and how it contributes to a universal harmonious order.	4
V	Implications of Holistic Understanding of Harmony on Professional Ethics 1. Natural acceptance of human values 2. Definitiveness of Ethical Human Conduct 3. Basis for Humanistic Education, Humanistic Constitution and Humanistic UniversalOrder 4. Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universalhuman order b. Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, c. Ability to identify and develop appropriate technologies and managementpatterns for above production systems. 5. Case studies of typical holistic technologies, management models and productionsystems 6. Strategy for transition from the present state to Universal Human Order:	5	Students will develop competence in professional ethics by understanding human values, ethical human conduct, and strategies for transitioning to a universal human order.	5

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually	
enriching institutions and organizations	

- 1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
- **2.** R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

- 1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
- 2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
- 3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986,1991

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Analyze the need for value education and its impact on personal and societal well-being.	1,4			
2	Evaluate the concepts of self-exploration, natural acceptance, and experiential validation as mechanisms for understanding human aspirations.	3,4,7			
3	Differentiate between happiness and prosperity and assess their implications on human aspirations in the current scenario.	6,8,10			
4	Demonstrate understanding of harmony in human relationships, family, society, nature, and existence.	4,6,8			
5	Apply principles of professional ethics to develop sustainable and humanistic solutions in their professional practice.	7,11			

		SEMESTER	R – II						
Course		Computational Systems and Digital World							
Title						I ~			
Course	22UUDL103R	Total credits: 1	L	<u>T</u>	P	S	R	O/F	C
code	2701	Total hours: 10P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				N	11		
requisite		D Took Ci	ril Eme	inoo	, in a				
Program me		B.Tech Ci	vii ciliğ	mee	ring				
Semester	•	Fall/ II semester of fi	irst veai	· of tl	he nrogi	ramme	<u> </u>		
Course	To provide a comprehe							on tools, and	1
Objectiv	•	•		5 -	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
s	To equip students with		manage	ment	, analys	is, and	visuali	zation using	g MS-
(Minimu	Excel.				•				
m 3)	To enhance knowledge		nedia, e	-comi	merce, a	nd digi	ital pay	ment systen	ns,
	including their ethical a	<u> </u>							
CO1	Identify the component	s of a computer system	and ex	plain	their fur	nctions			
604	A 1 CC	. 1 14 3 60 ***	1 3.50		1 .) (C F		·	
CO2	Apply office automati		ora, MS	-Exc	el, and	MS-Po	owerPo	int for crea	atıng,
CO2	managing, and presenting	<u> </u>		MC	E1				
CO3	Analyze statistical data Demonstrate the use of					oorohi	na taah	nigues	
CO5	Evaluate the impact of	•							odern
COS	society, including assoc				uigitai	paymo	ont sys		Jucin
Unit-	Conten		Contac		Le	arning	g Outco	ome	KL
No.	Conten		Hour		2.		, oute	,,,,,,	
I	Fundamentals of Com	puter Systems,		S	tudents	will	under	stand the	
	Office Automation and	d Internet Search		fu	ındamen	ıtal	compo	nents of	
	i. Components of a C	Computer and their			omputer	•		and their	
	functions.			re	espective	e functi	ons.		
	ii. Office Automation	_							
	MS-Excel, and MS-Pov		2						
	iii. Data management,Analysis and Data Visu								
	Excel.	alization with Mis-							
		Graphs & Charts in							
	MS-Excel.	Stapins & Charts III							
II	Internet & Cyber Worl	d		S	tudents	will	be pro	oficient in	
	i. Introduction to C	omputer Networks,						Excel, and	
	Internet and World Wide	Web, Websites and			IS-Powe			office	
	Web portals.			aı	utomatic	n tasks	S.		
	ii. Creation and use o								
	iii. Web browsing,	Web Searching,							
	Different aspects of Wel Keywords, conditions and	_	2						
	•	Search Engines like							
	Google, Microsoft Bing	<u> </u>							
	DuckDuckGo, Ask.com								
		per Laws and IT Act							
	2000, India								
III	Introduction to Socia	l Media and E-	2	S	tudents	will b	e able	to manage	
	Commerce		4	aı	nd analy	ze dat	a, and	create data	

	 i. Relevance of Social Media in present scenario. Posting different types of contents in Social Media. ii. Creating accounts and using some popular Social media portals and Apps like WhatsApp, Facebook, etc. Social Media Etiquettes & Crimes. iii. Definition of E-Commerce; E-Commerce versus traditional Commerce. iv. Case studies of popular E-Commerce portals like Amazon. v. E-commerce Etiquettes & Crimes. 		visualizations using MS-Excel.	
IV	 i. Introduction to Digital Payment Systems. ii. Creating accounts and using Digital Payment Systems like Credit Cards, Debit Cards, Netbanking, UPI. iii. Digital payments Etiquettes & Crimes. 	2	Students will gain skills in web browsing, web searching, and understanding the use of various search engines.	
V	Basic Accounting and Utility Software i. Introduction to Basic accounting concepts, Introduction to an Accounting Software like GnuCash or Tally. ii. Introduction to Technical Document writing using LaTex. iii. Introduction to Data Visualization software – Sigma, Google Charts, Tableau.	2	Students will acquire knowledge of digital payment systems, social media, e-commerce, and their related etiquettes and crimes.	

- 1. Sinha Pradeep K. and Priti Sinha. *Computer Fundamentals: Concepts Systems & Applications*. 3rd ed. New Delhi: BPB Publications.
- 2. Goel, A, 2010. Computer Fundamentals, Pearson India.

Reference Books:

- 1. Balaguruswamy, E. 2009 Fundamentals of Computers, Tata McGraw-Hill Education.
- 2. Balaguruswamy, 2014. E. Fund Of Comp & Programming (Updated Ed Sem. I, Au) Tata McGraw-Hill Education.
- 3. Lawson, C. 2022. Introduction to Social Media, Oklahoma State University.

CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Identify the components of a computer system and explain their functions.	1,3,6			
2	Apply office automation tools like MS-Word, MS-Excel, and MS-PowerPoint for creating, managing, and presenting data.	3,4,7			
3	Analyze statistical data and create visualizations using MS-Excel.	6,8,12			
4	Demonstrate the use of computer networks, the Internet, and web searching techniques.	4,6,8			
5	Evaluate the impact of social media, e-commerce, and digital payment systems in modern society, including associated crimes and legal frameworks.	7,11			

		SEMESTER	. – II						
Course Title		CO-CURRIC	ULAR A	ACTI	VITIES	5			
Course	22UBCC121	Total credits: 1	L	T	P	S	R	O/F	C
code		Total hours: 10P	0	0	0	4	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite		D.T. I. C.		•	•				
Program	m	B.Tech Ci	ivil Emg	gineei	rıng				
e Semester	•	Fall/ II semester of f	irst vea	r of tl	he prog	ramm	<u>. </u>		
Course		Tuny II semester of I	nst year	01 01	ne prog	- 4422222			
Objective	e 1. 1. Meeting the	e needs of the students a	and cove	ring a	a broad/	wide ra	ange of	their abilit	ies and
S	talents.								
(Minimu	2 To etimule	ate the interests in the s	tudents	and r	rovide	eanal a	nnortuu	nities to al	1 the
m 3)		o participate	tudents	and p	novide	cquai (рропш	inties to ai	i tiic
		•	C.	1 .	1 .	1.1	1 .		1
		ce the learning experie					_		
	skills etc.	g their inner skills suc	n as ie	auers	ınp qua	nues,	creative	or innov	auve
CO1	Analyze: Students will	he able to analyze and	Levalue	e the	effectiv	veness	of varie	Olis co cur	ricular
COI	activities in relation to t			ic inc	CHECK	v CHCSS	or vari	ous co-cui	iiculai
CO2	Organize: Students will			e wor	rkshops,	exhibi	tions, a	nd guest le	ectures
	that foster a deeper und	erstanding of their acade	emic sub	jects.					
CO3	Demonstrate: Students		strate in	prov	ed soft	skills a	and apti	itude by a	ctively
	participating in related to								
CO4	Develop: Students will					and ir	npleme	nt progran	ns that
promote the exchange of ideas and information among peers. CO5 Evaluate: Students will evaluate the impact of co-curricular acti				tivitios	on the	ir parcan	ol and		
COS	professional growth, pa								
Unit-	Conte	·	Conta				g Outco		KL
No.			ct			,	o .		
			Hour						
I	AdtU has included co-cur				Engage i		•		
	as an integral and manda	• •			urricular amwork				
	curriculum with an aim to	_			nhance i				
	work and the spirit of self the students. Students	_			urricului		_		
		-						ganizing	
		rganize various programs like Workshop, roject Exhibition, Guest Lectures, Soft-				_	g in vari	ous	
	skill and Aptitude Te			pı	rograms	and ev	ents.		
	activities will provide a co								
	for the students to exch	_	4.0						1,2,
	information on the topics	of their interest	10						3,4,
	e.g. curriculum, employ	ment / higher							3
		es, emerging							
	trends, new developme								
		nhance the							
	_	ne degree of							
,	association of student								
,	prescribed curriculum a	•							
	perform better from perspective.	a 360 degree							
	perspective.								

		•	
I	ı	1	l

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Analyze: Students will be able to analyze and evaluate the effectiveness of various co-curricular activities in relation to their academic curriculum.	1,3				
2	Organize: Students will be able to organize and execute workshops, exhibitions, and guest lectures that foster a deeper understanding of their academic subjects.	3,4,7				
3	Demonstrate: Students will be able to demonstrate improved soft skills and aptitude by actively participating in related tests and activities.	6,8				
4	Develop: Students will develop the ability to independently plan and implement programs that promote the exchange of ideas and information among peers.	4,6				
5	Evaluate: Students will evaluate the impact of co- curricular activities on their personal and professional growth, particularly in terms of employment and higher education opportunities.	7,11				

		SEMESTER -	– II						
Course		EXTRA-CURRICULAR ACTIVITIES							
Title	221DEC121	T-4-1 1'4 4							
Course code	22UBEC121	Total credits: 1 Total hours: 10P	L 0	T 0	P 0	S 4	R 0	O/F 0	<u>C</u>
Pre-	Nil	Co-requisite	U	U	U		<u>V </u>	U	1
requisite		Co-requisite				N	(11		
Program	- i	B.Tech Civ	ıl Engi	ineeri	nσ				
me		D.Teen Civ	in Eng	incern	ug				
Semester	•	Fall/ II semester of fir	st vear	of the	e progr	amme	<u> </u>		
Course		nd soft skills: Foster the acq						ne manageme	ent
Objective	-	-	•		•			Ç	
S		development: Encourage st	udents t	o enga	ge in m	ultiface	ted activ	ities beyond	
(Minimu	academics, nurtur	ring their leadership and int	terests.						
m 3)	Facilitate in-der	oth expression: Provide op	portuni	ities fo	r studer	nts to a	rticulate	their ideas	and
		early and critically analyze t							
CO1	L	ey can make meaningful c				a com	mitment	, and manag	e their
	time and priorities.								
CO2	Transform passionate stud	ents who demonstrate leade	ership a	nd purs	sue inter	ests be	yond the	ir academics	
CO3	Learn to participate in var	ious co-curricular activitie	s leadin	g to th	eir mult	tifacete	d person	ality develop	ment.
60.4	T 4 ' ' 1 '	T 1 4 1 2 1	1 .	1 1	1 .	• •	1		
CO4	_	In-depth evaluation and ar							tundia -
CO5	Demonstrate and practic transferable skills.	es different activities, by	y integ	rating	iearnin	g expe	riences	by demons	ıratıng
Unit-	Conte	nt	Conta	a	L	earnin	g Outco	ome	KL
No.			ct				J		
			Hour						
I	AdtU encourages a range of							well-rounded	
	the regular curriculum in				rsonality		cluding		
	learner's interest, These activ				anning, rticipatio		adership diverse	skills, e activities,	
	develop the social and soft ski	_					of		
	holistic development to the l							experiences,	
	in mind the 3 60 degree learn the students are engaged in d						developi		
	headed under different clu								
	music, photography, drama,								1,2,
	students are encouraged to	-	10						3,4,
	regular club activities								5, 1,
	competitions as per their inte	•							
	The student members of the	club are trained							
	represent AdtU in various	•							
	student and national leve	_							
	Renewed personalities are in								
	workshops that benefit the								
	students by giving them the								
	from experts in the respective	fields.							

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,9,11,12				
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,9,11,12				
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,9,11,12				
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,9,11,12				
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,9,11,12				

		SEMESTE	ER II									
Course Title	MOOCS I: I	Ecosystem Services:	: A Met	hod f	for Su	ıstair	nable	Developr	nent			
Course code	MOOCSCECE1	Total credits: 2	L	T	P	S	R	O/F	С			
		Total hours: 30	0	0	0	0	0	0	2			
Pre-requisite	Nil	Co-requisite					Nil					
Programme	B.Tech in Civil Engineering											
Semester	Fall/II Semester of First Year of the Programme											
Course	1. To provide students with a comprehensive understanding of ecosystem services and their											
Objectives	role in sustainable development.											
(Minimum 3)	2. To equip students with the skills to assess, value, and analyze ecosystem services using											
		various economic, ecological, social, and cultural valuation methods.										
		dents to critically eva				-		-	strategies,			
		niques for the sustaina		_								
CO1		concept and classifica	tion of e	cosys	tem s	ervice	es and	their imp	ortance in			
	sustainable developr											
CO2		methods for valuing	g ecosys	tem	servic	es an	d ider	ntify the o	challenges			
	associated with their											
CO3		e of provisioning, reg	gulating,	cultui	ral, an	d sup	portin	g services	to assess			
	their impact on hum	<u> </u>										
CO4		and management s		for	integr	ating	ecosy	stem serv	vices into			
	-	ing and impact assess										
CO5		ze tools and technique	s, such as	GIS	and re	emote	sensir	ng, for asse	essing and			
	mapping ecosystem								1			
Unit-No.	Cor	ntent	Contac	t	Lea	arnin	g Outo	come	BL			
			Hour									

I	 Introduction to Ecosystem Services Definition and Classification of Ecosystem Services History and Evolution of Ecosystem Services Concept Importance of Ecosystem Services in Sustainable Development Ecological Foundations of Ecosystem Services Case Studies of Ecosystem Services 	8	Students will understand the definitions, classifications, and ecological foundations of ecosystem services, and recognize their significance in sustainable development through various case studies.	1,2,3
II	Economic Valuation Methods: Market Pricing, Hedonic Pricing, Contingent Valuation Ecological Valuation Methods Social and Cultural Valuation Methods Cost-Benefit Analysis in Ecosystem Services Challenges in Ecosystem Services Valuation	12	Students will analyze different economic, ecological, social, and cultural valuation methods for ecosystem services, conduct cost-benefit analyses, and identify challenges associated with the valuation process.	3,4
III	 cosystem Services and Human Wellbeing Linkages between Ecosystem Services and Human Wellbeing Provisioning Services (e.g., food, water, raw materials) Regulating Services (e.g., climate regulation, water purification) Cultural Services (e.g., recreational, aesthetic, spiritual) Supporting Services (e.g., nutrient cycling, soil formation) 	8	Students will apply their knowledge to identify and assess the linkages between ecosystem services and human well-being, focusing on provisioning, regulating, cultural, and supporting services.	3,4
IV	Policy and Management of Ecosystem Services • Integrating Ecosystem Services into Policy and	6	Students will evaluate various policy and management strategies, including the integration of ecosystem services into policy and planning, environmental impact	4

	Planning		assessments, ecosystem- based management approaches, and payment for ecosystem services programs.	
V	Tools and Techniques for Ecosystem Services Assessment Geographic Information Systems (GIS) in Ecosystem Services Remote Sensing and Spatial Analysis Modelling Ecosystem Services Participatory Approaches and Stakeholder Engagement Case Studies of Tools and Techniques	5	Students will analyze and utilize tools and techniques such as Geographic Information Systems (GIS), remote sensing, spatial analysis, modeling, and participatory approaches for assessing and mapping ecosystem services, supported by relevant case studies.	4

TEXT BOOKS:

1. "Ecosystem Services: From Concept to Practice"** by J. Maes, M. L. Paracchini, G. Zulian, M. Thijssen, and E. Bidoglio

REFERENCE BOOKS:

1. "Natural Capital: Theory and Practice of Mapping Ecosystem Services"** edited by Peter Kareiva, Heather Tallis, Taylor H. Ricketts, Gretchen C. Daily, and Stephen Polasky

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	To understand the concept and classification of ecosystem services and their importance in sustainable development.	1,2,3,4,						
2	To analyze various methods for valuing ecosystem services and identify the challenges associated with their valuation.	3,4,5						
3	To apply knowledge of provisioning, regulating, cultural, and supporting services to assess their impact on human well-being.	5,10,12						
4	To evaluate policy and management strategies for integrating ecosystem services into environmental planning and impact assessments.	10,12						
5	To analyze and utilize tools and techniques, such as GIS and remote sensing, for assessing and mapping ecosystem services.	1,2,3,,10						

			SEM	ESTER – II											
Course	Title		Tech	nno Profess	sional S	Skills-	I								
Course	code	22BTCM125R	Total cree		L	T	P	S	R	O/F	C				
			Total hou	ırs: 20P	0	0	2	0	0	0	1				
Pre-		Nil	Co-r	equisite	Nil										
requisit															
Program		_		3.Tech Civil E											
Semeste Course	er			mester of first year of the programme inciples and techniques of engineering graphics relevant to civil											
Objective Course	VOC	engineering.													
(Minim		Develop students' ability to create accurate and detailed engineering drawings using basic graphical tools.													
3)		Enhance spatial visualization skills and the ability to interpret engineering designs through graphical													
ŕ		representation.			•					•					
CO	1	Understand the basic principles	s and standa	rds of enginee	ring gra	phics.									
GOA		D 1 C 1	. 1 .	. 1 1.	1 .	<u> </u>			1.	4.					
CO2		Develop proficiency in using b			-			eering a	pplica	ations.					
CO3				ing drawings of civil structures.											
CO4		Interpret and visualize enginee					tion.								
COS	5	Apply engineering graphics ski	ills in praction	cal civil engin	eering p	rojects.									
Unit-		Content		Contact		Lea	ırning	Outc	ome		KL				
No.				Hour											
Ι		duction to Engineering Graph		6	Under	1, 2									
		view of engineering graphics, dra			engine	eering g	raphics	•							
		ards, and conventions. Important eering.	ce in civil												
II		Drawing Tools and Technique	96.	6	Devel	on profi	ciency	in using	r hasio		2, 3				
11		luction to drawing instruments, s						chniques			2, 3				
		construction techniques. Use of				8		1							
		s, and geometric shapes.													
III		ographic Projections: Principle		6				graphic			3, 4				
		graphic projection, multi-view d	rawing,		and se	ctional	views c	of civil s	tructu	ires.					
IV		ectional views. etric and Perspective Drawing	•	6	Intern	rat and	vicualiz	a angin	aaring	decione	4, 5				
1 V		niques for creating isometric and		0	Interpret and visualize engineering designs through isometric and perspective										
		ective drawings. Visualization of		drawings.											
	object	ts on 2D planes.													
V		ical Applications and Projects		6				raphics			5				
		ojects involving the creation of d			practio	cal civil	engine	ering pr	ojects	3.					
		eering drawings for civil engineers	ering												
	Таррис	cations.		l]						<u>i</u>				

CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the basic principles and standards of	5, 7						

	engineering graphics.	
2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10
4	Interpret and visualize engineering designs through graphical representation.	11,12
5	Apply engineering graphics skills in practical civil engineering projects.	10

MAPPING TABLE (2nd Semester):

Subject Code	Course Name	PO 1	P O 2	PO 3	PO 4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM121R	Engineering Mathematics II	3	2	2	2	1		1					2
22BTCM122R	Engineering Chemistry	1		2									
22BTCM123R	Programmin g for Problem Solving	2		3	1	2							2
22BTCM124R	Engineering Graphics and Design	1	2	3		2	1						2
22UBPD12R	Effective English for Engineers						1		1	2	3	2	2
MOOCSCECE1	MOOCS I	2		3	1	2							2
22UBCC121	Co-curricular	1	2	3		2	1						2
22UBEC121	Extra- curricular	1	2	3		2	1						2
22BTCM125R	Techno- Professional Skills I						1		1	2	3	2	2
22UUHV102R	Universal Human Values (UHV) + Professional Ethics						1		1	2	3	2	2
22UUDL103R	Computation al Systems	2		3	1	2							2

and Digital						
World						

			SEM	IESTER -	- III										
Course	9			Engineeri		echan	ics								
Title					1_	1_	1_	1			1				
Course	9	22BTCM211R	Total credits		L	T	P	S	R	O/F	C				
code		X 74X	Total hours:		2	1	0	0	0	0	3				
Pre-	.,	Nil	Co-requisite		Nil										
requisi			Daahalana	f Tashmal		Cirri	L True cui	: 							
Progra Semest		Fall.	Bachelor o												
Course			Winter/ III se								1	1			
Object			life applications												
(Minin		**													
3)		2. This course covers statics, dynamics and elementary part of strength of materials3. This course covers statics, dynamics, and mechanics of materials, offering													
		fundamental		-								_			
		_		anaryze	engi	шееп	ing p	nobiei	118 1	IIVOIVIII	ig forces	5,			
		motion, and m		1 , 1	~	• 41		,		1.1.	41				
		4. Students gain	-		_		-	-		_					
001		effectively sol													
CO1		Construct free bod	y diagram ai	nd calcul	ate th	ne rea	action	s nece	essary	to er	isure stat	t1C			
CO2		equilibrium. Study the effect of fr	iction in static	and dynas	mic co	nditio	ne								
		•		roperties, property of masses and material properties.											
CO3 CO4		Analyze and solve di		<u> </u>		-			iateria	ii prope	rues.				
CO4		Apply the concepts o						US.							
Unit-	Cont		i mechanics a	Conta		ning (me			KL				
No.	Com	ZIII		ct	Lear	ming '	Outco	ШС			KL				
110.				Hour											
I	UNI	Γ I Importance of th	e knowledge	11001	Stude	ents	will	be	intro	duced	to 1, 2				
	of	•	hanics in		funda	ament		concep		of for					
		neering. Introduction			syste	ms, i		•		of force	es				
	_	ept of particle and								l spatia					
		of forces; collinear	•							pace, a					
	copla		oncepts of						•	will lea					
		entrated and distrib	•				-			olve for					
		or and scalar quantitie	•		syste		usin		orinci _]		of				
		or, principle of trai								diagran termina					
		e is a vector, p				also be			mue	ıcı IIIII	Cy				
		missibility. Introduct	_	_	vv 111 C	4150 U		ncu.							
		ora, parallelogram la		5											
	and	subtraction vector													
	theor	em statement &													
		or, Bound vector, Re	•												
		orces in terms of I,	_												
		act and Dot produc													
		cations. Moment of a													
		int and about an axi													
	_	ems discussion Two													
	•	system; resolution													
	Mom	•	theorem;												
	1,1011	, unglion s													

II	statement and proof Couple; resolution of a force by its equivalent force - couple system; resultant of forces. Numerical problem discussion UNIT II Concept and Equilibrium of forces in two dimensions; Free body concept and diagram, Conditions of equilibrium. Discussion on concept of free body with different examples Numerical problem discussion Concept of Friction; Coulomb's law of dry friction; Angle of friction; Angle of Repose; Coefficient of friction. Angle of friction, cone of friction concept of drawing FBD for different problems Numerical problems discussion Concept of Distributed Force: Centroid and Centre of Gravity;	10	Students will study the equilibrium of particles in both two and three dimensions, understanding how forces act to maintain static equilibrium. They will extend this knowledge to rigid bodies, applying principles of equilibrium to analyze systems of forces acting on bodies in static equilibrium. Methods for determining resultant forces, moments of forces, and solving equilibrium equations will be taught.	1, 2, 3, 4
III	UNIT III Centroid of a triangle, quadrilateral, rectangle and circular sector. To determine coordinates of centroid of composite areas consisting of above figures. Theorem of Pappus & Guldinus and its applications To find out the coordinates of the centroid of different composite area, curves etc. Discussion of the different numerical problems. Concept of mass moment of inertia, concept of moment of inertia of areas about an axis in its plane. Parallel axis theorem, perpendicular axis theorem and its applications Mass moment of inertia of symmetrical bodies like cylinder, sphere and cone; To determine MI of plane areas and solid	10	Students will calculate centroids of simple figures and composite sections using first principles. They will understand the concept of centre of gravity and its practical implications in engineering applications. The unit includes the calculation of area moment of inertia for plane sections, including theorems of moment of inertia and their applications in structural analysis. Mass moment of inertia for circular plates, cylinders, cones, spheres, and hooks will also be covered.	1, 2, 3, 4, 5
IV	UNIT IV Concept of simple stresses and strains, Normal stress, Shear stress, Bearing stress, Normal strain and shearing strain, L Hooke's Law, Elastic constants and their relation. Poisson's ratio; Stress -strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety Discussion of some numerical	10	The unit revisits particle dynamics, covering rectilinear motion, plane curvilinear motion (rectangular, path, and polar coordinates), and 3-D curvilinear motion. Students will apply Newton's second law of motion in different coordinate systems and study work-kinetic energy, power, potential energy, impulse-momentum (linear and angular), and impact (direct and oblique).	2, 3, 4

	applications; Principle of virtual work — Explanation and its applications. Numerical problem based on the principle of virtual work Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity. Rectilinear motion of particles; determination of position, velocity and acceleration under uniform acceleration rectilinear motion; construction of x -t, v -t and a -t graphs non -uniformly accelerated rectilinear motion; construction of x -t, v -t and a -t graphs; Numerical problems on uniform and non - uniform acceleration Plane curvilinear motion of particles: Rectangular components; Normal and tangential components (circular motion).			
V	UNIT V Radial and transverse components of acceleration; Projectile motion. Numerical problem on the above problems; D.Alembert's principle and free body diagram — principle, concept and examples Principle of work and energy applied to particle and rigid bodies; Principle of conservation of energy; Applications of D.Alembert's principle — numerical discussion. Applications of conservation of energy; Power and efficiency Applications of conservation of work energy & moment principle Kinetics of particles: Newton's second law; Equation of motion.	10	Students will understand basic terms and general principles in dynamics, including types of motion and instantaneous centre of rotation in plane motion. They will study D'Alembert's principle and its applications in plane motion and connected bodies. The work-energy principle will be applied to analyze plane motion of connected bodies and kinetics of rigid body rotation	2, 3, 4, 5

- 1. Irving H. Shames (2006), Engineering Mechanics, 4th Edition, Prentice Hall
- 2. F. P. Beer and E. R. Johnston (2011), Vector Mechanics for Engineers, Vol I Statics, Vol II, Dynamics, 9th Ed, Tata McGraw Hill
- 3. R. C. Hibbler (2006), Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press.

Reference Books:

1. Reddy Vijaykumar K. and K. Suresh Kumar(2010), Singer's Engineering Mechanics

- Bansal R.K.(2010), A Text Book of Engineering Mechanics, Laxmi Publications
 Khurmi R.S. (2010), Engineering Mechanics, S. Chand & Co.

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.	1,2,3	
2	Study the effect of friction in static and dynamic conditions.	3,5,6	
3	Understand the different surface properties, property of masses and material properties.	7,2,4	
4	Analyze and solve different problems of kinematics and kinetics.	8,1,9	
5	Apply the concepts of mechanics and work in force analysis.	10,4,7	

	SEMESTER – III												
Course	9			Engin	eerir	ng Ge	eology	7					
Title													
Course	9	22BTCM212R	Total cr			L	T	P	S	R	O/F	C	
code				ours: 30T			0	2	0	0	0	2	
Pre-		Nil	Co-requ	isite		Nil							
requisi							~* **						
Progra		77.11.1		or of Techr									
Semest				II semester								· · · · ·	(D.D. 1
Course		1. Use suitable sof			geolo	ogy, s	SOII, §	geolog	gic haz	zard,	and N	1EH	RP data to
Object (Minin		characterize a geo 2. Calculate the bul			c on	d une	oncol	lidata	d codin	aants	cuch c	na d	oncity void
3)	IUIII	ratio, water conte				u unc	JOHSOI	nuaice	ı scum	iciits	Sucii a	15 U	ensity, void
3)		3. Evaluate rock-ma		_		cinem	atic a	nalvsi	S				
CO1		1. Discuss the importance								spec	ially si	ite s	selection of
001		engineering projects.	01 000	108) 111 111	8	,		-6	-1010110	Брес	1411) 51		3010001011 01
CO2		2. Analyze the concepts o	f how mir	nerals form	and t	their ı	uses fo	or ide	ntifyin	g the	rock fo	rmi	ng.
CO3		3. Analyze graphs and							•				•
		tectonics.				5	5]	-01			.0 5.11	,	
CO4		4. Generalize rocks using	basic geo	logical syst	ems	for se	electiv	e con	structio	n ma	terial		
CO5		5. Apply quantitative skill										olen	ns related to
		geological features and ge	ological l	nazards and	rem	edial	meası	ires th	nereof.				
Unit-	Cont	ent		Contact	Lea	arnin	g Out	tcome	;				KL
No.				Hour									
I	usefu geold engir Mine Physi susce basic form ident secon	eral, Origin and complical properties of neptibility of minerals to all of optical mineralogying minerals, megification of common prindary minerals.	ecope of us civil eralogy-position. minerals, teration, v, Rock gascopic mary &	5	sele mat like env mai con	ection terial e land vironn nagen astruc	n, for source Islides mental ment tion.	oundating. To and asses	tion They pr sinkho ssments for	desig even les an s and su	t hazard nd aid resourd stainab	nd ds in ce le	1, 2
П			5	geo geo und whi gro asse	civil ology, ology. dersta ile oundw esses	engin hydro Str nd ro hydro vater f	neering ogeolo cuctura ck be ogeolo low. l logica	g throu ogy, an al ge shavior ogy Engine	agh s d eng ology unde deals ering	er stres	ral ng ps ss, th	1, 2, 3, 4	

III	Igneous rocks like Granite, Rhyolite or Tuff, Felsite, Pegmatite, Hornfels. Metamorphic Aureole, Kaolinization. Landform as Tors. Engineering aspect to granite. Basic Igneous rocks Like Gabbro, Dolerite, and Basalt. Engineering aspect to Basalt. Sedimentary petrology- mode of formation, Mineralogical Composition. Texture and its types, Structures, Gradation of Clastic rocks. Classification of sedimentary rocks and their characteristics. Detailed study of Conglomerate, Breccia, Sandstone, Mudstone and Shale, Limestone Metamorphic petrology-Agents and types of metamorphism, metamorphic grades, Mineralogical composition, structures & textures in metamorphic rocks. Important Distinguishing features of rocks as Rock cleavage, Schistosity, Foliation. Classification. Detailed study of Gneiss, Schist, Slate with engineering consideration. Physical Geology- Weathering. Erosion and Denudation. Factors affecting weathering and product of		Geological studies are crucial for site selection, foundation design, and material sourcing. They prevent hazards	1, 2, 3, 4, 5
	weathering and product of weathering. Engineering consideration. Superficial deposits and its geotechnical importance: Water fall and Gorges, River meandering, Alluvium, Glacial deposits, Laterite (engineering aspects), Desert Landform, Loess, Residual deposits of Clay with flints, Solifluction deposits, mudflows, Coastal deposits.	5	like landslides and sinkholes and aid in environmental assessments and resource management for sustainable construction.	
IV	Strength Behavior of Rocks- Stress and Strain in rocks. Concept of Rock Deformation & Tectonics. Dip and Strike. Outcrop and width of outcrop. Inliers and Outliers. Main types of discontinuities according to size. Fold-Types and nomenclature, Criteria for their recognition in field. Faults: Classification, recognition in field, effects on outcrops. Joints & Unconformity; Types, Stresses responsible, geotechnical importance. Importance of structural elements in engineering operations. Consequences of failure as land sliding, Earthquake and Subsidence. Strength of Igneous rock structures.	5	Physical geology examines weathering (mechanical, chemical), erosion, and denudation processes influencing rock properties. Superficial deposits like alluvium and glacial deposits impact construction and groundwater management. Geological structures such as folds, faults, and joints affect rock strength and stability. Understanding these structures is vital for engineering operations, preventing hazards like landslides and earthquakes	2, 3, 4

V	Geological Hazards-Rock Instability		Geological hazards include slope	2, 3, 4, 5
	and Slope movement: Concept of		instability, groundwater dynamics, and	
	sliding blocks. Different controlling		seismic activities. Prevention measures	
	factors. Instability in vertical rock		like drainage systems, slope	
	structures and measures to prevent		reinforcement, and seismic design	
	collapse. Types of landslide.		mitigate risks in civil engineering	
	Prevention by surface drainage, slope		projects. This structured approach	
	reinforcement by Rock bolting and		covers essential topics in geology	
	Rock anchoring, retaining wall, Slope		relevant to civil engineering, ensuring a	
	treatment. Case study on black clay.		comprehensive understanding of	
	Ground water: Factors controlling	10	geological principles and their practical	
	water bearing capacity of rock.		applications.	
	Pervious & impervious rocks and			
	ground water. Lowering of water table			
	and Subsidence. Earthquake:			
	Magnitude and intensity of earthquake.			
	Seismic sea waves. Revelation from			
	Seismic Records of structure of earth.			
	Case Study on Elevation and			
	Subsidence in Himalayan region in			
	India. Seismic Zone in India.			

- 1. P.C. Varghese, Engineering Geology for Civil Engineers, PHI Learning private limited.
- 2. Parbin Singh, Engineering & General Geology, S.K. Kataria and Sons- Delhi.

Reference Books:

- 1. Dr. D.V. Reddy, Engineering Geology, Vikas Publishing House.
- 2. Chadha S. K., Elements of Geological Maps for Geology, Geography & Civil Engineering, CBS Publishers & Distributors- New Delhi.
- 3. Gautam Mahajan, Evaluation and Development of Ground Water, APH Publishers.
- 4. Jerome V. Degraff Robert B. Johnson, Principles of Engineering Geology, Wiley India Pvt Ltd.
- 5. Geology for Geotechnical Engineers, J.C.Harvey, Cambridge University Press (1982).

CO	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Discuss the importance of Geology in making engineering decisions specially site selection of engineering projects.	1,2
2	Analyze the concepts of how minerals form and their uses for identifying the rock forming.	3,5,6
3	Analyze graphs and models used in structural geology for demonstrating stress, strain and tectonics.	7,2
4	Generalize rocks using basic geological systems for selective construction material	1,9
5	Apply quantitative skills and frame work for solving basic engineering geology problems related to geological features and geological hazards and remedial measures thereof.	4,7

		SE	EMESTE	R – III						
Course		Compute	er-aided (Civil Eng	ineer	ing Dr	awing			
Title		_		1_	1_	1_	1			1 2.
Course		Total cre		L	T	P	S	R	O/F	C
code		Fotal hou		0	0	4	0	0	0	2
Pre-	Nil	Co-requis	site	Nil						
requisite	Daabalan ef Taabaala	· · · · · · · · · · · · · · · · · · ·	E	<u> </u>						
Programme Semester	Bachelor of Technology Fall: Winter/ III semest									
Course					_		ongina	orina	drozzin	σ.
Objectives	 To develop parametr Produce and interpre 				18 01 1	Offilai	engme	ering	urawiii	g
(Minimum	3. To communicate a d			_	lv/ vi	villeria				
3)	4. To develop graphica						leas ar	d des	signs of	engineering
	products graphically.									•88
CO1	CO1- Examine a design									ent learn to
	interpret drawings, and to									
CO2	CO2- Get a Detailed stud	y of an er	ngineering	g artifacts.						
CO3	CO3- Examine a design	riticall	y and w	ith under	standi	ing of	CAD	- Tł	ne stude	ent learn to
	interpret drawings, and to									
CO4	CO4- Construct accurate	e 2D ge	ometry a	s per the	dim	ension	s follo	wing	standa	rd drawing
	practices with proper dime									
CO5	CO5- Create 2D represen					, eleva	ations,	side v	views ar	nd sections /
	auxiliary views using Cor	nputer Ai								
Unit-No.	Content		Conta	Learnin	ıg Ou	tcome				KL
			ct							
т	LINUT I. INTRODU	OTION:	Hour	Tr1. :	14 14	1			4 C	1.2
I	UNIT-I: INTRODUC			This un					•	1, 2
	Introduction to conc	•		engineer their in						
	drawings, Interpretation			concise		and			nensive	
		Planning		informat						
	drawings to show info			optimal						
	concisely and comprehe	-		the basi						
	optimal layout of drawi	_		(CAD),						
	Scales; Introduction			and esse	ential	comm	ands 1	ike d	rawing	
	_	lrawing,		entities,				•		
	coordinate systems, re			dimension	_					
	planes. Commands:	Initial		and nor						
	settings, Drawing aids, I	•	5	are also					•	
	· ·	Modify		consiste			in	te	chnical	
	commands, Layers, Te			docume	ntatio	n.				
	Dimensioning, Blocks. I	-								
	presentation norms	and								
	standards.									

			Т	
II	UNIT-II: SYMBOLS AND SIGN CONVENTIONS: Materials, Architectural, Structural, Electrical and Plumbing symbols. Rebar drawings and structural steel fabrication and connections drawing symbols, welding symbols; dimensioning standards	5	Symbols and sign conventions play a crucial role in engineering drawings across various disciplines such as materials, architecture, structural engineering, electrical systems, and plumbing. This unit explores standard symbols used in rebar drawings, structural steel fabrication, and welding, alongside dimensioning standards. Understanding these conventions is essential for accurate communication and interpretation of technical details in construction and engineering projects.	1, 2, 3, 4
III	UNIT-III: MASONRY BONDS: English Bond and Flemish Bond – Corner wall and Cross walls - One brick wall and one and half brick wall	10	Building drawing essentials are covered in this unit, including terms, planning elements, and methods for creating line drawings and detailed architectural drawings. It includes the depiction of site plans, floor plans, elevations, sections, foundation plans, and roof drainage plans for small residential buildings. Detailing of joinery, fittings, fixtures, and finishes, along with the use of notes for clarity, enhances the communicative value of architectural drawings.	1, 2, 3, 4, 5
IV	UNIT-IV: BUILDING DRAWING: Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential buildings. Foundation plan. Roof drainage plans. Depicting joinery, standard fittings & fixtures, finishes. Use of Notes to improve clarity	5	Building drawing essentials are covered in this unit, including terms, planning elements, and methods for creating line drawings and detailed architectural drawings. It includes the depiction of site plans, floor plans, elevations, sections, foundation plans, and roof drainage plans for small residential buildings. Detailing of joinery, fittings, fixtures, and finishes, along with the use of notes for clarity, enhances the communicative value of architectural drawings.	2, 3, 4
V	UNIT-V: PICTORIAL VIEW: Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information	5	Principles of isometric and perspective drawing techniques are explored in this unit, emphasizing their application in architectural representation. It includes creating perspective views of buildings and introduces fundamentals of Building Information Modelling	2, 3, 4, 5

Modelling (BIM)	(BIM), highlighting its role in digital representation, collaboration, and project management in contemporary architectural and construction
	practices.

- 1. Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers
- 2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 2001", Tata- Mc Graw-Hill Company Limited, New Delhi
- 3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,

Reference Books:

- 1. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age
- 2. International Pvt. Ltd.,
- 3. Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades publishing
- 4. KDR building, Calicut,
- 5. (Corresponding set of) CAD Software Theory and User Manuals.
- 6. Malik R.S., Meo, G.S. (2009) Civil Engineering Drawing, Computech Publication Ltd
- 7. New Asian.
- 8. Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria& Sons,

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D software.	1,2,3	
2	Get a Detailed study of an engineering artifacts.	3,5,6	
3	Examine a design critically and with understanding of CAD - The student learn to interpret drawings, and to produce designs using a combination of 2D and 3D	7,2,4	
4	Construct accurate 2D geometry as per the dimensions following standard drawing practices with proper dimensioning using Computer Aided drafting software	8,1,9	
5	Create 2D representations of 3D objects as plan view, elevations, side views and sections / auxiliary views using Computer Aided drafting software	10,4,7	

	SEMESTER – III											
Course Title	2			Biology	for Eng	ineer	<mark>'S</mark>					
Course	2	22BTCM213R	Total credi		L 2	T 1	P 0	S	R	O/F 0	C	
Pre- requisi	ite	Nil	Co-requisi	te	Nil		•					
Progra		Bachelor of Technolo	ogy in Civil	Engineer	ring							
Semest	ter	Fall: Winter/ III sem				rogra	mme					
Course Object (Minin 3)	ives	 To make conn To identify an living things. Biology for E concepts in bio 	nd define the	e basic lif designed	e proces to introd	ses, tl	he basi engine	ic need	stude	nts to f		-
CO1		Discuss biological science	ces, its scope a	and perspec	ctives.							
CO2		Discuss regarding the eco	ological energ	getics, its w	orking m	echani	sm, ide	ntificat	ion o	f organis	sms.	
CO3		Analyse the mechanism										
CO4		Explain the genetic code										
CO5	Ι ~ .	Interprets the relation bet	ween various									
Unit- No.	Cont	ent		Conta ct Hour	Learni	ng Oı	ıtcome	9				KL
I UNIT I Introduction Importance and scope of Biology as an important scientific discipline Branches of biological sciences Fundamental differences between science and engineering Comparison between the working mechanism of eye and camera, Bird flying and aircraft Biological observations of 18th century that lead to major discoveries in the world Steps in scientific research works Brownian motion in biological sciences			10	This unit introduces the importance and scope of biology, covering its branches and comparing fundamental differences between science and engineering. It explores biological systems such as the eye versus a camera and bird flight versus aircraft dynamics. Students also learn about key 18th-century biological observations and phenomena like Brownian motion.				hes ces It the ght also	1, 2			
II	Class class bioch organ conc multi and e Adap Struct an ec	ification: Morphological nemical or ecological, lanization, symmetry, generation, segmentation, ept of unicellular and cellular organisms; produkaryotes; Habitat & patations Concept of Econture & Function Energy	based on morphology, biochemistry, and ecological, level of symmetry, germ layer segmentation, notochord nicellular and organisms; prokaryotes es; Habitat & Concept of Ecosystem: Sunction Energy flow in: Lindemann ten percent Lindemann ten percent based on morphology, biochemistry, and ecology. They learn about unicellular and multicellular organisms, prokaryotes versus eukaryotes, and habitats and adaptations. The unit covers ecosystem structures, functions, energy flow, and types of excretion (ammonotelism, uricotelism).			2, 3, 4						

	Ammonotelism, Ureotelism and Uricotelism Animal Kingdom: Characters of phylum with examples Model organisms for the study of biology come from different groups. E. coli, S. cerevisiae, D. Melanogaster, C. elegans, A. thaliana, M. musculus			
III	UNIT III Genetics & Biomolecules Concept of Allele; Dominance & Recessive; Monohybrid, Dihybrid & Trihybrid cross; Mitosis & Meiosis Mendel's laws, Concept of Segregation and Independent assortment Concept of co-dominance and incomplete dominance with illustrations Sex determination in human Genetic disorders in human beings DNA & RNA as genetic material Enzymes: Classification; Mechanism of enzyme action	10	This unit covers basic genetics including alleles, dominance, and recessiveness. Students learn about monohybrid, dihybrid, and trihybrid crosses, mitosis, meiosis, Mendel's laws, and genetic disorders. Biomolecules like DNA, RNA, enzymes (classification and mechanism), and genetic material are also discussed.	1, 2, 3, 4
IV	UNIT IV Information Transfer & Metabolism Genetic code: Properties Structure of DNA Concept of recombination and crossing over Proteins: Primary secondary, tertiary and quaternary structure Concept of Central dogma ATP as an energy currency of cell Concept of docking: Protein Ligand interaction	10	Students delve into the genetic code, DNA structure, recombination, crossing over, and protein structures (primary, secondary, tertiary, quaternary). The unit covers the central dogma of biology, ATP as an energy carrier, and protein-ligand interactions.	1, 2
V	UNIT V Physiology Human Circulatory System: Heart and its working mechanism; Blood groups; Erythroblastosis fetalis Neuroendocrine system of human: Endocrine glands and their functions Human Excretory system: Structure of Kidney and Nephron Nervous system of human: Structure of neuron; Resting Membrane Potential; Origin and conduction of nerve impulse Human Respiratory System: Structure of lungs and exchange of gases Human digestive enzymes: Components and enzymes Mechanism of muscle contraction.	5	This unit focuses on human physiology, covering the circulatory system (heart function, blood groups), neuroendocrine system (endocrine glands and functions), excretory system (kidney structure, nephron), nervous system (neuron structure, nerve impulse), respiratory system (lung structure, gas exchange), digestive enzymes, and muscle contraction mechanisms.	2, 3, 4, 5

- 1. Biology: A global approach: Campbell, N. A.; Reece, J. B.; Urry, Lisa; Cain, M, L.; Wasserman, S. A.; Minorsky, P. V.; Jackson, R. B. Pearson Education Ltd
- 2. Outlines of Biochemistry, Conn, E.E; Stumpf, P.K; Bruening, G; Doi, R.H., John Wiley and Sons.
- 3. Principles of Biochemistry (V Edition), By Nelson, D. L.; and Cox, M. M.W.H. Freeman and Company.

Reference Books:

- 1. Molecular Genetics (Second edition), Stent, G. S.; and Calender, R.W.H. Freeman and company, Distributed by Satish Kumar Jain for CBS Publisher
- 2. Microbiology, Prescott, L.M J.P. Harley and C.A. Klein 1995. 2nd edition Wm, C.
- 3. Brown Publishers

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Discuss biological sciences, its scope and perspectives.	2,6,4	
2	Discuss regarding the ecological energetics, its working mechanism, identification of organisms.	3,9,7	
3	Analyse the mechanism of transfer of character from parent to next generation.	1,3,5	
4	Explain the genetic code and production of proteins.	2,9	
5	Interprets the relation between various physiological processes of our body	10,12	

				SE	MESTER	R – III							
Course	e				for Emp		ty for	Engi	neers				
Title													
Course	e	22UBI	PD213R	Total cred		\mathbf{L}	T	P	S	R	O/F	C	
code				Total hour		0	0	4	0	0	0	2	
Pre-		Nil		Co-requisi	te	Nil							
requisi													
Progra				ology in Civil									
Semest		Fall: V	Vinter/ III se	emester of sec	ond year	of the p	rogra	amme					
Course		1.	To capacitat	e the students	with mast	erv over	· Rasi	c Fnol	ish ora	mma	r		
Object (Minin		2.	_	ne students to		-		_	_			nσ	
(1 V 1111111 3)	IIUIII	۷.	and speaking		Commun	cate con	mucm	tiy wit	11 a 100	cus o	ii iisteiii	iig	
3)		3.		elp of the bas	ics of Ph	onetics.	the s	tudent	s will	be a	ble to		
				vords correctly		,				o c u	010 00		
		4.	•	successfully an		corum.							
CO1				concise techni			in bot	h writt	en and	oral f	ormats, ii	ncorpor	rating
		industry	-specific termi	nology.								•	Ü
CO2				crafting resum	nes, cover	letters, a	and te	chnical	report	ts to	effectivel	ly shov	wcase
CO3			ring qualificati	ons. n creating and o	deliverine	importfu	1 proce	antation	ne 114i1i	zina :	vicual aid	le to co	onwow.
COS						ппраспи	i prese	ciitatioi	15, uu11	zing	visuai aic	is to co	Jiivey
CO4			ngineering concepts to diverse audiences. Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict										
	resolution,			ommunication v									
CO5				ng job intervie					s, expe	erience	es, and c	eareer g	goals,
T 1:4			ng both techni	cal and behavio								T	7 T
Unit- No.	Cont	ent			Conta ct	Learni	ing O	utcom	ie			l P	KL
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						will 6							
						includi		nouns	_	noun	is, ver	bs,	
	Parts	of Spee	ech			adjecti			erbs,	•	repositio		
	A	Articles Auxiliary Verbs				conjun			and		terjectio		
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		ompreh	nension Exerc	cises			_	_	•		omparan dored. T		
											prehensi		
<u> </u>	<u> </u>				L	module	VV 111	a150 I	neruuc	COIII	prenensi	OH	

III	What is listening? The Process of Listening Factors that adversely affect Listening Difference between Listening and Hearing, Purpose and Importance of Effective Listening How to Improve Listening	5	exercises designed to enhance students' ability to understand and interpret written texts effectively Students will be introduced to the fundamentals of listening, distinguishing it from hearing. They will study the process of listening and identify factors that adversely affect it. The module will highlight the purpose and importance of effective listening and provide strategies to improve the listening process. By understanding these concepts, students will enhance their ability to comprehend and retain spoken information.	1, 2, 3, 4
137	Process.			1.2
IV	Introducing yourself Self-discovery Basics of Phonetics, pronunciation Extempore speech Video Recording for Self reflection	10	This module focuses on developing students' speaking abilities. They will learn how to introduce themselves and engage in self-discovery to build confidence. Basics of phonetics and pronunciation will be covered to ensure clear and correct speech. Students will practice extempore speech to improve their ability to speak spontaneously. Video recording for self-reflection will be used as a tool for students to evaluate and improve their speaking skills.	1, 2
V	Introduction to Communication, Importance of Communication Skills, Purpose of Communication, Types of Communication, Formal and informal communication Importance of Communication, Barriers to Communication, How to improve/ tips to improve Communication skills. Responding to different questions in various situations (formal/informal)	5	Students will gain a comprehensive understanding of communication and its significance. The module will cover the types and purposes of communication, distinguishing between formal and informal contexts. Students will learn about the importance of communication skills and the barriers that can impede effective communication. Tips and strategies to improve communication skills will be provided. The module will also include exercises on responding to different questions in various situations, enhancing students' adaptability and effectiveness in both formal and informal interactions.	2, 3, 4, 5

- 1. Chaturvedi, P.D., Chaturvedi Mukesh, 2011.Business Communication: Concepts, Cases and Applications, second edition, Pearson, Noida.
- 2. Alex K., Chand, S, 2009. Soft Skills: Know Yourself and Know the World, first

edition, S. Chand & Delhi. Company Ltd.: New Delhi.

Reference Books:

- 1. Quirk, Randolp. (2010) A Comprehensive Grammar of the English Language by Randolph Quirk, Sidney Greenbaum, Pearson Education India
- 2. Marks, Jonathan. (2017) IELTS Advantage Speaking and Listening Skills: A step-by-step guide to a high IELTS speaking and listening score. Book + CD-ROM, Delta Publishing by Klett

Other Learning Resources:

- 1. https://youtu.be/bEB8-SWMYhI
- 2. https://youtu.be/-zZau_dttRY

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	2,6,3	
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	3,9,8	
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	1,3,9	
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	2,9,4	
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10,12	

			SE	MESTEI	R – III							
Course	2		Intr	oduction	to Civil	Engi	neerin	ıg				
Title												
Course	9	22BTCM215R	Total cred	its: 2	\mathbf{L}	T	P	S	R	O/F	C	
code			Total hour		2	0	0	0	0	0	2	
Pre-		Nil	Co-requisi	te	Nil							
requisi												
Progra		Bachelor of Technol										
	Semester Fall: Winter/ III semester of se											
Course		1. To give an u	_							nume	rous	areas of
Object		engagement a										
(Minin	num	2. to motivate th		_	career in	one o	of the i	many a	ireas	of Civi	I Eng	ıneerıng
3)		with deep inte	rest and kee	nness.								
		3. To expose the	ne students	to the v	arious a	ivenii	es ava	ilable	for	doing	creat	ive and
		innovative wo										
		of public utilit		-3 0 0110					-105 41	р	8	F10J0018
CO1		Gaining practical and		experience	e in con	ductir	g inde	epende	nt res	search	on an	y Civil
		Engineering subject, a										
CO2		Explore the scope of v	arious discir	olines of C	Civil Eng	ineer	ing.					
CO3		The student will learn	^					vater a	nd its	conser	vatio	n
CO4				management, environmental issues and the sustainable								
		levelopment.										
CO5	*				epreneu	rial o	pportu	nities	in the	Civil	Engi	neering
		profession.			•	•						
Unit-	Cont	tent		Conta	Learni	ing O	utcom	ie				KL
No.				ct								
				Hour								
I		c Understanding: Wh			This u							1, 2
	_	neering/ Infrastructure			other						,	
		neering and Civil E			focusir	_		simple		habilita		
	Broa	1	of Civil		system							
		neering; Importance			testing							
	_	neering, Possible sco	opes for a		carbon			nng an	ia coi	nposite	es in	
	caree	er. Ory of Civil engineer	ing: Forly		structu	rai rej	jairs.					
		tructions and develop	•									
		Ancient monuments										
		els; Development of		5								
		rials of construction ar		3								
		onstruction; Works of										
		engineers.										
	Over	view of National Pla	anning for									
		struction and Infr	_									
		elopment; Position										
		truction industry vis-	à-vis other									
		stries, five year plan										
1		truction; current bu										

	infrastructure works.			
II	Fundamentals of Architecture & Town Planning: Aesthetics in Civil Engineering, Examples of great architecture, fundamentals of architectural design & town planning; Building Systems (HVAC, Acoustics, Lighting, etc.); LEED ratings; Development of Smart cities Fundamentals of Building Materials: Stones, bricks, mortars, Plain, Reinforced &		This unit highlights typical software applications in civil engineering such as Finite Element Method, Computational Fluid Dynamics, and Computational Geotechnical Methods. It includes software for highway design (MX), Building Information Modelling (BIM), and various other tools like SAP, STAAD, ABAQUS, MATLAB, and AUTOCAD.	2, 3, 4
	Prestressed Concrete, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Plastics in Construction; 3D printing; Recycling of Construction & Demolition wastes Basics of Construction Management & Contracts Management: Temporary Structures in Construction; Construction Methods for various types of Structures; Major Construction equipment; Automation & Robotics in Construction; Modern Project management Systems; Advent of Lean Construction; Importance of Contracts Management.	10		
III	Environmental Engineering & Sustainability: Water treatment systems; Effluent treatment systems; Solid waste management; Sustainability in Construction. Geotechnical Engineering: Basics of soil mechanics, rock mechanics and geology; various types of foundations; basics of rock mechanics & tunneling. Hydraulics, Hydrology & Water Resources Engineering: Fundamentals of fluid flow, basics of water supply systems; Underground Structures; Underground Structures Multipurpose reservoir projects. Ocean Engineering: Basics of Wave and Current Systems; Sediment	5	Industry professionals present case studies of large civil engineering projects, covering comprehensive planning through commissioning. Topics include project management strategies, challenges faced, and solutions implemented.	1, 2, 3, 4

	transport systems; Ports & Harbours			
IV	Power Plant Structures: Chimneys, Natural & Induced Draught Colling towers, coal handling systems, ash handling systems; nuclear containment structures; hydro power projects Structural Engineering: Types of buildings; tall structures; various types of bridges; Water retaining structures; Other structural systems; Experimental Stress Analysis; Wind tunnel studies; Surveying & Geomatics: Traditional surveying techniques, Total Stations, Development of Digital Terrain Models; GPS, LIDAR; Traffic &Transportation Engineering: Investments in transport infrastructure development in India for different modes of transport; Developments and challenges in integrated transport development in India: road, rail, port and harbour and airport sector; PPP in transport sector; Intelligent Transport Systems; Urban Public and FreightTransportation; Road Safety under heterogeneous traffic; Sustainable and resilientpavement materials, design, construction and management; Case studies and examples.	5	This unit explores professional ethics, entrepreneurial opportunities, and encourages creative and innovative approaches in civil engineering. It enhances technical writing skills and discusses facilities management, quality assurance, and health, safety, and environment (HSE) systems in construction.	1, 2
V	Repairs & Rehabilitation of Structures: Basics of corrosion phenomena and other structural distress mechanisms; some simple systems of rehabilitation of structures; Non- Destructive testing systems; Use of carbon fibre wrapping and carbon composites in repairs. Computational Methods, IT, IoT in Civil Engineering: Typical software used in Civil Engineering- Finite Element Method, Computational Fluid Dynamics; Computational Fluid Dynamics; Computational Geotechnical Methods; highway design (MX), Building Information Modelling; Highlighting typical available software systems (SAP, STAAD,	5	This unit focuses on sustainability principles in civil engineering, addressing environmental, social, and economic aspects. It covers sustainable construction materials and practices, energy-efficient design, and green building certifications. Topics include lifecycle assessment, carbon footprint reduction strategies, and renewable energy integration in infrastructure projects. Case studies highlight successful sustainable initiatives and their impact on the built environment.	2, 3, 4, 5

ABAQUS, MATLAB. ETAB. NASTRAN, NISA, **MIKE** 21, MODFLOW, REVIT, TEKLA, AUTOCAD,...GEOSTUDIO, EDUSHAKE, MSP, PRIMAVERA, ArcGIS, VisSIM, ...) Industrial lectures: Case studies of large civil engineering projects by industry professionals, covering comprehensive planning commissioning; Basics of **Professionalism:** Professional Ethics, Entrepreneurial possibilities in Civil Engineering, Possibilities for creative & innovative working, Technical writing Skills enhancement; Facilities Management; Quality **HSE Systems** Construction

Text Books:

- 1. Patil, B.S.(1974), Legal Aspects of Building and Engineering Contract
- 2. Avtarsingh (2002), Law of Contract, Eastern Book Co.
- 3. Dutt (1994), Indian Contract Act, Eastern Law House.

Reference Books:

- 1. Anson W.R.(1979), Law of Contract, Oxford University Press
- 2. Kwatra G.K.(2005), The Arbitration & Conciliation of Law in India with case law on
- 3. UNCITRAL Model Law on Arbitration, Indian Council of Arbitration
- 4. Avtarsingh (2005), Law of Arbitration and Conciliation, Eastern Book Co.
- 5. Wadhera (2004), Intellectual Property Rights, Universal Law Publishing Co.
- 6. P. S. Narayan (2000), Intellectual Property Rights, Gogia Law Agency.
- 7. The National Building Code, BIS, (2017).
- 8. K.M. Desai(1946), The Industrial Employment (Standing Orders) Act.

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Gaining practical and theoretical experience in conducting independent research on any Civil Engineering subject, as well as in oral and written presentations, in team work and in self-discipline	2,6,4	
2	Explore the scope of various disciplines of Civil Engineering.	3,9,7	
3	The student will learn about role of transportation as	1,3,5	

	well as of water and its conservation	
4	Ability to define construction management,	2,9
	environmental issues and the sustainable	
	development.	
5	Assess possible avenues of career and entrepreneurial	10,12
	opportunities in the Civil Engineering profession.	

			SE	MESTER	R – III							
Course	;		PDI	E and tra	nsform	math	ematio	es				
Title												
Course	•		Total cred		L	T	P	S	R	O/F	C	
code		r	Total hour	s: 45T	2	1	0	0	0	0	3	
Pre-	Pre- Nil Co-requ			te	Nil							
requisi	te											
Progra	Programme Bachelor of Technology in C				ing							
Semest	er	Fall: Winter/ III seme	ester of sec	ond year	of the p	rogra	mme					
Course	;	1. To familiarize the stu	dents with	Laplace T	Transfort	n, Foi	urier T	ransfo	rm, tl	neir app	licati	on,
Object		logic group, sets, lattice		algebra a	nd Karna	augh r	napso	make (conne	ections	betwo	een the
(Minin	num	various branches of scie										
3)		2. It aims to present the										
		3. This course delves in										
		and Transform Mathem	atics, provi	iding stude	ents with	a str	ong fo	undatio	on in	these fu	ındar	nental
		mathematical concepts.										
CO1		Understand the concep problems.	ot and app	lication o	f transfo	orm c	alculu	s in s	olvin	g vario	us c	omplex
CO2		Understand the basic p	Inderstand the basic principles of set theorem and apply them in solving different complex									
		problems.										
CO3		Understand and apply th	ne concepts	of propos	sition log	gic.						
CO4		Understand the concept					Boolea	n algeb	ora ar	d Bool	ean r	ing and
	apply them in understanding co			lex proble	ems.							
CO5		Understand apply the co	oncept of g	raphs.								
Unit-	Con	tent		Conta	Learni	ing O	utcom	ıe				KL
No.				ct								
				Hour								
I	Tran	sform Calculus -1								, includ		1, 2
										Lagrang		
			rthogonal							as well		
		nomials - Lagrange's,								introdu		
	-		onometric							propert		
		, I	ransform,							of perio		
		erties of Laplace T			functio			ds fo		_	the	
	_	ace transform of		inverse		Laplace		ansfo		the		
		tions. Finding inverse						-		evaluat		
		2	methods,	10						sforms		
		olution theorem. Eval								s of		
		grals by Laplace t			_					g ordin	-	
		ing ODEs and PDEs by	y Laplace				_			and par		
Transform method. differential equations (PDEs) a included.						are						
	Prop	ositional Logic:			include	ea.						
	Synt	ax and semantics, proof	f systems,									
	•	fiability, validity, se	•									
	Synt	ax and semantics, proof	•									

	completeness, deduction theorem, etc. Decision problems of propositional logic. Introduction to first order logic and first order theory.			
II	Fourier transforms, Z-transform and Wavelet transforms: properties, methods, inverses and their applications. Sets, relations and functions: Basic operations on sets, Cartesian products, disjoint union (sum), and power sets. Different types of relations, their compositions and inverses. Different types of functions, their compositions and inverses.	10	This unit focuses on Fourier transforms, Z-transforms, and Wavelet transforms, covering their properties, methods, inverses, and applications. It also delves into set theory, exploring basic operations on sets, Cartesian products, disjoint unions (sums), and power sets. Different types of relations and functions, along with their compositions and inverses, are also examined.	2, 3, 4
III	Partially ordered sets: Complete partial ordering, chain, lattice, complete, distributive, modular and complemented lattices. Boolean and pseudo Boolean lattices.	10	The propositional logic section addresses syntax, semantics, proof systems, satisfiability, validity, soundness, completeness, and the deduction theorem. Decision problems of propositional logic and an introduction to first-order logic and theory are also included. The unit then explores partially ordered sets, including concepts like complete partial ordering, chains, lattices, and Boolean lattices.	1, 2, 3, 4
IV	Algebraic Structures with one binary operation – semigroup, monoid and group. Cosets, Lagrange's theorem, normal subgroup, homomorphic subgroup. Congruence relation and quotient structures. Error correcting code. Algebraic structures with two binary operationsring, integral domain, and field. Boolean algebra and boolean ring (Definitions and simple examples only).	5	This unit covers algebraic structures with one binary operation, such as semigroups, monoids, and groups. Topics include cosets, Lagrange's theorem, normal subgroups, homomorphic subgroups, congruence relations, and quotient structures. The unit also introduces error-correcting codes and algebraic structures with two binary operations, such as rings, integral domains, fields, Boolean algebra, and Boolean rings, with definitions and simple examples.	1, 2
V	Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeon-hole principle, permutation, combination,	10	This unit introduces basic counting techniques, including inclusion and exclusion, the pigeonhole principle, permutations, combinations, and summations. It also covers recurrence	2, 3, 4, 5

summations. Introduction to	relations and generating functions. The	
recurrence relation and generating	introduction to graphs section explores	
functions.	basic properties of graphs, such as	
Introduction to Graphs:	degrees, paths, cycles, subgraphs, isomorphism, Eulerian and Hamiltonian walks, and trees.	
Graphs and their basic properties – degree, path, cycle, subgraph, isomorphism, Eulerian and Hamiltonian walk, trees.		

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
- 2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
- 3. C. L. Liu, Elements of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 2000.
- 4. R. C. Penner, Discrete Mathematics: Proof Techniques and Mathematical Structures, World Scientific, 1999.
- 5. R. L. Graham, D. E. Knuth, and O. Patashnik, Concrete Mathematics, 2nd Ed., Addison-Wesley, 1994.

Reference Books:

- 1. K. H. Rosen, Discrete Mathematics and its Applications, 6th Ed., Tata McGraw-Hill, 2007.
- 2. J. L. Hein, Discrete Structures, Logic, and Computability, 3rd Ed., Jones and Bartlett, 2010.
- 3. N. Deo, Graph Theory, Prentice Hall of India, 1974.
- 4. S. Lipschutz and M. L. Lipson, Schaum's Outline of Theory and Problems of Discrete Mathematics, 2nd Ed., Tata McGraw-Hill, 1999.
- 5. J. P. Tremblay and R. P. Manohar, Discrete Mathematics with Applications to Computer Science, Tata McGraw-Hill, 1997.

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Understand the concept and application of transform calculus in solving various complex problems.	2,6,3	
2	Understand the basic principles of set theorem and apply them in solving different complex problems.	3,9,8	
3	Understand and apply the concepts of proposition logic.	1,3,9	
4	Understand the concept of algebraic structures including Boolean algebra and Boolean ring and apply them in understanding complex problems.	2,9,4	
5	Understand apply the concept of graphs.	10,12	

		SEMESTER -	· III									
Course Title		Techno Pro	ofessiona	al Skil	12							
Course code	22BTCM217R	Total credits: 2	L	T	P	S	R O/F		C			
		Total hours: 20P	0	0	2	0	0	0	1			
Pre-	Nil	Co-requisite		Nil								
requisite		D. T. 1. C.										
Programme		B.Tech Ci										
Semester		Fall/ III semester of se	cond year	of the	progra	mme						
Course Objectives	1 Favring about a post a point	h advanad AvtaCAD akil	II	£	حجاجاتين				ن ماه سما			
(Minimum 3)	Equip students wit technical proficiency and pr	h advanced AutoCAD skil ofessional competency.	iis necessa	ary for c	ivii eng	meerinį	g projec	ts, ennanci	ing thei			
		Develop students' ability to create precise engineering drawings and detailed designs, fostering attention to detail and accuracy in their work.										
	Enhance problem-solving and critical thinking abilities through practical AutoCAD applications, preparin students for real-world engineering challenges.											
CO1	Demonstrate proficiency in	emonstrate proficiency in using AutoCAD tools for creating complex civil engineering drawings.										
CO2	Apply advanced AutoCAD	Apply advanced AutoCAD techniques to design detailed structural plans and layouts.										
CO3	Develop the ability to interp											
CO4	Integrate AutoCAD skills w											
CO5	Exhibit improved problem-s	olving skills and technica	al knowled	dge thro	ugh pra	ctical A	utoCAI	D application	ons.			
Unit-No.	Conte	nt	Contact Hour	t	Le	arning	Outcom	e	KL**			
I	Overview of advanced drawing tools,				4	and			drawing tools 1, n features in			
II	Creating Detailed Civil Engi Techniques for creating detarchitectural drawings, includimensioning, and annotation	neering Drawings: ailed structural and uding layering,	4	eng	gineerin		l detaile ngs with ues.		2, 3			
III	3D Modeling and Visualizat modeling, rendering, and vi in AutoCAD for civil enginee	ion: Introduction to 3D sualization techniques	4	civi	-		s and vi esigns u		3, 4			
IV	Integration with Other Too integrating AutoCAD with o software and tools, includin files and collaborative proje	ls: Methods for ther engineering g importing/exporting	4	Inte	egrate A	ompreh	ensive	vith other opment.	4, 5			
V	Practical Applications and F projects and case studies to real-world civil engineering project presentation and do	Projects: Hands-on apply AutoCAD skills in scenarios, including	4	pro	jects, d	emonst	ills in pr rating p cal prof	roblem-	5			

CO PO Mapping

SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate proficiency in using AutoCAD tools for creating complex civil engineering drawings.	5, 7
2	Apply advanced AutoCAD techniques to design detailed structural plans and layouts.	8
3	Develop the ability to interpret and convert conceptual sketches into precise digital drawings.	7.9,10
4	Integrate AutoCAD skills with other engineering tools and software for comprehensive project development.	11,12
5	Exhibit improved problem-solving skills and technical knowledge through practical AutoCAD applications.	10

SEMESTER – III												
Course Title	;		Ma	terial Tes	ting and	l Eval	luation	1				
Course	<u> </u>	22BTCM218R	Total cred	its: 3	L	T	P	S	R	O/F	C	
code			Total hour		1	1	2	0	0	0	3	
Pre-		Nil	Co-requisi	te	Nil	1 —	1-	1 -	1 -	1 -	.1-	
requisi	te		1									
Progra		Bachelor of Technology in Civil Engineering										
Semest	er	Fall: Winter/ III sem				rogra	mme					
Course	Course 1. Provide students with all inf			ation cond	cerning p	rincip	ole, wa	y of m	easuı	rement,	as well as	ıs
Objecti		practical application of mechanical characteristics.										
(Minim	num	Make measurements							_	_		
3)		3. Introduce experimental procedures and common measurement instruments, equipment,										
		devices giving exposure to a variety of established material testing procedures and techniques.										
001		4. Make measurements										
CO1		Describe the various en	ngineering n	naterials, t	heir qua	lities,	and ho	w they	are	made		
CO2		Identify the mechanic history of fracture mec									s, and t	the
CO3											non-ferro	0116
COS		Perform mechanical testing on a range of metals, including iron, steel, and various non-ferrous metals. Additional mechanical testing includes impact testing, background fracture toughness										
		research, creep, and fatigue research										
CO4		Discuss the methods used to evaluate soils, bitumen, bitumen blends, bricks, sand, concrete,										
		and other materials										
CO5		Identify the mechanica	al characteri	stics and	qualities	of sp	ecial n	nateria	ls, m	netals, co	ementitio	ous
		materials, composites,			•	•						
Unit-	Cont	tent		Conta	Learni	ng O	utcome	9			KL	
No.				ct Hour								
I	UNI	Γ 1- Introduction to E	ngineering	nour	This 1	ınit	nrovide	es an	OV	erview	of 1, 2	2
_			nents, M-							essential		_
		, Concrete (plain, rein								differ		
		fibre/ glass fibre-								nd vario		
	light-	-weight concrete,	High		forms	of	concre	te su	ıch	as pla	in,	
		ormance Concrete,	Polymer		reinford				_	ss fib	re-	
		erete), Ceramics, and Re			reinford		_	ghtwei		•	gh-	
		nen and asphaltic		10	_					icrete. T		
		ers, Glass and Plastics.				also	delve		nto	cerami		
		and other Metals, l								materia		
		ishes, Acoustical ma	ieriai and			_	•			tural ste		
	geoie	extiles,								onally, acousti		
										ighlighti		
										cations		
					constru			U				
II	UNI	Γ 2- Introduction to	Material					mate	rial e	ngineeri	ing 2,	3,
	Testi				This unit introduces material engineering and its significance, focusing on the						-	,
		erial Engineering"?; N		10						racterist		
			mechanical	10	of mat	erials	. It ex	plains	elas	sticity a	nd	
	chara	acteristics; Elasticity -								standa		
	and	characteristics;	Plastic		for ten	sile te	esting o	of diff	erent	materia	ıls,	

	deformation of metals; Tensile test – standards for different material (brittle, quasi-brittle, elastic and so on), True stress – strain interpretation of tensile test; hardness tests; Bending and torsion test; strength of ceramic;		and the interpretation of true stress-strain curves. The unit also covers hardness tests, bending and torsion tests, the strength of ceramics, and the fundamentals of internal friction and creep.	
III	Internal friction, creep – fundaments and characteristics; UNIT 3- Brittle fracture of steel – temperature transition approach; Background of fracture mechanics; Discussion of fracture toughness testing – different materials; concept of fatigue of materials; Structural integrity assessment procedure and fracture mechanics.	5	This unit addresses the brittle fracture of steel, particularly focusing on the temperature transition approach. It provides background knowledge on fracture mechanics, discusses fracture toughness testing for various materials, and introduces the concept of material fatigue. The unit also covers structural integrity assessment procedures using fracture mechanics principles.	1, 2, 3, 4
IV	UNIT 4-Standard Testing & Evaluation Procedures covering, Laboratory for mechanical testing; Discussion about mechanical testing; Naming systems for various irons, steels and nonferrous metals; Discussion about elastic deformation; Plastic deformation; Impact test and transition temperatures	10	This unit covers the standard procedures and laboratory practices for mechanical testing. It includes discussions on mechanical testing methods, naming systems for various irons, steels, and nonferrous metals. The unit explores elastic and plastic deformation, impact tests, and transition temperatures, emphasizing the importance of these tests in material evaluation	1, 2
V	UNIT 5-Testing of polymers and polymer-based materials, tests and testing of metals, special materials, composites and cementitious materials. Explanation of mechanical behaviour of these materials.	10	This unit focuses on the testing of polymers and polymer-based materials, as well as metals, special materials, composites, and cementitious materials. It explains the mechanical behaviour of these materials and the specific tests used to evaluate their properties, providing a comprehensive understanding of their performance in engineering applications.	2, 3, 4, 5

- 1. S. Delhi. Peter Domone and J. M. Illston. (2018), Construction Materials: Their Nature and Behaviour", Taylor & Francis
- 2. SK Duggal, Building materials(2019), New Age Publishers
- 3. Materials Testing and Evaluation for Civil Engineering, by K. Subramanian, Oxford
- 4. University Press (2019)

Reference Books:

1. Material Testing for Civil Engineering, by E.A. Avallone (McGraw-Hill, 2009)

2. Materials Testing for Civil and Construction Engineers, by A.G. Kulkarni and R.T. Johns (CRC Press, 2011)

CO	PO Mapping	Γ	
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Describe the various engineering materials, their qualities, and how they are made	2,6,8	
2	Identify the mechanical behavior and characteristics, the strength characteristics, and the history of fracture mechanics. Metals can deform in both elastic and plastic ways	3,9,5	
3	Perform mechanical testing on a range of metals, including iron, steel, and various non-ferrous metals. Additional mechanical testing includes impact testing, background fracture toughness research, creep, and fatigue research	1,7,9	
4	Discuss the methods used to evaluate soils, bitumen, bitumen blends, bricks, sand, concrete, and other materials	9,1,8	
5	Identify the mechanical characteristics and qualities of special materials, metals, cementitious materials, composites, and polymers	10,12,6	

		SEMESTE	RIII								
Course Title		CO CURRIO	CULAR	AC	TIVI'	FIES					
Course code	22UBCC211	Total credits: 1	L	T	P	S	R	O/F	C		
		Total hours: 15P	0	0	0	4	0	0	1		
Pre-requisite	Nil	Co-requisite					Nil				
Programme	- 1	Bachelor of Tec	hnology	Civil	Engir						
Semester		Fall/ IV semester of						1			
Course		ent classroom educa							es and		
Objectives	-	activities that reinfor	-	_	_	-		-			
(Minimum 3)		ssential skills such a									
	*	communication, and collaboration through structured, curriculum-aligned									
	activities.	,		υ		,			2		
		students to expl	lore the	eir iı	nteres	ts ar	ıd ta	lents, bu	ild self-		
		e, and cultivate a we									
		lar programs.				•	•	1 0			
CO1	Demonstrate the a	bility to apply theo	retical	know	ledge	from	the	classroon	n to real-		
		rough hands-on exp									
CO2		oblem-solving, critica			mmun	icatio	ı, and	collabora	tion skills,		
		ademic and profession									
CO3		-confidence, self-awa	areness,	and a	well-	round	ed cha	aracter by	exploring		
G 0.4		interests and talents.									
CO4		nity service and soci	ial initia	tives,	foste	ring a	sens	se of resp	onsibility,		
005	empathy, and active		.1. ' 1. '1	141	1	1 (1	. 1		. •		
CO5		teamwork and leaders				d thro	ugn pa	articipatioi	ı ın group		
Unit-No.		ship roles within co-cu tent	Contac			arning	· Out	nomo	BL		
Cint-No.	Con	itent	Hour		Le	a1 11111 ₂	z Out	come	DL.		
I		range of activities	15			ricular		activities			
		gular curriculum						practical			
		learner's interest,				tion		academic			
		e aimed to develop			oncep		critica				
		skills and promote a				ment		problem-			
		ent of the learners, I the 360 degree			olving oster		ommu onal	nication), growth			
		ogy the students are			confid		onai	self-			
		nt activities headed					nromo	ote social			
		clubs viz. Dance,				sibility		through			
		ny, drama, literary			ommu	•		gagement,			
		are encouraged to						work and	3		
	T	ılar club activities,			eaders			abilities,			
		titions as per their					em fo	r holistic			
	interest and hob	bies, The student						mic and			
		club are trained		S	ocial c	contex	ts.				
	represent AdtU in various inter										
	University student and national level										
		ewed personalities									
		luct workshops that									
		ers and students by									
		atform to learn from									
	experts in the respe	ctive fields.									

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate the ability to apply theoretical knowledge from the classroom to real-world situations through hands- on experiences and projects.	1,2,3,4,5,6,10,12
2	Exhibit improved problem-solving, critical thinking, communication, and collaboration skills, essential for both academic and professional success.	1,2,3,4,5,6,10,12
3	Show increased self-confidence, self-awareness, and a well-rounded character by exploring and developing their interests and talents.	1,2,3,4,5,6,10,12
4	Engage in community service and social initiatives, fostering a sense of responsibility, empathy, and active citizenship.	1,2,3,4,5,6,10,12
5	Demonstrate strong teamwork and leadership abilities, learned through participation in group activities and leadership roles within co-curricular programs.	1,2,3,4,5,6,10,12

		SEMESTER	III							
Course Title		EXTRA	-CURI	RICU	LAR					
Course code	22UBEC211	Total credits: 1	L	T	P	S	R	O/F	C	
		Total hours: 60P	0	0	0	4	0	0	1	
Pre-requisite	Nil	Co-requisite					Nil			
Programme		Civil	Engin	eerin	g					
Semester	S	ummer/ V semester of	the th	ird ye	ear of	the p	rogra	m		
Course	Develop so	cial and soft skills: Fost	er the a	acquis	ition (of inte	rperso	nal skills a	and time	
Objectives	managemer	nt abilities among learne	ers.							
(Minimum 3)	2. Promote holistic development: Encourage students to engage in multifaceted activities									
	beyond acad	beyond academics, nurturing their leadership and interests.								
	Facilitate in	3. Facilitate in-depth expression: Provide opportunities for students to articulate their								
	ideas and o	ideas and opinions clearly and critically analyze topics of interest.								
CO1	Learn to a plan so the	hat they can make mea	ningful	contr	ibutio	ns, m	aintair	a commi	tment, and	
	manage their time ar	nd priorities.								
CO2	Transform passionat	e students who demon	strate 1	eader	ship a	nd pu	rsue ii	nterests be	yond their	
	academics.				•	•			•	
CO3		in various co-curricular	activi	ties le	ading	to the	eir mu	Itifaceted 1	personality	
	development.									
CO4	Express their ideas,	views, In-depth evaluati	on and	analy	sis cle	early i	n the t	opic of the	eir interest.	
CO5	Demonstrate and p	practices different act	ivities,	by	Integr	ating	learn	ing exper	riences by	
	demonstrating transf	erable skills.								
Unit-No.	Con	itent	Contac Hour	et	Lea	arnin	g Outo	come	BL	

I	AdtU encourages a range of activities outside the regular curriculum intended to meet learner's interest, These activities are aimed to develop the social and soft skills and promote a holistic development to the learners, Keeping in mind the3 60 degree learning methodology the students are engaged in different activities headed under different clubs viz. Dance, music, photography, drama, literary etc., The students are encouraged to participate in regular club activities, workshops, competitions as per their interest and hobbies, The student members of the club are trained represent AdtU in various inter University student and national level competitions, Renewed personalities are invited to conduct workshops that benefit the members and students by giving them the platform to learn from experts in the respective fields.	8	Students develop a well-rounded personality, including effective planning, leadership skills, participation in diverse activities, clear expression of ideas, and integration of learning experiences, fostering holistic development.	2,3
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	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	1,2,3,4,5,9,11,12
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	1,2,3,4,5,9,11,12
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	1,2,3,4,5,9,11,12
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	1,2,3,4,5,9,11,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	1,2,3,4,5,9,11,12

SEME	STER	– III										
Course	e	Basic Life Saving Ski	ills									
Title						1	1		1			
Course	e	22UULS212R	Total credi		L	T	P	S	R	O/F	C	
code			Total hour		0	0	2	0	0	0	1	
Pre-		Nil	Co-requisi	te	Nil							
requisi												
Progra		Bachelor of Technology in Civil Engineering										
Semest		Fall: Winter/ III sem										
Course		1. Equip students with	essential kn	owledge a	and skills	s in ba	sic life	e-savir	ig tec	hniques	, includi	ing
Object		CPR and first aid.			·	1		1 00				c
(Minin	num		to assess emergency situations and respond effectively to various types of									
3)		· ·	uries and medical conditions. Foster an understanding of preventive measures and safety protocols to minimize the									
			•						to m	ınımıze	the	
001		occurrence of emergen										
CO1		Demonstrate proficien external defibrillators ((AEDs).									
CO2		Exhibit the ability to provide immediate care	•	ess emer	gency si	tuatio	ns and	l make	e info	ormed o	lecisions	s to
Understand and apply basic safety protocols to prevent accidents efficiently.						lents a	and h	andle e	mergeno	cies		
CO4		Display confidence an	Display confidence and competence in handling a range of medical emergencies, from minor njuries to life-threatening conditions.									
CO5		Advocate for and pron	note safety a		ntive me	asures	s withi	n the o	comm	nunity, c	ontribut	ting
		to a safer environment.										
Unit-	Cont	tent		Conta	Learni	KI	L					
No.				ct Hour								
I		 Unit 1: Introduction to Life-Saving Skills Importance of life-saving skills Basic principles of first aid Legal and ethical aspects of providing first aid Personal safety and use of protective equipment Assessing the scene of an emergency 		5	saving first aid aspects emphas safety equipm assess	skills d. It discourse of the state of the s	and to scusse the ir the Student scene	he bases the leaviding mportause use of an	egal age of of lear	ice of li inciples and ethi irst a of perso protect rn how ergency provid	of cal nid, nal ive to to	2
II	Resu	2: Cardiopulmonary scitation (CPR) and omated External Defib	rillators	5	physiol steps t childre	logy r for ponding and particular to the post of the p	elevan erform l infan	t to Cl ing C its. Th	PR, le PR is un	atomy a carning on adu it include for us	the lts, des	3,

	 Anatomy and physiology relevant to CPR Steps for performing CPR on adults, children, and infants Use of an AED: principles and procedures Hands-on practice sessions for CPR and AED use Recognizing and responding to cardiac emergencies 		an AED, with hands-on practice sessions to ensure proficiency. The unit also focuses on recognizing and responding to cardiac emergencies.	
III	 Unit 3: First Aid Techniques Managing bleeding, wounds, burns, and fractures Providing first aid for choking, poisoning, and shock Practical sessions for bandaging, splinting, and other first aid procedures 	5	This unit teaches essential first aid techniques for managing bleeding, wounds, burns, and fractures. Students will learn how to provide first aid for choking, poisoning, and shock. The unit includes practical sessions to practice bandaging, splinting, and other first aid procedures	1, 2, 3, 4
IV	Unit 4: Emergency Medical Conditions - Recognizing symptoms of heart attacks, strokes, asthma attacks, and diabetic emergencies - Immediate response actions for medical emergencies - Ongoing care until professional help arrives - Importance of staying calm and effective communication during emergencies	5	Students will explore common medical emergencies such as heart attacks, strokes, asthma attacks, and diabetic emergencies. This unit covers the recognition of symptoms, immediate response actions, and ongoing care until professional help arrives. Emphasis is placed on staying calm and effective communication during emergencies.	1, 2
V	 Unit 5: Safety and Prevention Home and workplace safety measures Fire prevention and electrical safety Accident prevention strategies Community safety programs Advocating for safety and preventive measures within the community 	5	The final unit focuses on preventive measures to minimize the occurrence of emergencies. Students will learn about home and workplace safety, including fire prevention, electrical safety, and accident prevention. The unit also covers community safety programs and how to advocate for safety and preventive measures within the community.	2, 3, 4, 5

Textbooks:

- 1. "First Aid Manual" by British Red Cross, St John Ambulance, St Andrew's First Aid, 2016.
- 2. "Emergency Care and Transportation of the Sick and Injured" by American Academy of Orthopaedic Surgeons (AAOS), 2016.
- 3. "Advanced First Aid, CPR, and AED" by American Academy of Orthopaedic Surgeons (AAOS), 2011.

Reference Books:

- 1. "Wilderness First Responder: How to Recognize, Treat, and Prevent Emergencies in the Backcountry" by Buck Tilton, 2010.
- 2. "Prehospital Trauma Life Support" by National Association of Emergency Medical Technicians (NAEMT), 2014.
- 3. **"Fundamentals of Basic Emergency Care"** by Richard W. O. Beebe, Deborah L. Funk, 2013.
- 4. "CPR and AED" by Alton L. Thygerson, Steven M. Thygerson, 2011.
- 5. "Basic Life Support (BLS) Provider Manual" by American Heart Association, 2020.

CO	PO Mapping	I	
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Demonstrate proficiency in performing CPR, administering first aid, and using automated external defibrillators (AEDs).	2,3,4	
2	Exhibit the ability to quickly assess emergency situations and make informed decisions to provide immediate care	1,2,4	
3	Understand and apply basic safety protocols to prevent accidents and handle emergencies efficiently.	3,5,6	
4	Display confidence and competence in handling a range of medical emergencies, from minor injuries to life-threatening conditions.	3,2,5	
5	Advocate for and promote safety and preventive measures within the community, contributing to a safer environment.	2,3,7	

			SE	MESTEI	R – III										
Course	2		Personal Financial Planning												
Title						1				1	T				
Course	9	22UUFL213R	Total cred		L	T	P	S	R	O/F	С				
code		N 703	Total hour		0	0	2	0	0	0	1				
Pre-	.,	Nil	Co-requisi	te	Nil										
requisi Progra		Bachelor of Technological	ogy in Civil	Engineer	, in a										
Semest				Engineering cond year of the programme											
Course		1. Understand the						s of no	ercon	al finan	cial				
Object		planning.	iic ruiidaiiic	mai pim	cipies a	na co	псері	s or po	213011	ai iiiiaii	Ciai				
(Minin		1 0	c in catting	CMADT	financi	مر اوز	alc an	d cras	ting (affactiv	a budgat				
3)		2. Develop skills in setting SMART financial goals and creating effective budget													
		plans. 3. Gain knowledge of various investment vehicles, their risks, returns, and													
		suitability for	-			CIIICI	cs, the	/11 115N	, 100	ums, ar	Iu				
		_			_	l nla	nning	and re	etiren	nent sav	ings				
		4. Learn strategies for tax-efficient financial planning and retirement savings.5. Acquire knowledge of estate planning essentials and legal considerations for													
		asset distribution.													
CO1	Ability to create comprehensive personal financial plans aligned with individual goals an														
		values.	•	•		•									
CO2		Proficiency in analyzi	•	cting appr	opriate i	nvest	ment o	options	s base	d on ris	k tolerance				
		and financial objective													
CO3		Competence in manag													
CO4		and regu	lations 1	to mi	nımıze	e tax	liabili	ties and	maximize						
CO5		savings.	Understanding of estate planning strategies to protect and transfer wealth according to personal												
COS		wishes and legal requir		strategies	to protec	t and	transi	ci wca	iiii ac	cording	to personal				
Unit-	Cont		e e e e e e e e e e e e e e e e e e e	Conta	Learni	ing O	utcom	ne e			KL				
No.				ct		8 -									
				Hour											
I		Γ 1- Fundamentals of F	inancial			unit	cove			oundatio					
	Plani	ning			princip		of	finan		plannii					
		D : 1				_	_		_	ls, creati	_				
	•	Principles of financ	ıal	_	_			_	_	ash flo importar					
		planning Setting financial go	alc	5		-	_			financ					
		Budgeting and cash								financ					
		management	110 **							m financ					
		U			securit	_		•	-						
II	UNI	Γ 2- Investment Plannin	ng		This un	nit foc	cuses o	n diffe	erent t	ypes of	2, 3,				
					investr	nents	such a	s stock	ks, bo	nds,	4				
	•	Types of investmen								t explore					
		bonds, mutual fund		_				•		allocation	n				
	•	Risk and return ana	•	5	strateg		•		_		a				
	•	Portfolio manageme	ent		manage					build an	u				
		strategies			effectiv		. 111103	CIIt	Portit	71103					
	1				1										

III	 Retirement Planning Retirement savings vehicles (401(k), IRA, pension plans) Estimating retirement needs Social Security and Medicare considerations 	5	TRetirement planning addresses the process of saving and investing for retirement. It covers retirement savings vehicles like 401(k) plans and IRAs, estimating retirement needs based on lifestyle expectations, and navigating Social Security and Medicare benefits to optimize retirement income.	1, 2, 3, 4
IV	 UNIT 4- Tax Planning Tax-efficient investment strategies Tax deductions and credits Tax implications of retirement distributions 	5	Tax planning involves strategies to minimize tax liabilities and maximize after-tax income. This unit discusses taxefficient investment strategies, deductions, credits, and tax implications related to retirement contributions, distributions, and estate planning.	1, 2
V	 Wills, trusts, and probate Power of attorney and healthcare directives Charitable giving and legacy planning 	5	Estate planning encompasses the process of managing and distributing assets in accordance with an individual's wishes upon death. It covers essential topics such as wills, trusts, probate, power of attorney, healthcare directives, charitable giving, and strategies for minimizing estate taxes.	2, 3, 4, 5

Textbooks:

- 1. "Personal Finance" by Jeff Madura, 2016.
- 2. "Personal Financial Planning" by Lawrence J. Gitman, Michael D. Joehnk, and Randy Billingsley, 2013.
- 3. "Fundamentals of Financial Planning" by Michael A. Dalton, James F. Dalton, 2011.

Reference Books:

- 1. "The Bogleheads' Guide to Retirement Planning" by Taylor Larimore, Mel Lindauer, Richard A. Ferri, Laura F. Dogu, 2009.
- 2. "The Financial Planning Workbook: A Practical Guide to Creating Your Own Financial Plan" by Coventry House Publishing, 2018.
- 3. "The Millionaire Next Door: The Surprising Secrets of America's Wealthy" by Thomas J. Stanley, William D. Danko, 2010.
- 4. "Your Money or Your Life: 9 Steps to Transforming Your Relationship with Money and Achieving Financial Independence" by Vicki Robin, Joe Dominguez, 2008.
- 5. "Smart Couples Finish Rich: 9 Steps to Creating a Rich Future for You and Your Partner" by David Bach, 2009.

CO	PO Mapping		
SN	Course Outcome (CO)	Mapped Outcome	Program
1	Ability to create comprehensive personal financial plans aligned with individual goals and values.	2,3,4	
2	Proficiency in analyzing and selecting appropriate investment options based on risk tolerance and financial objectives.	1,2,4	
3	Competence in managing cash flow, budgeting effectively, and optimizing financial resources.	3,5,6	
4	Capability to navigate tax laws and regulations to minimize tax liabilities and maximize savings.	3,2,5	
5	Understanding of estate planning strategies to protect and transfer wealth according to personal wishes and legal requirements.	2,3,7	

		SEMESTER -	- III									
Course Title	MO	OCS-III THE AGE OF S	USTAI	NABL	E DEV	ELOPN	MENT					
Course code	22UBPD224R	Total credits: 2	L	T	P	S	R	O/F	C			
		Total hours: 30P	0	0	4	0	0	0	2			
Pre-requisite	Nil	Co-requisite				N	il					
Programme		B.Tech Civ	zil Emg	ineerin	ıg							
Semester		Fall/ IV semester of sec	ond ye	ar of th	e progi	amme						
Course Objectives (Minimum 3)		1. To provide students with a comprehensive understanding of the principles, theories, and frameworks of sustainable development and their application to global challenges.										
	 To equip students with the knowledge and skills to address environmental, economic, and social sustainability issues through practical applications and case studies. To enable students to critically evaluate integrated and interdisciplinary approaches to sustainable development and develop effective strategies for policy integration and governance. 											
CO1		, principles, and historical							global			
		e Sustainable Developmen							C			
CO2	Apply knowledge of ecos address environmental sus	ystem functions, biodivers tainability challenges.	ity con	servatio	on, and	renewa	ble ene	rgy technolo	gies to			
CO3	Analyze economic sustai corporate social responsib	nability concepts, includi- ility, and evaluate case stud	ies of s	ustainal	ble econ	omic p	ractices.					
CO4	Apply principles of social sustainable development, a	l sustainability to promot and overall health and well		equity	, comm	nunity p	participa	tion, educat	ion for			
CO5		aches to sustainable devel	opment.									
Unit-No.	Conte	nt	Contac Hour	et	L	earning	g Outco	me	KL			

I	 Introduction to Sustainable Development Definition and Principles of Sustainable Development Historical Context and Evolution of the Concept Global Challenges and Sustainable Development Goals (SDGs) Key Theories and Frameworks Case Studies of Sustainable Development Initiatives 	7	Students will understand the definitions, principles, and historical context of sustainable development, and recognize the significance of global challenges addressed by the Sustainable Development Goals (SDGs), supported by relevant case studies.				
II	 Environmental Sustainability Ecosystem Functions and Services Biodiversity Conservation Climate Change: Science, Impacts, and Mitigation Renewable Energy Sources and Technologies Environmental Policy and Legislation 	7	Students will apply their knowledge of ecosystem functions, biodiversity conservation, and renewable energy technologies to propose and implement solutions for environmental sustainability challenges.	1,2			
III	 Sustainability Sustainable Economic Growth Green Economy and Circular Economy Corporate Social Responsibility (CSR) and Ethical Business Practices Economic Instruments for Environmental Management Case Studies of Sustainable Economic Practices 	7	Students will analyze concepts related to sustainable economic growth, green economy, corporate social responsibility, and economic instruments for environmental management, and evaluate case studies demonstrating sustainable economic practices.	1,2			
IV	 Social Sustainability Social Equity and Justice Community Development and Participation Education for Sustainable Development Health and Well-being Cultural Dimensions of Sustainability 	7	Students will apply principles of social sustainability to promote social equity and justice, enhance community participation, support education for sustainable development, and improve health and well-being.	1,2			
V	Integrated Approaches to Sustainable Development	7	Students will evaluate integrated approaches to sustainable development, including	1,2			

 Interdisciplinary and Transdisciplinary Approaches Systems Thinking and Resilience Sustainable Urban Planning and Development Policy Integration and Governance for Sustainability Monitoring and Evaluation of Sustainable Development Projects 	interdisciplinary and transdisciplinary methods, systems thinking, sustainable urban planning, and the effectiveness of policy integration and governance for sustainability.	
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- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 5. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 6. Fast track Objective mathematics for Competitive exam by Arihant
- 7. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Understand the definitions, principles, and historical context of sustainable development, as well as the global challenges addressed by the Sustainable Development Goals (SDGs).	5, 7									
2	Apply knowledge of ecosystem functions, biodiversity conservation, and renewable energy technologies to address environmental sustainability challenges.	8									

3	Analyze economic sustainability concepts, including sustainable economic growth, green economy, and corporate social responsibility, and evaluate case studies of sustainable economic practices.	7.9,10
4	Apply principles of social sustainability to promote social equity, community participation, education for sustainable development, and overall health and wellbeing.	11,12
5	Evaluate integrated approaches to sustainable development, including interdisciplinary and transdisciplinary methods, systems thinking, and sustainable urban planning, and assess the effectiveness of policy integration and governance.	10

MAPPING TABLE (3RD SEM)

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM211R	Engineering Mechanics	3	3	1	1	1		1					1
22BTCM212R	Engineering Geology	2	3	2	1	1	1	1					1
22BTCM213R	Biology for Engineers	3	3	1	1	1		1					1
22BTCM214R	Computer Aided Design (CAD)	3	2	2	3	2	1				1		
22BTCM215R	Introduction to Civil Engineering	3	3	1	1	1		1					1
22BTCM216R	PDE and transform mathematics	2	3	2	1	1	1	1					1
22BTCM217R	Techno-Professional Skills II	3	3	1	1	1		1					1
22BTCM218R	Material Testing and Evaluation	3	2	2	3	2	1				1		
22UBPD213R	English for Employability for Engineers	3	3	1	1	1		1					1
22UBCC211	Co-curricular	2	3	2	1	1	1	1					1

22UBEC211	Extra-curricular	3	3	1	1	1		1			1
22UULS212R	Basic Life Saving Skills	3	2	2	3	2	1			1	
22UUFL213R	Personal Financial Planning	3	3	1	1	1		1			1

		SEMESTER	R – IV						
Course Title		Basic Electronics for (Civil Eng	gineer	ing Ap	plicati	on		
Course	22BTCM225R	Total credits: 3	L	T	P	S	R	O/F	С
code		Total hours: 30T+30P	3	0	1	0	0	0	4
Pre- requisite	Nil	Co-requisite				N	il		
Programi e	m	B.Tech (Civil Emgi	neerir	ng				
Semester Course		Fall/ IV semester of s	econd yea	r of th	ne progi	ramme			
Objective (Minimum 3)	n devices relev 5. Analyze election and maintain 6. Acquire propaplication of 7. Improve propapplication of 8. Apply acquire	 Understand the principles of electronic components, circuits, and semiconductor devices relevant to civil engineering applications. Analyze electronic applications in civil engineering for designing, constructing, and maintaining infrastructure. Acquire proficiency in digital electronics, including the understanding and application of logic gates for civil engineering applications. Improve problem-solving skills through hands-on exercises and practical application of electronic principles in civil engineering projects. Apply acquired knowledge in projects, designing and implementing electronic systems tailored for specific civil engineering applications. 							
CO1	Attain foundational devices.	knowledge in electronic	ronic co	mpon	ents, o	circuit	s, and	semicond	uctor
CO2	Analyze electronic maintenance	applications in civ	ril engir	neerin	g for	infra	structu	re design	and
CO3	Attain digital elecapplications.	tronics expertise, i	ncluding	g log	ic gat	tes, f	or civ	il engine	ering
CO4	Enhance problem-so projects	olving with hands-o	n applic	ation	of ele	ectron	ic prin	ciples in	civil
CO5	Apply knowledge in	projects, design tailo	red elect	ronic	systen	ns, fos	tering	practical s	kills.
Unit-No.	Conte	nt	Contact Hour	t	L	earning	g Outco	me	KL
I	 Introduction to Electronic Fundamentals Overview of relevance to cive Basic electronic resistors, capacit 	electronics and its il engineering onic components:	7	co cir Oh in	ım's La	nts a alysis w and ntext o	technic Kirchh	electronic ndamental ques using off's Laws ngineering	

	Ohm's Law, Kirchhoff's Laws, and circuit analysis			
	Series and parallel circuits			
II	Semiconductor Devices and Diodes Introduction to semiconductor materials Diodes and their applications in civil engineering Zener diodes and voltage regulation	7	Comprehend the properties and applications of semiconductor materials and diodes, including rectification and voltage regulation in civil engineering.	1,2
	Rectifiers and power supply basics			
III	 Transistors and Amplifiers Bipolar Junction Transistors (BJTs) and Field Effect Transistors (FETs) Transistor amplifiers and amplifier configurations Operational amplifiers (Op-amps) and their applications 	7	Learn the operation and applications of BJTs, FETs, and operational amplifiers, and their use in designing transistor amplifiers and amplifier configurations.	1,2
IV	Sensors and Instrumentation in Civil Engineering Overview of sensors and transducers Types of sensors relevant to civil engineering Data acquisition systems and instrumentation	7	Gain knowledge of various sensors and transducers, their applications in civil engineering, and the principles of data acquisition systems and instrumentation.	1,2
V	Digital Electronics and Control Systems Basics of digital electronics Logic gates and digital circuits Introduction to control systems in civil engineering applications	7	Understand the basics of digital electronics, logic gates, digital circuits, and the introduction of control systems for civil engineering applications.	1,2
Practical	 To study about the components used in electronics laboratory To Study the V-I characteristics of Forward Biased PN junction diode. To Study the Reverse characteristics of Zener diode. To Study the working of a diode as half wave rectifier with and without filter To Study the working of a diode as full wave rectifier with and without filter. To study the input and output characteristic of in CE configuration. 	30	Describe, illustrate and explain and apply the concepts of electronics engineering in engineering prospect.	1,2, 3,4

7.	7. To study and verify the truth table of logic	
8.	gates. 3. Practical Implementation of Electronic circuit based 35 projects in real world	

TEXT BOOKS:

- 1. Electronic Devices and Circuit Theory" by Robert L. Boylestad and Louis Nashelsky
- 2. Introduction to Control System Technology" by Robert N. Bateson

REFERENCE BOOKS:

- 1. Basic Electronics, Santiram Kal, Prentice Hall
- 2. Basic Electronics, BL Thareja, S.Chand Publishing
- 3. All-in-One Electronics Simplified, A.K. Maini, Khanna Book Publishing

RELATIONSHIP BETWEEN COURSE OUTCOMES (CO) AND PROGRAM OUTCOMES

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Attain foundational knowledge in electronic components, circuits, and semiconductor devices	1,3 & 4				
2	Analyze electronic applications in civil engineering for infrastructure design and maintenance	1,2				
3	Attain digital electronics expertise, including logic gates, for civil engineering applications.	7.9,10				
4	Enhance problem-solving with hands-on application of electronic principles in civil projects	5,7				
5	Apply knowledge in projects, design tailored electronic systems, fostering practical skills.	5,8				

SEMESTER – IV

Course Title		Environmental Science							
Course code	22UBPD226R	Total credits: 2 Total hours: 30T	L 2	T 0	P 0	S 0	R 0	O/F 0	C 2
Pre-	Nil	Co-requisite		I		N	il		I
requisite	<u> </u>	B.Tech Civ	ril Emgir	ina					
Programı e	11	B. Tech Civ	ıı Emgn	ieering					
Semester		Fall/ IV semester of sec	ond year	of the	progr	amme			
Course Objective (Minimur 3)		vides students with a chemistry, biodiversity co	-						_
	2. Through a blend complexities of pollution, the interconnectedness of exercise the policy of the control of t	ological systems, aiming	and sust	ainable	devel	opmen	t. The c	course empl	nasizes
	3. By studying students develop the si environmental challenges.		chemist y analyz	•		iversity ose so			llution, porary
CO1	Understand the relation	nships between natural	and mai	n-made	e syste	ems.			
CO2	Develop critical thinking legal) for environment sustainable developmen	al protection, conserva	-						
CO3	Understand the conseq of human life.		ns on th	e web	of life	, globa	al econo	omy, and q	uality
CO4	Understand about Environment Population and modern	•			nmen	t issu	es, Imp	oact of H	uman
CO5	Analyse various aspects environment.	of human population,	, and the	e impa	ct of t	he po	pulatio	n growth o	n the
Unit-No.	Content	t	Contact Hour		Le	earning	g Outco	me	KL
I	To Develop a comprehensite the components of the environments of t	vironment, including phere, lithosphere, mowledge of the n of these systems, les governing life pocesses, and the	6	of th and syste	ne env prin ems,	rironm iciples	ent's co gove bolic	erstanding omponents rning life processes,	
П	To Acquire proficiency in ecological concepts, including terminology, ecosystem structure and function, mineral cycling, energy flow, trophic chains, and the development and evolution of ecosystems. Understand the relationships between different components of ecosystems and their ecological roles.			term struc chai relat	ninolo cture, ns, tionsh poner	gy, ener and ips be	gy flov unders tween	ecological ecosystem w, trophic tand the ecosystem ecological	1,2

Ш	To Develop the ability to analyze environmental pollution by examining its sources, causes, assessment, effects, and methods of prevention and control. Explore strategies for managing different types of pollution, emphasizing the concept of sustainability and the relationships between energy, environment, and human activities.	6	Develop the ability to analyze environmental pollution sources, causes, effects, and prevention methods, emphasizing sustainability and the interplay between energy, environment, and human activities.	1,2
IV	To Gain knowledge of the utilization and sustainable management of water and forest resources. Understand the role of human activities in shaping the environment, including the management of rivers, lakes, forests, and wildlife. Explore concepts related to urbanization, green cities, global warming, and carbon sequestration.	6	Gain knowledge of sustainable water and forest resource management, understand human impacts on the environment, and explore concepts related to urbanization, global warming, and carbon sequestration.	1,2
V	To Develop awareness of international agreements and protocols addressing global environmental issues. Understand the role of society, non-governmental organizations (NGOs), and government agencies in addressing environmental challenges. Familiarize yourself with national forest policies, environmental laws, acts, and Environmental Impact Assessment (EIA) processes.	6	Develop awareness of international agreements and protocols addressing global environmental challenges, understand the roles of society, NGOs, and government agencies, and familiarize oneself with national environmental policies and laws, including Environmental Impact Assessment processes.	1,2

- 1 H.S. Peavy, D.R. Rowe and G. Tchobanoglous, Environmental Engineering, McGraw Hill International.
- 2 J. G. Henry and G.H. Heinke, Environmental Science and Engineering, Prentice Hall International.

Reference Books:

- 1 G.M. Masters, Introduction to Environmental Engineering and Science, Pearson Education.
- 2 R.T. Wright and D.F. Boorse, Environmetal Science Towards a Sustainable Future, PHI Learing.
- 3 P.A. Vesilind and S.M. Morgan, Introduction to Environmental Engineering, Thomson Books.

		CO PO Mapping	
SN	Course Outcome (CO)		Mapped Program Outcome

1	Understand the relationships between natural and man-made systems.	1,3 & 4
2	Develop critical thinking for shaping strategies (scientific, social, economic, administrative, and legal) for environmental protection, conservation of biodiversity, environmental equity, and sustainable development.	1,2
3	Understand the consequences of human actions on the web of life, global economy, and quality of human life.	7.9,10
4	Understand about Environment Pollution, Global Environment issues, Impact of Human Population and modern civilization on the Environment	5,7
5	Analyse various aspects of human population, and the impact of the population growth on the environment.	5,8

		SEMESTER	R – IV						
Course Title	Geotechnical Engineering								
Course code	22BTCM224R	Total credits: 4 Total hours: 45T+30P	1 3	T 0	P 1	S 0	R 0	O/F 0	C 4
Pre- requisite	Nil	Co-requisite				N	il		
Programm e	B.Tech Civil Emgineering								
Semester		Fall/ IV semester of s	econd yea	ar of tl	he prog	ramme			
Course	1. To focus on the	e study of soil behaviour	and prope	erties t	o desigr	n secure	founda	tions, assess	s slope
Objectives		onduct geotechnical invest							
(Minimum		vledge on the various fact					behavio	ur of soils a	and the
3)		ils for various Geotechnic							
	3. To characterize parameters of s	e the failure criteria ar oils.	id to eva	luate	the she	ar stre	ngth an	d compres	sibility
CO1	Distinguish various soil	type based on their proper	ties and b	ehavio	our.				
CO2	Calculate soil parameter	s of soils at different site of	condition.						
CO3	Predict the occurrence o	f failure of sub-soil benea	th any fou	ındatio	n.				
CO4	Determine the bearing c	apacity of soil and possibl	e settleme	ent of t	he found	lation.			
CO5	Test various direct and i	ndirect soil exploration.							
Unit-No.	Conte	ent	Contac Hour	t	L	earning	g Outco	me	KL

I	Introduction—Origin and types of soils, Basic Definitions and Relationships-Soil as three-phase system in terms of weight, volume, voids ratio, and porosity. Definitions: moisture content, unit weights, degree of saturation, voids ratio, porosity, specific gravity, mass specific gravity, etc. Relationship between volume weights voids ratio-moisture content, unit weight-percent air voids, saturation-moisture content, moisture content-specific gravity etc. Determination of various parameters (such as: Moisture content, Specific gravity, Unit weight of soil), Plasticity Characteristics of Soil -Introduction to definitions of: plasticity of soil, consistency limits-liquid limit, plastic limit, shrinkage limit, plasticity, liquidity	11	Understand the origin, types, and basic properties of soils, and establish relationships between key parameters such as moisture content, unit weights, and void ratios.	1,2
II	and Consistency indices, flow & toughness indices, definitions of activity and sensitivity. Determination of: liquid limit, plastic limit, Classification of Soils. **Permeability of Soil-** Darcy's law, validity of Darcy's law. Determination of coefficient of permeability: Laboratory method: constant-head method, falling-head method, Seepage Analysis-Introduction, stream and potential functions, characteristics of flow nets, graphical method to plot flow nets. Effective Stress Principle - Introduction, effective stress principle, nature of effective stress, effect of water table, Stresses in soils.	10	Learn and apply Darcy's law to determine soil permeability using laboratory methods and perform seepage analysis through the construction of flow nets.	1,2
III	Compression of soil: Compaction of Soil-Introduction, theory of compaction, laboratory determination of optimum moisture content and maximum dry density. Consolidation of Soil - Introduction, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's theory of consolidation,.	10	Grasp the concept of effective stress, analyze the impact of the water table on soil stress, and differentiate between soil compaction and consolidation processes.	1,2
IV	Shear Strength- Mohr circle and its	7	Analyze soil shear strength using	1,2

	characteristics, principal planes, relation between major and minor principal stresses, Mohr-Coulomb theory, types of shear tests: direct shear test, merits of direct shear test, triaxial compression tests, unconfined compression test, vane shear test, Types of slopes and their failure mechanisms, factor of safety, Introduction to of finite and infinite slopes.		Mohr-Coulomb theory and various shear tests, and understand the mechanisms of slope failures and the factor of safety in slope stability.	
V	Soil Exploration - Introduction, methods of site exploration and soil investigation, methods of boring, soil samplers, sampling procedures, trail pits, borings, penetrometer tests, analysis of borehole logs, geophysical methods.	7	Acquire knowledge of site exploration methods, soil sampling techniques, and the interpretation of borehole data for geotechnical investigations.	1,2
Practical	 Moisture content by oven dry method Field density by core cutter method Sieve analysis Liquid limit test by Casagrande Apparatus Plastic limit test Standard compaction test (OMC & MDD) Consolidation test Direct shear test Unconfined compression test 	30	Describe, illustrate and explain and apply the concepts of geotechnical engineering in engineering prospect.	1,2, 3,4

- 1. Ranjan G., Rao A.S.R (2011), Basic and Applied Soil Mechanics
- 2. Saran S. (2015) Analysis and Design of Substructures
- 3. Punmia B.C. (2005), Soil Mechanics And Foundation Engineering

Reference Books:

- 1. Soil Mechanics by Craig R.F., Chapman & Hall
- 2. Fundamentals of Soil Engineering by Taylor, John Wiley & Sons
- 3. An Introduction to Geotechnical Engineering, by Holtz R.D. and Kovacs, W.D., Prentice Hall, NJ
- 4. Soil Mechanics in Engineering Practice by Karl Terzaghi, Ralph B. Peck, and Gholamreza Mesri.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Distinguish various soil type based on their properties and behabior.	1,3 & 4				
2	Calculate soil parameters of soils at different site condition.	1,2				
3	Predict the occuarance of failure of sub-soil beneath any foundation.	7.9,10				
4	Determine the bearing capacity of soil and possible settlement of the foundation.	5,7				
5	Test various direct and indirect soil exploration.	5,8				

		SEMESTER	- IV						
Course Title	Introduction to Fluid mechanics								
Course	22BTCM222R	Total credits: 4	L T P S R O/I						С
code		Total hours: 45T+30P	3	0	1	0	0	0	4
Pre- requisite	Nil	Co-requisite				N	il		
Programm		B.Tech C	ivil Em	gineerii	ng				
e									
Semester		Fall/ IV semester of s							
Course Objectives (Minimum 3)	fluid dynami engineering f 5. Students engineerises to go skills and critical fills and	ntroduces fundamental cs, and flow measuren fields such as mechanical gage in theoretical lectrical analysis of fluid flow equips students with the inciples to real-world expressional practice in the	nent, en, civil, a cures, la g of flui w phence knowngineer field.	nphasizand aeraborate d beha omena. vledge ing pro	zing the ospace ory exp vior, en and sk	eir appengine perimer ahancin tills ne prepar	olication ering. nts, and og their ecessary	n across v d computa problem-so to apply	arious ational olving fluid
CO1		s fluid characteristics tha			ehaviou	ır.			
CO2	Explain the fluid pres	sure and about its measu	rements	S.					
CO3	Summarize the various	us fluid flow.							
CO4	Apply the conservation	on laws for fluids in fluid	l dynam	ics.				•	

CO5	O5 Discuss various non dimensional parameters of fluid flow.					
Unit-No.	Content	Contact Hour	Learning Outcome	KL		
I	Basic Concepts and Definitions – Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.	11	Comprehend fundamental fluid properties such as viscosity, density, surface tension, and compressibility, and understand the distinction between fluids and solids.	1,2		
П	Fluid Statics - Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, UTube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.	10	Analyze fluid pressure variations and measure pressure using various manometers and gauges, while understanding hydrostatic forces and buoyancy on submerged and floating bodies.	1,2		
III	Fluid Kinematics-Classification of fluid flow: steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates	10	Classify different types of fluid flow, understand flow patterns and visualization methods, and apply the continuity equation in one, two, and three dimensions.	1,2		
IV	Fluid Dynamics- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation — derivation; Energy Principle; Practical applications of Bernoulli's equation : venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow — Free and Forced	7	Apply Euler's and Bernoulli's equations to solve fluid flow problems and analyze forces in practical applications like venturimeters, orifice meters, and pipe bends.	1,2		
V	Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π -Theorem.	7	Utilize dimensional analysis and understand dimensionless numbers like Reynolds, Froude, Mach, Weber, and Euler for modeling and analyzing fluid flow similarity.	1,2		
Practical	 Bernoulli's Theorem Discharge Over Notches Triangular Rectangular Impact Of Jet On Vanes Flat Hemispherical Flow Through Orifice And Mouthpiece 	30	Describe, illustrate and explain and apply the properties of fluid in engineering prospect.	1,2, 3,4		

5. Reynolds's Number	
Determination	
6. Losses Due To Pipe Friction	
7. Determination of metacentric	
height of a given ship model	

- 1. Dr. D.S. Kumar, "Fluid Mechanics and Fluid Power Engineering".
- 2. Dr. R.K.Bansal, "A textbook on Fluid Mechanics and Hydraulic Machines", Laxmi Publication ltd
- 3. Fluid Mechanics and Machinery, C.S.P.Ojha, R. Berndtsson and P. N. Chadramouli, Oxford University Press, 2010.

Reference Books:

- 1. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Standard Book House.
- 2. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- 3. Fluid Mechanics with Engineering Applications, R.L. Daugherty, J.B. Franzini and E.J. Finnemore, International Student Edition, Mc Graw Hill.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Determine the various fluid characteristics that affect fluid behaviour.	1,3 & 4
2	Explain the fluid pressure and about its measurements.	1,2
3	Summarize the various fluid flow.	7.9,10

4	Apply the conservation laws for fluids in fluid dynamics.	5,7
5	Discuss various non dimensional parameters of fluid flow.	5,8

		SEMESTER	- IV						
Course Title		SOLID	MECHA	NICS					
Course	22BSB221R	Total credits: 3	L	T	P	S	R	O/F	C
code		Total hours: 35T	3	0	0	0	0	0	3
Pre-	Nil	Co-requisite				N	il		
requisite									
Programi	n	B.Tech C	ivil Emgi	neerii	ng				
Semester		Fall/ IV semester of se	econd ves	r of tl	he nrogi	amme			
Course	1. Introdu	ce to continuum mechani						ng materials	based
Objective		principles: deformation a							
(Minimur		sticity bounds; plasticity							
3)		erstand analytical metho						ness (deform	nation
		and stability of the variou							
CO1		anding, modelling and de							
COI	Relate and describe the		roduced	ру е	ngineei	ing m	ateriais	when the	y are
CO2	subjected to various fo				le e ele e				
CO2	Summarize the equation			_				_	ment
002	diagrams for different	•							
CO3	Identify the principal s	-	_			ingles	acting	on any arbi	trary
CO4	plane within a structur					12			
CO4	Apply the knowledge					_			s tor
COF	analyzing the flexural s								
CO5	Understand the conce		Kling of	nın s	neiis, sį	oneres	, etc. to	o determin	e tne
TI24 NI-	stresses at various poir		C4	. 1		•_	0-4		TZT
Unit-No.	Conten	ıt	Contact Hour					me	KL
I	Simple Stresses and Strain	ns- Concept of stress	11041	Ur	nderstand	the fu	ndamen	tal concepts	+
	and strain, St. Venant's	•						luding their	
	strain diagram, Elasticity a	-						applications	
	of stresses and strains, Ho			in various loading conditions.		ons.			
	strain diagram for mild st								
	 Factor of safety – Late 	_							
	ratio and volumetric stra	•	7						1,2
	and the relationship betw								
	varying section – co								
	Temperature stresses.	•							
	Resilience – Gradual, si								
	shock loadings – si	•							
	SHOCK IDUALINGS - 31	inpic applications.							

	Т			
и	:Compound Stresses and Strains- Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, ellipse of stress and their applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain and ellipse of strain. Relationship between elastic constants.		Analysis and assistant by Tax	
П	Bending moment and Shear Force Diagrams-Bending moment (BM) and shear force (SF) diagrams.BM and SF diagrams for cantilevers simply supported and fixed beams with or without overhangs. Calculation of maximum BM and SF and the point of contra flexure under concentrated loads, uniformly distributed loads over the whole span or part of span, combination of concentrated loads (two or three) and uniformly distributed loads, uniformly varying loads, application of moments.	7	Analyze and construct bending moment and shear force diagrams for various beam configurations and loading conditions to determine critical values and points of contraflexure.	1,2
Ш	Flexural Stresses-Theory of simple bending — Assumptions — Derivation of bending equation: M/I = f/y = E/R - Neutral axis — Determination of bending stresses — Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections — Design of simple beam sections. Shear Stresses- Derivation of formula — Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.	7	Apply the theory of simple bending and shear stress distribution to calculate stresses in different beam sections and design simple beam sections.	1,2
IV	Slope and deflection- Relationship between moment, slope and deflection, Moment area method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams.	7	Utilize moment-area and Macaulay's methods to determine the slope and deflection in determinate beams.	1,2
V	Torsion- Derivation of torsion equation and its assumptions. Applications of the equation of the hollow and solid circular shafts, torsional rigidity, Combined torsion and bending of circular shafts, principal stress and maximum shear stresses under combined loading of bending and torsion. Analysis of close-coiledhelical springs, Thin Cylinders and Spheres-Derivation of formulae and calculations of hoop stress, longitudinal stress in a cylinder, and sphere subjected to internal pressures.	7	Derive and apply torsion equations for circular shafts, analyze combined torsion and bending stresses, and calculate stresses in thin-walled cylinders and spheres under internal pressure.	1,2

Text Books: Example

1 Timoshenko, S. and Young, D. H., "Elements of Strength of Materials", DVNC, New York, USA.

2 Solid Mechanics by Dr. Utasv Chandra Kalita

Reference Books: Example

- 1 Mechanics of Materials Ferdinand P. Beer, E. Russel Jhonston Jr., John T. DEwolf TMH 2002.
- 2 Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979
- 3 Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.

	CO PO Mapping				
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Relate and describe the strain and strain produced by engineering materials when they are subjected to various forms of stress.	1,3 & 4			
2	Summarize the equations of equilibrium for constructing the shear force and bending moment diagrams for different types of loads on cantilever and simply supported beams.	1,2			
3	Identify the principal stresses, maximum shearing stresses and angles acting on any arbitrary plane within a structural element using Mohr's circle method.	7.9,10			
4	Apply the knowledge of theories of failure, shear force and bending moment relations for analyzing the flexural stress, shear stress distributions and failure of beam sections.	5,7			
5	Understand the concept of torsion and buckling of thin shells, spheres, etc. to determine the stresses at various points of geometry.	5,8			

		SEMESTER	– IV						
Course Title		Surveying	and G	eoma	tics				
Course code	22BTCM223R	Total credits: 4 Total hours: 45T+30P	3	T 0	P 1	S 0	R 0	O/F 0	C 4
Pre- requisite	Nil	Co-requisite			1	N	il		•
Programi e	n	B.Tech Ci	ivil Emg	ineerii	ng				
Semester Course Objective	s required for su	Fall/ IV semester of sequips students with esurveying and geomatics,	sential	theore	tical kı	nowled	lge and		
(Minimur 3)	management industries. 2. Students gain hands-on experience in modern surveying techniques, enhanc ability to apply these skills in real-world geospatial data analysis and mapping. 3. The curriculum is designed to prepare students for professional success, enabling excel in various applications of surveying and geomatics within engineering management sectors.					oping. enabling th	em to		
CO1		ng instruments and map	pping						
CO2	· ·	veling and setting Level							
CO3	Explain the principle a planes.	and working of theodo	litefor r	neasu	ring an	gles in	vertica	al and horiz	ontal
CO4	Apply the methods o traverse	f radiation and interse	ectionfo	r obta	aining a	an area	a enclo	sed with i	n the
CO5	Discuss the concept an	d principle of modern s	surveyin	g.					
Unit-No.	Conte	nt	Contac Hour	t	L	earning	g Outco	me	KL
I	Introduction and Basic Introduction, Objectives principles of surveying, of Map, Conventional sy of Signals, Surveying ac of surveying. Measurement of Distant Directions	s, classification and Scales, Shrinkage ymbols and Code ccessories, phases	11	pr ob th sy	e use	s, cla s of su of sca and	ssificati rveying iles, co	indamental ions, and g, including inventional surveying	
	Linear distances- Appr	oximate methods,							

	Direct Mathoda Chaire Tarre wasin			
	Direct Methods- Chains- Tapes, ranging,			
	Tape corrections.			
	Driematic Compace Dearings included angles			
	Prismatic Compass- Bearings, included angles,			
	Local Attraction, Magnetic Declination and			
II	dip. Leveling-		Acquire skills in measuring linear	
	Types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels, Effect of Curvature of Earth and Refraction.		distances and directions using chains, tapes, and prismatic compasses, and comprehend corrections for tape measurements and the impact of	
	Contouring- Characteristics and uses of		magnetic declination.	
	Contours, methods of contour surveying. Areas -Determination of areas consisting of irregular boundary and regular boundary. Volumes -Determination of volume of earth work in cutting and embankments for level	10		1,2
	section, volume of borrow pits, capacity of			
	reservoirs.			
III	Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible. Traversing: Methods of traversing, traverse computations and adjustments, Omitted measurements.	10	Master different leveling techniques, including the use of various types of levels and levelling staves, and understand the methods and applications of contour surveying.	1,2
IV	Curves: Types of curves and their necessity, elements of simple, compound, reverse, transition and vertical curves. Tachometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry, Modern Surveying Methods: Principle and types of E.D.M. Instruments, Total stationadvantages and Applications. Field Procedure for total station survey, Errors in Total Station Survey, Global Positioning System- Principle and Applications.	7	Learn to calculate areas with irregular and regular boundaries and determine the volumes of earthwork in different contexts, such as cutting, embankments, borrow pits, and reservoir capacities.	1,2
V	Photogrammetry Surveying:Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic	7	Apply advanced surveying methods using theodolites, traverse computations, curves, tacheometry, and modern instruments like EDM, total stations, and GPS, along with understanding the principles and	1,2

	mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.		applications of photogrammetry.	
Practical	 To range a line more than one chain length and recording the details in a field book. Profile leveling and cross section leveling with Dumpy level. Trigonometric Constant Close Compass Traversing to plot the existing layout or built up area Measurement of horizontal and angles with Theodolite Measurement of vertical angles with Theodolite Contouring of a given area by method of grid and prepare the contour map of that area. 	30	Describe, illustrate and explain and apply the concepts of surveying in engineering prospect.	1,2, 3,4

- **1.** Chandra A M, "Plane Surveying and Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi.
- **2.** Duggal S K, "Surveying (Vol 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Reference Books:

- 1. Arthur R Benton and Philip J Taety, Elements of Plane Surveying, McGraw Hill.
- 2. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi
- 3. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi.
- 4. Surveying (Vol -1, 2 & 3), by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications (P) ltd., New Delhi.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Use of various surveying instruments and mapping	1,3 & 4					
2	Explain Methods of Leveling and setting Levels	1,2					

	with different instruments	
3	Explain the principle and working of theodolitefor measuring angles in vertical and horizontal planes.	7.9,10
4	Apply the methods of radiation and intersectionfor obtaining an area enclosed with in the traverse	5,7
5	Discuss the concept and principle of modern surveying.	5,8

	SEMESTER – IV								
Course Title		Basic Acclima	tizing	Skill	s (BAS	5)			
Course code	22UULS201R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 20P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite									
Programme		B.Tech Civil Emgineering							
Semester		Fall/ IV semester of sec	cond ye	ar of t	he prog	ramme	<u> </u>		
Course Objectives (Minimum 3)	 Develop students' abilities in technical writing, speaking, and presentations to effectively convey engineering concepts and solutions. Analyze electronic applications in civil engineering for designing, constructing, and maintaining infrastructure. Focus on crafting professional resumes and cover letters tailored for engineering positions, improving students' chances of securing employment. 								
CO1	exercises and targeted	amwork abilities and pre training, enhancing their re and concise technical co	adiness	for er	igineerir	ng care	ers.		
	incorporating industr	y-specific terminology.							
CO2	Develop expertise in showcase engineering	n crafting resumes, cov	er let	ters, a	and ted	chnical	report	ts to effec	tively
CO3	Acquire proficiency i	n creating and deliverin oncepts to diverse audie	•	ctful	present	ations	, utilizii	ng visual ai	ds to
CO4	Cultivate effective int	terpersonal skills for collar	aborati			-	_	active liste	ening,
CO5		ing job interviews by ar htechnical and behavior		•			xperier	nces, and c	areer
Unit-No.	Conte	nt (Contac Hour	t	L	earning	g Outco	me	KL

I	 Unit 1- Introduction to Accommodation Management Telephone handling technique Organizing of Rooms. Cleaning equipments and uses. Bed making Process. 	4	Develop skills in telephone handling, room organization, cleaning equipment usage, and bed-making processes.	1,2
II	Unit-2- Fundamental of Cooking Uses of basic cooking equipments Uses of fire & Fuel Different cuts of vegetables Uses of herbs & spices Regional Food Habits	4	Gain proficiency in using basic cooking equipment, fire, and fuel, as well as preparing different cuts of vegetables, utilizing herbs, spices, and understanding regional food habits.	1,2
III	Unit 3- Food and Beverage skills Introduction to catering industry Types menus and beverages Identifications of Cutlery, crockery & glassware Table etiquettes or manners Customer handling skills or Situation Handling	4	Understand catering industry basics, menu types, beverage identification, table etiquette, and customer handling skills.	1,2
IV	Unit 4- Travel management	4	Learn about travel documentation, passport and visa applications, tourism products like UNESCO sites, and various logistics in travel and tourism management.	1,2
V	Unit 5- Basic Hospitality Skills Various Egg Preparations Canapés preparations Mocktail & Shakes Preparations Butter Rice / Lemon Rice Various Lentils Preparations 1 non-veg preparation/ 1 veg preparation	4	Master various egg preparations, canapés, mocktails, shakes, rice dishes, lentil preparations, and both vegetarian and nonvegetarian dishes.	1,2

- 1. Arora K (2011). Theory of cookery, Frank brothers & company (pub) pvt ltd-New Delhi.
- 2. Bruce H. Axler, Carol A. Litrides (2010) Food and Beverage Service Volume 1 of Wiley Professional Restauranteur, Guides.
- 3. Mohammed Zulfikar (2010) Introductions to Tourism and Hotel Industry Introduction to Tourism and Hotel Industry. Vikas Publishing.

Reference Books

1..Sudhir Andrews (2013) Food and Beverage Service: A Training Manual, Tata McGraw Hill, 2013.

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5,7				
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8				
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10				
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12				
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10				

	SEMESTER – IV								
Course Title		CO-CURRICULAR ACTIVITIES							
Course code	22UBCC221	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	1s
Pre-	Nil	Co-requisite				N	il		
requisite									
Programme		B.Tech Ci	vil Em	gineerii	ng				
Semester		Fall/ IV semester of se	cond ye	ear of tl	he prog	ramme	!		
Course									
Objectives	1. 1. Meeting the	1. Meeting the needs of the students and covering a broad/wide range of their abilities							
(Minimum	9			Ü			Ü		
3)									

	and talents.							
	2.To stimulate the interests in the students to participate	idents and	l provide equal opportunities to all t	the				
	<u> </u>	3.To enhance the learning experience of the students and help in recognizing and developing their inner skills such as leadership qualities, creative or innovative skills etc.						
CO1	Apply foundational acclimatization principles to ada	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.						
CO2	Analyze environmental factors influencing acclimat adaptation mechanisms.							
CO3	Evaluate personal adaptability through practical executable challenges.	ercises, fost	tering a proactive approach to acclimatiz	ation				
CO4	Synthesize acclimatization strategies for varying in response.			•				
CO5	Demonstrate mastery in acclimatization technique challenges.							
Unit-No.	Content	Contac t Hour	Learning Outcome	KL				
I	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students. Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	30	Engage in mandatory co-curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing and participating in various programs and events.	1,2				

CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Apply foundational acclimatization principles to adapt	5,7			

	effectively in diverse environments and situations.	
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7.9,10
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

		SEMESTER –	IV						
Course Title	ENGI	LISH LANGUAGE PRO	FIC	ENCY	FOR	ENGI	NEERS	S	
Course code	22UBPD224R	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	4	0	0	0	2
Pre-requisite	Nil	Co-requisite				N	il		
Programme		B.Tech Civ	il Emg	gineerin	ıg				
Semester		Fall/ IV semester of second	nd ye	ar of th	ie progi	ramme			
Course									
· ·	 Develop students 	s' abilities in technical writ	ing, s	peaking	, and p	resenta	itions to	effectively	convey
(Minimum 3)	engineering concepts an	d solutions.Analyze electi	onic	applicat	tions in	civil	enginee	ring for de	esigning,
	constructing, and maintain	ning infrastructure.							
	Focus on craftir	ng professional resumes a	and co	over le	tters ta	ilored	for eng	gineering p	ositions,
	improving students' chanc	es of securing employment	•						
	3. Strengthen team	work abilities and prepare	stude	nts for	job inte	rviews	through	n practical e	exercises
	and targeted training, enh	ancing their readiness for e	nginee	ering ca	reers.				
CO1	Demonstrate clear and	d concise technical con	nmun	ication	in bo	th wr	itten ai	nd oral fo	rmats,
	incorporating industry-s	specific terminology.							
CO2	Develop expertise in cra	afting resumes, cover let	ters, a	nd tec	hnical	reports	to effe	ectively sho	owcase
	engineering qualificatio	•				•		•	
CO3	<u> </u>	creating and delivering	impa	actful r	resent	ations	utilizir	ng visual a	aids to
		cepts to diverse audience	•						
	convey engineering con	cepts to diverse addiction							

CO4	Cultivate effective interpersonal skills for co		•	ening
	conflict resolution, and clear communication			
CO5	Prepare for engineering job interviews by arti			goals
	addressing both technical and behavioral que			
Unit-No.	Content	Contact Hour	Learning Outcome	KL
I	Writing Skills	Hour	Develop proficiency in various	
	i. Paragraph Writing & Narratives		forms of writing, including	
	ii. Letter Writing		paragraph and narrative	
	iii. Technical Writing		construction, letter writing, and	
		7	technical documentation.	1,2
	Pipe and cistern	'		1,2
	i. Introduction of pipes and cistern			
	iii.Solving different types of questions iv. Workshee1 and Worksheet 2			
	iv. Worksheet and Worksheet 2			
II	Self-Management Skills		Gain competency in solving	
	i. SWOT Analysis		practical problems related to	
	ii. Goal Setting and Personal Hygiene		pipes and cisterns, mixtures and	
			alligations, clocks, and profit, loss,	
	Mixture allegation and Clock	_	and discounts through targeted practice and worksheets.	
	i.Introduction of basics	7	practice and worksneets.	1,2
	ii.Solving questions on mixture and			
	alligationion.			
	iii.Workshee1 and Worksheet 2			
III	Vocabulary Development		Enhance personal effectiveness	
	i.Understanding different aspects of a word		through SWOT analysis, goal	
	(such as the use of say, tell, speak).		setting, and maintaining personal	
	ii. Learning strategies to develop vocabulary		hygiene.	
	iii Contextual vocabulary learning			
	iv. Use of phrasal verbs and idioms in a			
	conversation	_		1.0
	v. Effectively using dictionary, thesaurus	7		1,2
	Statement and Course of action			
	i.Revision of syllogism			
	ii.Statement and conclusion Iii. Course of action based on statement			
	Iv. Workshee1 and Worksheet 2			
	TV. Worksheet and Worksheet 2			
IV	Interview Skills & Dress Code Ethics		Improve vocabulary through	
	i. Types of interview-		understanding word usage,	
	telephonic, virtual & face to face		contextual learning, and effective	
	online interview, personal interview, Panel	7	dictionary use, and strengthen logical reasoning with practice in	1 2
	interview, Group interview ii. Common interview questions and answering	'	syllogisms, statements,	1,2
	strategies		conclusions, and courses of	
	iii. Dress Code Ethics during Interviews		action.	
	in. Diess code Lunes during litterviews		1	

iv. Mock Interview Session

	Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Workshee1			
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt) Profit loss and discount i.Introduction to basics ii.Introduction to discount iii.Probems related on the topics Iv. Workshee1 and Worksheet 2	7	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving exercises in linear, circular, and matrix arrangements.	1,2

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5,7						

2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

	SEMESTER – IV								
Course Title	Extra-curricular Activities								
Course code	22UBEC221	Total credits: 2	L	T	P	S	R	O/F	C
		Total hours: 30P	0	0	0	4	0	0	1s
Pre-requisite	Nil	Co-requisite				N	il		
Programme		B.Tech Civ							
Semester		Fall/ IV semester of sec	ond ye	ar of th	ie progi	ramme			
(Minimum 3)	 Equip students with effective time management and prioritization skills, fostering leadership qualities and a commitment to their endeavors. Encourage exploration of interests beyond academics and participation in co-curricular activities, cultivating well-rounded individuals capable of making meaningful community contributions. Enhance students' abilities to express ideas clearly and engage in in-depth evaluation and analysis, while integrating learning experiences to practice transferable skills across various activities. 								
CO1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.								
CO2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.								
	Learn to participate in development.	various co-curricular a	ctivitie	es lead	ing to	their	multifa	ceted pers	onality
CO4	Express their ideas, view	vs, In-depth evaluation a	nd ana	alysis c	learly ir	n the to	opic of t	their intere	st.

CO5	Demonstrate and practices different ac demonstrating transferable skills.	tivities, by	Integrating learning experience	es by
Unit-No.	Content	Contact Hour	Learning Outcome	KL
I	AdtU encourages a range of activities outside the regular curriculum intended to meet learner's interest, These activities are aimed to develop the social and soft skills and promote a holistic development of the learners, Keeping in mind the 360 degree learning methodology the students are engaged in different activities headed under different clubs viz. Dance, music, photography, drama, literary etc., The students are encouraged to participate in regular club activities, workshops, competitions as per their interest and hobbies, The student members of the club are trained represent AdtU in various inter University student and national level competitions, Renewed personalities are invited to conduct workshops that benefit the members and students by giving them the platform to learn from experts in the respective fields.	30	Participate in diverse club activities to develop social and soft skills, achieve holistic development, and gain exposure through workshops and competitions led by experts.	1,2

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7					
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8					
3	Learn to participate in various co-curricular activities leading to their multifaceted personality	7.9,10					

	development.	
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10

		SEMESTER	R – IV						
Course Title	Techno Professional Skills-III								
Course 22BTCM227R Total credits: 2				T	P	S	R	O/F	C
code		Total hours: 20P	0	0	2	0	0	0	1
Pre-	Nil	Co-requisite				N	il		
requisite		D. W. 1. C	<u> </u>						
Programi e	m	B.Tech C	Civil Emgi	neerin	ıg				
Semester		Fall/ IV semester of	first vear	of the	progra	mme			
Course		the fundamental prir					nginee	ring grap	hics
Objective	es relevant to civil engi		· r		1		8	66 T	
(Minimu		ility to create accurat	e and det	ailed	engin	eering	drawii	ngs using	basic
3)	graphical tools.				V-1-8-11-1	8	0100111		0 4.510
	<u> </u>	alization skills and th	e ability	to int	erpret	engine	eering	designs th	rough
	graphical representat		o delliej		orpro-	VII-8111	8		110000
CO1		nciples and standards of e	ngineering	grapł	nics.				
CO2	Develop proficiency in u	sing basic drawing tools a	and technic	ques fo	or civil e	enginee	ring app	lications.	
CO3	Create accurate and detail	iled 2D engineering draw	ings of civi	il struc	ctures.				
CO4		ngineering designs through				n.			
CO5	Apply engineering graph	ics skills in practical civil	l engineerii	ng pro	jects.				
Unit-	Conte	ent	Contac		Lea	rning	Outco	ome	KL
No.			t Hour						
I	Introduction to Engine		6	Understand the principles at standards of engineering				-	1, 2
	Overview of engineerin						gineer	ing	
	drawing standards, and			gra	aphics.				
	Importance in civil engi	Ÿ							
II	Basic Drawing Tools a		6		-	-	•	n using	2, 3
	Introduction to drawing					_	tools a	nd	
	scales, and basic constru	uction techniques.		tec	chnique	es.			
	Use of lines, angles, and	×							
III	Use of lines, angles, and Orthographic Projecti	×	6	Cr	eate ac	curate	e ortho	graphic	3, 4
III	· · · · · · · · · · · · · · · · · · ·	ions: Principles of	6				e ortho		3, 4
III	Orthographic Projecti	ions: Principles of , multi-view	6	pre	ojectio	ns and		nal	3, 4
IV	Orthographic Projection orthographic projection	ions: Principles of , multi-view views.	6	pro vie	ojectio ews of	ns and civil s	l sectio	onal es.	3, 4

	perspective drawings. Visualization of 3D objects on 2D planes.		isometric and perspective drawings.	
V	Practical Applications and Projects: Hands-on projects involving the creation of detailed engineering drawings for civil engineering applications.	6	Apply engineering graphics skills in practical civil engineering projects.	5

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Understand the basic principles and standards of engineering graphics.	5, 7					
2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8					
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10					
4	Interpret and visualize engineering designs through graphical representation.	11,12					
5	Apply engineering graphics skills in practical civil engineering projects.	10					

SEMESTER – IV									
Course	MOOCS IV-Excel Skills for Business: Essentials								
Title									
Course	22MOCE221R	Total credits: 1	\mathbf{L}	T	P	\mathbf{S}	R	O/F	C
code		Total hours: 15T	0	0	0	0	0	0	1
Pre-	Nil	Co-requisite	Nil						
requisite									
Programme		Bachelor of Techno	logy ir	ı Civil	Engi	neerin	g		
Semester	Fall:	Summer/ V semester	of seco	nd ye	ar of t	he pro	gran	ıme	
Course	Introduce the fundamenta	al concepts and interfac	e of Ex	cel.				•	

Object (Minin 3) CO1 CO2 CO3 CO4 CO5 Unit-No.			tomizing of el function siness sce face for b atasets usi ualization cros and a	data visualizations. as and macro automation. anarios. asic data management tasks. asig advanced Excel functions. s.	eations.
I	This Exce navig Stude and data, lays Exce comf	unit introduces the basics of el, including the user interface, gation, and essential functions. ents will learn how to create, save, open workbooks, enter and edit and use basic formulas. This unit the foundation for more advanced el skills, ensuring students are fortable with the fundamental ations and tools available in Excel.	Hour 3	Upon completing this unit, students will be able to confidently navigate the Excel interface, understanding the structure of workbooks and worksheets. They will acquire basic data entry skills and learn essential formatting techniques to manage data effectively.	1, 2
П	Stude mana sortin table cond funct SUM state and a	2: Data Management and lysis ents will delve into data agement techniques, including ang, filtering, and using Excel as. This unit covers data validation, itional formatting, and the use of tions for data analysis such as I, AVERAGE, COUNT, and IF ments. The focus is on organizing analyzing data efficiently to act meaningful insights.	3	This unit will enable students to manipulate and analyze data efficiently within Excel. They will learn to sort and filter data, use advanced functions such as VLOOKUP and HLOOKUP, and apply data validation techniques to ensure data accuracy.	1, 2, 3, 4
III	Build intro and f about IND! form functionic perfections	3: Advanced Formulas and ctions ding on the basics, this unit duces more advanced formulas functions. Students will learn t VLOOKUP, HLOOKUP, EX, MATCH, and complex nested rulas. This unit also covers text tions, date and time functions, and ral operators, enabling students to form sophisticated data repulations and analyses.	3	Students will gain the ability to create and customize various types of charts and graphs, essential for effective data visualization. They will learn to use pivot tables and pivot charts to summarize large datasets and generate meaningful visual representations. The unit will also emphasize best practices for designing clear and impactful visualizations, which are crucial for business reports and presentations. By the end of this unit, students will be proficient in visually communicating data insights and findings.	1, 2, 3, 4, 5

IV	Unit 4: Data Visualization with		In this unit, students will be introduced to	2, 3, 4
	Charts and Graphs		advanced Excel functions and the use of	
			macros to automate repetitive tasks. They	
	Effective data visualization is crucial		will learn complex functions such as	
	for business reporting and decision-		INDEX and MATCH, array formulas, and	
	making. This unit teaches students how		logical functions like IF, AND, and OR.	
	to create and customize various types	3		
	of charts and graphs in Excel,	3		
	including bar charts, line charts, pie			
	charts, and scatter plots. Students will			
	learn how to use chart elements,			
	formatting options, and design			
	principles to present data clearly and			
	effectively.			
V	Unit 5: PivotTables and PivotCharts		The final unit will focus on applying	2, 3, 4, 5
			Excel skills to real-world business scenarios. Students will learn to create	
	PivotTables and PivotCharts are		financial models, perform budgeting and	
	powerful tools for summarizing and		forecasting, and conduct what-if analysis	
	analyzing large datasets. In this unit,		using tools like Scenario Manager and	
	students will learn how to create,	3	Goal Seek.	
	format, and manipulate PivotTables			
	and PivotCharts to explore data from			
	different perspectives. The unit covers			
	grouping, filtering, and using			
	calculated fields to enhance data			
	analysis.			

Textbooks:

- 1. "Excel 2019 Bible" by Michael Alexander, Richard Kusleika, and John Walkenbach, 2018.
- 2. "Microsoft Excel 2019 Step by Step" by Curtis Frye, 2018.
- 3. "Excel 2016 in Depth" by Bill Jelen, 2015.

Reference Books:

- 1. "Excel Data Analysis: Modeling and Simulation" by Hector Guerrero, 2018.
- 2. "Excel Formulas and Functions for Dummies" by Ken Bluttman and Peter G. Aitken, 2018.
- 3. "Pivot Table Data Crunching" by Bill Jelen and Michael Alexander, 2016.

CO I	PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Navigate and utilize the Excel interface for basic data management tasks.	1,4,7
2	Manipulate and analyze complex datasets using advanced Excel functions.	2,3,5
3	Create clear and impactful data visualizations.	3,7,9
4	Automate repetitive tasks with macros and advanced	6,8,10

	functions.	
5	Apply Excel skills to financial modeling, budgeting,	10,12,4
	forecasting, and other business applications.	

MAPPING TABLE (4TH Semester)

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM221R	Solid Mechanics	3	2	3	1	1	1	1					1
22BTCM222R	Introduction to Fluid mechanics	3	3	3	2					1		1	1
22BTCM223R	Surveying and Geomatics	3	3	2	2	2				1			3
22BTCM224R	Geotechnical Engineering	2	2	1	1	1	1	1					
22BTCM225R	Basic Electronics for Civil Engineering Application	2	2	1	1	3	1	1	1				
22BTCM226R	Environmental Science	3	2	2	3	2	2	2					
22UBPD223R	English Language Proficiency for Engineers	2	2	2	3	2	3	3		1	1		1
22UBCC221	Co-curricular	3	3	2	2	2				1			3
22UBEC221	Extra- curricular	2	2	1	1	1	1	1					
22BTCM227R	Techno- Professional Skills III	2	2	1	1	3	1	1	1				
22MOCE221R	MOOCS III	3	2	2	3	2	2	2					
22UULS221R	Basic Acclimatizing Skills (BAS)	2	2	2	3	2	3	3		1	1		1

		SEMESTER	- V								
Course Title		Environmental Engineering									
Course	22BTCM311R	Total credits: 3	L	T	P	S	R	O/F	C		
code		Total hours: 45T+30P	2	0	2	0	0	0	3		
Pre- requisite	Nil										
Programi	n	B.Tech Ci	vil Emgi	neerii	ng						
Semester		Fall/ V semester of th	ird year	of the	e progra	mme					
Course Objective (Minimur 3)	waste water treat To develop a st involved in water To learn the basic	e basic principles and ment. udent's skill in the base and wastewater treatment parties of water treatment parties involved in an	oasic de ment. olant con	esign mpos	of un	it ope	rations	and proc			
CO1	Analyze characteristi	cs of water and wastew	vater								
CO2	Estimate the quantity	of drinking water and	domest	ic wa	stewat	er gen	erated				
CO3	Identify the compone	nts of water supply sys	stems								
CO4	Design sewerage syst	em									
CO5	Plan strategies to con	trol, reduce and monit	or pollu	tion.							
Unit-No.	Conte	nt	Contact Hour		L	earning	g Outco	me	KL		
I	water quality requirer beneficial uses, Water quality indices, water supply systems, Need supply schemes, Water dagricultural water require of water supply system; T Distribution system, Van W/S systems, service re Water Treatment: aera coagulation floccula disinfection, advanced	Water: -Sources of Water and quality issues, ater quality requirement for different eneficial uses, Water quality standards, water and indices, water safety plans, Water apply systems, Need for planned water apply schemes, Water demand industrial and ericultural water requirements, Components as water supply system; Transmission of water, istribution system, Various valves used in V/S systems, service reservoirs and design. Vater Treatment: aeration, sedimentation, bagulation flocculation, filtration,									
Ш	Sewage- Domestic and S of Sewage, Sewage Conveyance of sewage- S parameters, operation a sewers, Sewage pumpin appurtenances, Design o	flow variations. Sewers, shapes design and maintenance of g; Sewerage, Sewer	9	inf	nderstai Iuencin astewat	ig wat		factors mand and	1,2		

	Small bore systems, Storm Water-Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment, aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.			
III	Air - Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations, Noise- Basic concept, measurement and various control methods.	9	To be able to explain the role of infrastructure in ensuring reliable and safe water supply.	1,2
IV	Solid waste management-Municipal solid waste, Composition and various chemical and physical parameters of MSW, MSW management: Collection, transport, treatment and disposal of MSW. Special MSW: waste from commercial establishments and other urban areas, solid waste from construction activities, biomedical wastes, Effects of solid waste on environment: effects on air, soil, water surface and ground health hazards. Disposal of solid waste-segregation, reduction at source, recovery and recycle. Disposal methods- Integrated solid waste management. Hazardous waste: Types and nature of hazardous waste as per the HW Schedules of regulating authorities, Government authorities and their roles in water supply, sewerage disposal. Solid waste management and monitoring/control of environmental pollution.	9	Understand the principles of gravity flow and hydraulic design in sewerage systems.	1,2
V	Building Plumbing-Introduction to various types of home plumbing systems for water supply and waste water disposal, high rise building plumbing, Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings used.	9	To be able to design and implement monitoring programs to track pollution levels in water bodies.	1,2

TEXT BOOKS:

- 1. Droste R.L., (1997)., Theory and Practice of water wastewater treatment, John Wiley & sons.
- 2. Garg S.K., (2001), Environmental Engineering, Vols. I and II, 12th Edition, Khanna Publishers, New Delhi.

Reference Books

- **1.** PeavyH.S.,.Rowe D.R and George Tchobanoglous (2001), Environmental Engineering, McGraw-Hill Company, New Delhi.
- **2.** Metcalf and Eddy (2003), Wastewater Engineering, Treatment and reuse, Tata McGraw-Hill Edition, Fourth edition.
- **3.** Rangwala (1999), Water supply & Sanitary Engineering, Charotar Publishing House, Anand-16th Edition.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Analyze characteristics of water and wastewater	1,2,7&10
2	Estimate the quantity of drinking water and domestic wastewater generated	1,3,6&7
3	Identify the components of water supply systems	1,2,3,5,6 &7
4	Design sewerage system	1,2,3,5&6
5	Plan strategies to control, reduce and monitor pollution.	1,2,3,7

		SEMESTEI	R −V						
Course		Mechanics of Materials							
Title									
Course	22BTCM312R	Total credits: 3	L	T	P	S	R	O/F	C
code		Total hours: 45T	3	0	0	0	0	0	3
Pre- requisite	Nil	Co-requisite	Co-requisite Nil						
Programm		B.Tech C	ivil Emg	gineerir	ıg				
e									
Semester		Fall/ V semester of T	hird yea	r of the	e progr	amme			
Course	1. 1. Mechanics	of Materials gives the stu	ident ba	asic to	ols for	stress,	strain	and deforn	nation
Objectives	analysis.	·							
(Minimum	•	etermining the stresses, s	trains a	nd def	ormati	ons pro	oduced	by applied	loads

3)	are presented.3. Engineering design concepts are integra	ted throug	hout the course						
CO1	Learn fundamental concepts of Stress, Strabars, beams and thin cylinders.	Learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.							
CO2	Infer the mechanism of load transfer in beadeformations.	ims, the in	duced stress resultants and						
CO3	Estimate the load carrying capacity of column various theories for failure of material.	mns, stress	ses due to unsymmetrical bending a	and					
CO4	Explain the effect of torsion on shafts and s	prings.							
CO5	Analyze plane trusses using method of join	t and the n	nethod of section.						
Unit-No.	Content	Contact Hour	Learning Outcome	KL					
I	Deformation and Strain covering description of finite deformation, Infinitesimal deformation: Analysis of statically determinate trusses; Stability of dams, retaining walls and chimneys; Stress analysis of thin, thick and compound cylinder; Generalized state of stress and strain: Stress and strain tensor, Yield criteria and theories of failure; Tresca, Von-Mises, Hill criteria, Heigh-Westerguard's stress space.	9	To be able to describe and differentiate between finite and infinitesimal deformation in materials.	1,2					
П	Momentum Balance and Stresses covering Forces and Moments Transmitted by Slender Members, Shear Force and Bending Moment Diagrams, Momentum Balance, Stress States / Failure Criterion Mechanics of Deformable Bodies covering Force-deformation Relationships and Static Indeterminacy, Uniaxial Loading and Material Properties, Trusses and Their Deformations, Statically Determinate and Indeterminate Trusses	9	Understand the principles of momentum balance in the context of mechanical structures.	1,2					
III	Force-Stress-Equilibrium covering	9	Analyze stress-strain- temperature relationships and	1,2					

	Multiaxial Stress and Strain		their implications in thin-walled pressure vessels.	
	Displacement – Strain covering Multiaxial Strain and Multiaxial Stress-strain Relationships Elasticity and Elasticity Bounds covering Stress-strain-temperature Relationships and Thin-walled Pressure Vessels, Stress and strain Transformations and Principal Stress, Failure of Materials			
IV	Stress and Strains; Deflections and Torsion covering Pure Bending, Moment- curvature Relationship, Beam Deflection, Symmetry, Superposition, and Statically Indeterminate Beams, Shear and Torsion, Torsion and Twisting, Thermo elasticity, Energy methods, Variational Methods; Strain energy, elastic, complementary and total strain energy, Strain energy of axially loaded bar, Beam in bending, shear and torsion; General energy theorems, Castigliano's theorem, Maxwell Bettie's reciprocal theorem; Virtual work and unit load method for deflection, Application to problems of beams and frames	9	Analyze pure bending in beams and derive the moment-curvature relationship.	1,2
V	Structural stability: Stability of columns, Euler's formula, end conditions and effective length factor, Columns with eccentric and lateral load; Plasticity and Yield Design covering 1D-Plasticity — An Energy Approach, Plasticity Models, Limit Analysis and Yield Design	9	Apply limit analysis and yield design principles to ensure the structural integrity and safety of materials and structures.	1,2

- 1. Hibbeler, R. C. Mechanics of Materials. 6th ed. East Rutherford, NJ: Pearson Prentice Hall, 2004. ISBN: 9780131913455
- 2. Crandall, S. H., N. C. Dahl, and T. J. Lardner. An Introduction to the Mechanics of Solids. 2nd ed. New York, NY: McGraw Hill, 1979. ISBN: 9780070662308

Reference Books:

1. Gere, J. M. Mechanics Of Materials. 2Ed (Pb 2004)

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn fundamental concepts of Stress, Strain and deformation of solids with applications to bars, beams and thin cylinders.	1,3 & 4
2	Infer the mechanism of load transfer in beams, the induced stress resultants and deformations.	1,2
3	Estimate the load carrying capacity of columns, stresses due to unsymmetrical bending and various theories for failure of material.	7,9,10
4	Explain the effect of torsion on shafts and springs.	5,7
5	Analyze plane trusses using method of joint and the method of section.	5,8

		SEMESTER	R – V						
Course Title	Construction Materials and Methods								
Course	22BTCM313R	Total credits: 3	L	Т	P	S	R	O/F	C
code		Total hours: 45T	2	1	0	0	0	0	3
Pre-	Nil	Co-requisite			1	N	il		ļ.
requisite									
Programm		B.Tech C	ivil Emg	gineerir	ıg				
e									
Semester		Fall/ V semester of T	hird yea	r of th	e progra	amme			
Course	1. Introduction	on to Construction Mate	rials						
Objectives	2. Construction	on Methods and System	s						
(Minimum 3)		on Details and Specificat							
CO1	Give examples on va	rious materials commo	nly use	d in ci	vil engi	neerir	ng const	truction ar	nd
	their properties.		•		J		J		
CO2	Explain various type	Explain various types of binding and constituent materials used in construction.							
CO3	Summarize the man	ufacturing and testing	of concr	ete.					

CO4	Distinguish the various materials used in c	onstructio	n.				
CO5	Infer the varying modern materials incorpo	orated in c	onstruction practice.				
Unit-No.	Content	Contact Hour	Learning Outcome				
I	INTRODUCTION; Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.	9	Identify and differentiate common construction materials and their applications.	1,2			
II	PLANNING AND ORGANIZING CONSTRUCTION SITE AND RESOURCES: Resource allocation, resource aggregation and resources levelling	9	Explain construction methods for different building elements.	1,2			
III	PERT CPM AND GERT NETWORKS: concepts of PERT, CPM and GERT, analysis of network and determining the critical path and duration of the network	9	Analyze and select materials and methods based on project requirements.	1,2			
IV	CONTRACTS MANAGEMENT BASICS AND CONSTRUCTION COSTS: Make up of construction costs including capital costs operational costs and life cycle cost	9	Describe and apply safe construction practices and regulations.	1,2			
V	COST ANALYSIS TECHNIQUES: Quality and Safety Concerns in Construction — Organizing for Quality and Safety — Work and Material Specifications — Total Quality Control — Quality Control by Statistical Methods — Statistical Quality Control with Sampling by Attributes — Statistical Quality Control with Sampling by Variables — Safety.	9	Interpret and communicate effectively using construction drawings and specifications.	1,2			

- 1. Saurabh Kumar Soni (2013), "Building construction and management", S.K Kataria and Sons.
- 2. Denis Lock (2010), "Project management in construction", Pearson Education,
- 3. Sidney M. Levy (2009), "project control and Practice", Pearson Education,

Reference Books:

- 1. Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.
- 2. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.
- 3. Chris Hendrickson and Tung Au, "Project Management for Construction Fundamental Concepts for Owners, Engineers", Architects and Builders, Prentice Hall, Pittsburgh, 2000.
- 4. Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.

5. Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Give examples on various materials commonly used in civil engineering construction and their properties.	1,3 & 4					
2	Explain various types of binding and constituent materials used in construction.	1,2					
3	Summarize the manufacturing and testing of concrete.	7.9,10					
4	Distinguish the various materials used in construction.	5,7					
5	Infer the varying modern materials incorporated in construction practice.	5,8					

		SEMESTER	R - V						
Course Title	Transportation Engineering								
Course	22BTCM314R	Total credits:3	L	Т	P	S	R	O/F	С
code		Total hours: 45T+30P	2	0	2	0	0	0	3
Pre- requisite	Nil	Co-requisite				N	il		
Programm e	B.Tech Civil Emgineering								
Semester		Fall/ V semester of T	hird yea	r of the	e progr	amme			
Course Objectives (Minimum 3)	Fall/ V semester of Third year of the programme 1. To introduce the students about different classifications/types of roads 2. To explain the students about different geometric features of highways 3. To describe about traffic characteristics and traffic control devices 4. To describe about different pavement materials, their properties and laboratory experiments. 5. To describe about different design phenomenon of pavement design							ratory	
CO1	Describe different ty	pes of roads, its admin	istratio	n and l	highwa	ıy surv	ey tech	niques	

CO2	Determine ideal road alignment in different features of flexible and rigid pavement.	it topograp	hies and design different geometric	C				
CO3	Perform traffic survey to collect data requi	red for tra	ffic regulations and control					
CO4	Discuss about different materials and their	suitability	to be used in construction of road.					
CO5	Design various components of flexible and rigid pavements as per the latest code of practice							
Unit-No.	Content Contact Learning Outcome K							
I	Highway development and planning Classification of roads, road development inIndia, Current Road projects in India; highway alignment, Highway Survey, and project preparation	9	Understand the classification of roads and the historical and current road development projects in India.	1,2				
П	Geometric design of highways Introduction; highway cross section elements; sight distance, design of horizontal alignment; design of vertical alignment; design of intersections, problems	9	Learn the principles of geometric design, including the cross-section elements of highways and sight distance requirements.	1,2				
Ш	Traffic engineering & control Traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control; design of road intersections; design of parking facilities; highway lighting; problems	9	Design road intersections, parking facilities, and highway lighting, and learn traffic regulation and control techniques.	1,2				
IV	Highway Materials and Construction Material requirement for pavements – Soil classification for Highway – Soil tests – CBR and Plate Load Test, Aggregate – materials testing and specification, Bitumen – material testing and specification – Concrete Mix Design, construction of bituminous and rigid pavements, Highway Maintenance – Material recycling	9	Understand the components, functions, and design principles of rigid pavements, and solve design problems as per IRC standards.	1,2				
V	Design of pavements- Introduction; flexible pavements, factors	9	To be introduced to the factors affecting the design and	1,2				

affecting design and performance; stresses	performance of flexible
in flexible pavements; design of flexible	pavements, including stress
pavements as per IRC; rigid pavements-	analysis and IRC design standards
components and functions; factors	
affecting design and performance of CC	
pavements; stresses in rigid pavements;	
design of concrete pavements as per IRC;	
problems.	

- 1. S.K.Khanna, C.E.G.Justo, (2001) "Highway Engineering", Nem Chand & Bros, Roorkee.
- **2.** Rao.G.V., (2005) "Principles of Transportation and Highway Engineering", Tata McGraw Hill Co.

Reference Books:

- 2. L.R.Kadiyali, (2003) "Principles and Practice of Highway Engineering", Khanna Publishers.
- 3. ParthaChakroborthy, Animesh Das, (2005) "Principles of Transportation Engineering", Prentice-Hall of India.

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Describe different types of roads, its administration and highway survey techniques	1,3 & 4					
2	Determine ideal road alignment in different topographies and design different geometric features of flexible and rigid pavement.	1,2					
3	Perform traffic survey to collect data required for traffic regulations and control	7.9,10					
4	Discuss about different materials and their suitability to be used in construction of road.	5,7					
5	Design various components of flexible and rigid pavements as per the latest code of practice.	5,8					

		SEMESTER -	- V							
Course Title		Hydrology and Wat	er Res	ource	Engine	ering				
Course	22BTCM315R	Total credits: 3	L	T	P	S	R	C		
code		Total hours: 45T	2	1	0	0	0	0	3	
Pre- requisite	Nil	Nil Co-requisite Nil								
Program	n	B.Tech Civ	vil Emg	ineerin	ıg					
e Semester		Fall/ V semester of Th	ird yea	r of the	e progra	amme				
Course Objective (Minimum 3)	development of to understand	rrence movement and of a civilization. The methods of collecting surface and ground wat pasic principles and move	g the leer hyd	nydrolo rology.	ogical in	nforma	tion, w	hich is esse	ential,	
CO1	Remember the key dr behavior in catchmen	rivers on water resourc ets.	es, hyd	lrologi	cal pro	cesses	and th	neir integra	ted	
CO2	Apply the knowledge characteristics, runof	of hydrological models f and hydrograph	to sur	face w	ater pi	oblen	ıs inclu	ding basin		
CO3	Explain the concept o strategies	f hydrological extremes	s such	as floo	d and	drough	nt and i	ts managei	nent	
CO4		groundwater for water								
CO5		rtance of spatial analys							voirs	
Unit-No.	Conte	nt	Contac Hour	t	L	earning	g Outco	me	KL	
I	Introduction: hydrolo budget equation, histo world water balance engineering, sources of	ory of hydrology, , applications in	9	pro an	ocesses d app	of the	e hydro ie wa	onents and logic cycle ter-budget narios.	1,2	
П	Precipitation: forms of precipitation, characteristics of precipitation in India, measurement of precipitation, rain gauge network, mean precipitation over an area, deptharea-duration relationships					equation to various scenarios. Apply depth-area-duration relationships, analyze maximum intensity/depth-duration-frequency relationships, ar estimate probable maximum precipitation (PMP).				

	evapotranspiration, measurement of evapotranspiration, evapotranspiration equations, potential evapotranspiration over India, actual evapotranspiration, interception, depression storage, infiltration, infiltration capacity, measurement of infiltration, modelling infiltration capacity, classification of infiltration capacities, infiltration indices			
III	Runoff: runoff volume, SCS-CN method of estimating runoff volume, flowduration curve, flow-mass curve, hydrograph, factors affecting runoff hydrograph, components of hydrograph, base flow separation, effective rainfall, unit hydrograph surface water resources of India, environmental flows.	9	Estimate runoff volume using methods like the SCS-CN method and analyze flow-duration and flow-mass curves.	1,2
IV	Ground water: forms of subsurface water, saturated formation, aquifer properties, geologic formations of aquifers, well hydraulics: steady state flow in wells, equilibrium equations for confined and unconfined aquifers, aquifer tests.	9	Analyze well hydraulics, including steady-state flow in wells, equilibrium equations for confined and unconfined aquifers, and conduct aquifer tests.	1,2
V	Dam and Spillway: embankment dams: Classification, design considerations, estimation and control of seepage, slope protection. Gravity dams: forces on gravity dams, causes of failure, stress analysis, elementary and practical profile. Arch and buttress dams. Spillways: components of spillways, types of gates for spillway crests; Reservoirs- Types, capacity of reservoirs, yield of reservoir, reservoir regulation, sedimentation, economic height of dam, selection of suitable site	9	Analyze forces on gravity dams, causes of failure, and stress analysis, and understand the design of arch and buttress dams, components of spillways, and reservoir management, including sedimentation and economic considerations.	1,2

- 1. K Subramanya, Engineering Hydrology, Mc-Graw Hill.
- 2. K N Muthreja, Applied Hydrology, Tata Mc-Graw Hill.

Reference Books:

- **1.** K Subramanya, Water Resources Engineering through Objective Questions, Tata McGraw Hill.
- 2. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill

3. G L Asawa, Irrigation Engineering, Wiley Eastern

	CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome				
1	Remember the key drivers on water resources, hydrological processes and their integrated behavior in catchments.	1,3 & 4				
2	Apply the knowledge of hydrological models to surface water problems including basin characteristics, runoff and hydrograph	1,2				
3	Explain the concept of hydrological extremes such as flood and drought and its management strategies	7.9,10				
4	Apply the concepts of groundwater for water resources management	5,7				
5	Understand the importance of spatial analysis of rainfall and design water storagereservoirs	5,8				

		SEMESTER	$-\mathbf{V}$						
Course Title	Construction Engineering & Management								
Course	22BTCM316R	Total credits:3	L	T	P	S	R	O/F	C
code		Total hours: 45T	3	0	0	0	0	0	3
Pre- requisite	Nil Co-requisite Nil								1
Programm		B.Tech C	ivil Eng	ineerin	g				
e									
Semester		Fall/V semester of T	hird yea	ır of the	e progra	amme			
Course	1. To train the	students with the late	st and	the be	st in t	he rap	idly ch	anging field	lds of
Objectives	Construction	Engineering, Technolog	y and M	Ianagei	nent.				
(Minimum	2. To prepare the	he students to be industr	y leade	ers who	imple	ment t	he best	engineerin	g and
3)		practices and technologic	•		•			C	Ü
	3. To continually work with industry to enhance the program's effectiveness and the opportunities for innovation in the construction industry.								
	4. To conduct re	esearch to develop advan	ced tecl	nnologi	es and	manag	ement a	approaches	

CO1	Proficiently apply construction planning prodefine tasks, and estimate activity duration						
CO2	Proficiently plan and organize construction aggregation, and leveling strategies for opt	-					
CO3	Apply PERT, CPM, and GERT techniques to and determine project durations.	analyze pr	oject networks, identify critical pat	hs,			
CO4	Analyze and manage construction contract of construction costs considerations.	s, encompa	assing a comprehensive understand	ling			
CO5	Proficiently apply cost analysis techniques, in construction projects.	, incorpora	ting quality and safety consideration	ons			
Unit-No.	Content	Contact Hour	Learning Outcome	KL			
I	INTRODUCTION; Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities – Coding Systems.	9	Learn to define work tasks, precedence relationships among activities, estimate activity durations, resource requirements, and use coding systems effectively.	1,2			
II	PLANNING AND ORGANIZING CONSTRUCTION SITE AND RESOURCES: Resource allocation, resource aggregation and resources levelling	9	Apply resource leveling methods to optimize the use of resources on construction sites.	1,2			
III	PERT CPM AND GERT NETWORKS: concepts of PERT, CPM and GERT, analysis of network and determining the critical path and duration of the network.	9	Understand the concepts of PERT, CPM, and GERT for project scheduling and management.	1,2			
IV	CONTRACTS MANAGEMENT BASICS AND CONSTRUCTION COSTS: Make up of construction costs including capital costs operational costs and life cycle cost	9	Comprehend the components of construction costs, including capital, operational, and life cycle costs.	1,2			
V	COST ANALYSIS TECHNIQUES: Quality and Safety Concerns in Construction – Organizing for Quality and Safety – Work and Material Specifications – Total Quality Control – Quality Control by Statistical Methods – Statistical Quality Control with Sampling by Attributes – Statistical Quality Control with Sampling by Variables – Safety.	9	Apply statistical quality control methods, including sampling by attributes and variables, and learn total quality control techniques to ensure high standards in construction projects.	1,2			

- 1. Saurabh Kumar Soni (2013), "Building construction and management", S.K Kataria and Sons.
- 2. Denis Lock (2010), "Project management in construction", Pearson Education,
- 3. Sidney M. Levy (2009), "project control and Practice", Pearson Education,

Reference Books:

- 1. Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.
- 2. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.
- 3. Chris Hendrickson and Tung Au, "Project Management for Construction Fundamental Concepts for Owners, Engineers", Architects and Builders, Prentice Hall, Pittsburgh, 2000.
- 4. Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.
- 5. Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Proficiently apply construction planning principles to systematically choose technologies, define tasks, and estimate activity durations.	1,3 & 4
2	Proficiently plan and organize construction sites by mastering resource allocation, aggregation, and leveling strategies for optimal project efficiency.	1,2
3	Apply PERT, CPM, and GERT techniques to analyze project networks, identify critical paths, and determine project durations.	7.9,10
4	Analyze and manage construction contracts, encompassing a comprehensive understanding of construction costs considerations.	5,7
5	Proficiently apply cost analysis techniques, incorporating quality and safety considerations in construction projects.	5,8

		SEMESTER -	- V						
Course Title		Hydraulio	es Eng	ineerin	ıg				
Course	22BTCM317R	Total credits: 2	L	T	P	S	R	O/F	С

code		Total hours: 30T	2	0	0	0	0	0	2	
Pre- requisite	Nil	Co-requisite	Nil							
Programi	n	B.Tech Civ	vil Emg	ineerir	ıg					
e Semester		Fall/ V semester of Th	ird vea	r of the	nrogra	amme				
Course		f Third year of the programme udy of open channel flow, to give brief description or								
Objective	s different types	of flows and channels a	•			-		•		
(Minimur 3)	n		-		_	-				
,		 To learn the fundamentals of Uniform and Non-Uniform flow in open channels. To understand about the concepts of specific energy, critical flow and their applications. 								
	To give an ide	ea about the gradually	, varie	d flow	, and i	rapidly	varied	I flow and	their	
	equations and	computations.								
CO1	Summarize the bound	ary layer analysis and	their s	eparat	ion.					
CO2	Illustrate the flow occ	urring in open channel	and v	elocity	distrib	oution.				
CO3	Assess energy equation	n and momentum equa	ation v	vith re	spect t	o unifo	orm flo	w.		
CO4	Summarize characteri uniform flow.	stics of surface profile	by gra	phical	and nu	ımeric	al appr	oach in no	n-	
CO5	Compile models relate resource engineering	ed to hydraulic jump ar	nd web	based	l mode	ling in	water			
Unit-No.	Conten	t	Contac Hour	t Learning Outcome			Learning Outcome			
I	Laminar Flow- Lamin circular pipes, annulus a Stoke's law, Measuremed Turbulent Flow- Rey Transition from laminar Definition of turbule intensity, Causes of turbulent turbulent flow in pipes. semi-empirical theorie Prandtl's mixing length velocity distribution equipment Resistance to flow of flow flowing pipes, Moody's distribution for the property of the pipes of th	and parallel plates. Ent of viscosity. Inolds experiment, It to turbulent flow. Ence, scale and Foulence, instability, Ince and effect of Reynolds stresses, Is of turbulence, In theory, universal Inalysis-Assumption	6	Comprehend the transition from laminar to turbulent flow, define turbulence, and analyze its effects using Prandtl's mixing length theory, Reynolds stresses, and Moody's diagram.					1,2	

	Control.			
п	Dimensional Analysis and Hydraulic Similitude: Dimensional homogeneity, Rayleigh method, Buckingham's Pi method and other methods. Dimensionless groups. Similitude, Model studies, Types of models. Application of dimensional analysis and model studies to fluid flow problem.	6	Analysis of laminar and turbulent boundary layers on a flat plate, understand local and average friction coefficients, and learn about boundary layer separation and control.	1,2
	Introduction to Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.			
Ш	Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n" Most economical section of <i>channel</i> . Computation of Uniform flow, Normal depth.		Application of dimensional homogeneity using Rayleigh and Buckingham's Pi methods, and understand the formation and application of dimensionless groups.	
	Non-Uniform Flow- Specific energy, Specific energy curve, critical flow, discharge curve Specific force Specific depth, and Critical depth. Channel Transitions. Gradually Varied Flow-Dynamic Equation of Gradually Varied Flow, Classification of channel bottom slopes, Classification of surface profile, Characteristics of surface profile. Computation of water surface profile by graphical, numerical and analytical approaches. Direct Step method, Graphical Integration method and Direct integration method	6		1,2
IV	Hydraulic Jump- Theory of hydraulic jump, Elements and characteristics of hydraulic jump in a rectangular Channel,	6	Comparison of open channel flow with pipe flow, understand geometrical parameters and classification of open channels.	1,2

	length and height of jump, location of jump, Types, applications and location of hydraulic jump. Energy dissipation and other uses, surge as a moving hydraulic jump. Positive and negative surges. Dynamics of Fluid Flow- Momentum principle, applications: Force on plates, pipe bends, moments of momentum equation,			
V	Flow through Pipes: Loss of head through pipes, Darcy-Wiesbatch equation, minor losses, total energy equation, hydraulic gradient line, Pipes in series, equivalent pipes, pipes in parallel, flow through laterals, flows in dead end pipes, siphon, power transmission through pipes, nozzles. Analysis of pipe networks: Hardy Cross method, water hammer in pipes and control measures, branching of pipes, three reservoir problem.	6	Application the continuity, energy, and momentum equations to characterize uniform flow using Chezy's and Manning's formulas, and compute normal depth.	1,2

- 1. Open channel Flow, K. Subramanya, Tata McGraw Hill.
- 2. Hydraulics and Fluid Mechanics, P.M. Modi and S.M. Seth, Standard Book House

Reference Books:

- 1. Theory and Applications of Fluid Mechanics, K. Subramanya, Tata McGraw Hill.
- 2. Open Channel Hydraulics, Ven Te Chow, Tata McGraw Hill

		CO PO Mapping	
SN	Course Outcome (CO)		Mapped Program Outcome

1	Summarize the boundary layer analysis and their separation.	5, 7
2	Illustrate the flow occurring in open channel and velocity distribution.	8
3	Assess energy equation and momentum equation with respect to uniform flow.	7.9,10
4	Summarize characteristics of surface profile by graphical and numerical approach in non-uniform flow.	11,12
5	Compile models related to hydraulic jump and web based modeling in water resource engineering	10

		SEMESTEI	R - V						
Course Titl	e	Extra-cur	ricular	Activ	ities				
Course cod	e 22UBEC311	Total credits: 1	L	T	P	S	R	O/F	C
		Total hours: 15P	0	0	0	4	0	0	1
Pre-requisi	te Nil	Co-requisite				N	il	l	.1
Programme	e	B.Tech (
Semester		Fall/ V semester of t	third year	r of the	e progra	mme			
Course Objectives (Minimum	1. Equip students v and a commitment to thei	vith effective time manager endeavors.	ement and	l priori	tization	skills, f	ostering	leadership	qualities
	2. Encourage explocultivating well-rounded in	oration of interests beyon ndividuals capable of mal							ctivities,
	while integrating learning	-	ansferabl	e skills	across v	arious	activitie	S.	•
CO1	Learn to a plan so th manage their time and		aningful	contri	butions,	, main	tain a	commitme	it, and
CO2	Transform passionate academics.	students who demons	strate lea	dershi	ip and	pursue	intere	ests beyon	1 their
CO3	Learn to participate in development.	various co-curricular	activition	es lead	ding to	their	multifa	ceted pers	onality
CO4	Express their ideas, vie	ws, In-depth evaluation	and ana	lysis c	learly ir	the to	pic of t	heir interes	t.
CO5	Demonstrate and practi transferable skills.								
Unit-No.	Conte	nt	Contac Hour	t	L	earning	g Outco	me	KL
I	AdtU encourages a routside the regular cuto meet learner's intereare aimed to develop skills and promote a hoof the learners, Keepin	rriculum intended st, These activities he social and soft listic development	15	ac so de ex	ft skills velopn	to devented to develop to the development, a throught.	velop s eve ho ind gair gh wor	ocial and listic n kshops	1,2

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10

		SEMESTE	R –V						
Course Title		CO-CURRIC	ULAR .	ACT	IVITII	ES			
Course co	de 22UBCC221	Total credits: 1	L	T	P	S	R	O/F	С
		Total hours: 15P	0	0	0	4	0	0	1
Pre- requisite	Nil	Co-requisite				N	il		
Programn	ne	B.Tech (Civil Emg	ineeri	ing				
Semester		Fall/ V semester of				amme			
Course Objectives (Minimum 3)	and talents.	e needs of the students te the interests in the s							
	3.To enhance	to participate the learning experie ng their inner skills su .					-		
CO1	Apply foundational acclin	matization principles to ac	lapt effect	ively i	n diverse	enviro	nments	and situation	ıs.
CO2	adaptation mechanisms.	actors influencing acclima							
CO3	Evaluate personal adapta challenges.	bility through practical ex	xercises, f	osterii	ng a proa	active a	pproach	to acclimat	ization
CO4	Synthesize acclimatiza	tion stratagies for war.							
	in response.	tion strategies for vary	ing conte	xts, c	demons	trating	creativ	ity and fle	kibility
CO5	•	n acclimatization technic							
CO5 Unit-No.	Demonstrate mastery in	n acclimatization technic		izing	critical	thinkin	g to a	ddress unfo	

degree of association of students with
their prescribed curriculum and help them
perform better from a 360 degree
perspective.

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5,7
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7,9,10
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12
5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

	SEMESTER – V											
Course Title	Competent English for Engineers											
Course code	22UBPD314R	Total credits: 2	L T P S R O/F									
	Total hours: 30P		0	0	4	0	0	0	2			
Pre-requisite	Nil	Co-requisite				Ni	il					
Programme		B.Tech Civ	il Emg	gineerin	ıg							
Semester		Fall/ V semester of Th	ird yea	r of the	e progra	amme						
Course												
Objectives	 Develop studen 	ts' abilities in technical wri	ting, s	peaking	, and p	resenta	tions to	effectively	convey			
(Minimum 3)	engineering concepts a	nd solutions.Analyze elect	ronic	applicat	tions in	civil	engineeı	ring for de	signing,			

	constructing, and maintaining infrastructure.			
	2. Focus on crafting professional resume	es and cove	er letters tailored for engineering po	sitions.
	improving students' chances of securing employm			,
	2 Changeboo to an analysistic and an analysis		. for intermining the contraction of	
	Strengthen teamwork abilities and prep and targeted training, enhancing their readiness for			ercises
G04				
CO1	Demonstrate clear and concise technical incorporating industry-specific terminology.	communica	ition in both written and oral for	mats,
CO2	Develop expertise in crafting resumes, cover	letters, and	technical reports to effectively show	wcase
	engineering qualifications.			
CO3	Acquire proficiency in creating and deliver	ing impact	ful presentations, utilizing visual ai	ids to
604	convey engineering concepts to diverse audie			
CO4	Cultivate effective interpersonal skills for co			ening,
CO5	conflict resolution, and clear communication Prepare for engineering job interviews by art	_		gnals
	addressing both technical and behavioral que		•	gouis,
Unit-No.	Content	Contact	Learning Outcome	KL
I	Writing Skills	Hour	Develop proficiency in various	
	i. Paragraph Writing & Narratives		forms of writing, including	
	ii. Letter Writing		paragraph and narrative	
	iii. Technical Writing		construction, letter writing, and	
		6	technical documentation.	1,2
	Pipe and cistern ii. Introduction of pipes and cistern			
	iii.Solving different types of questions			
	iv. Workshee1 and Worksheet 2			
**	G 1825			
П	Self-Management Skills		Gain competency in solving practical problems related to	
	i. SWOT Analysis		pipes and cisterns, mixtures and	
	ii. Goal Setting and Personal Hygiene		alligations, clocks, and profit, loss,	
	Mixture allegation and Clock		and discounts through targeted	
	i.Introduction of basics	6	practice and worksheets.	1,2
	ii.Solving questions on mixture and			
	alligationion.			
	iii.Workshee1 and Worksheet 2			
III	Vocabulary Development		Enhance personal effectiveness	
	i.Understanding different aspects of a word		through SWOT analysis, goal	
	(such as the use of say, tell, speak).		setting, and maintaining personal hygiene.	
	ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning		,8.2	
	iv. Use of phrasal verbs and idioms in a	6		1,2
	conversation			
	v. Effectively using dictionary, thesaurus			
	Statement and Course of action			
	i.Revision of syllogism			

	ii.Statement and conclusion Iii. Course of action based on statement Iv. Workshee1 and Worksheet 2			
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Workshee1	6	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt) Profit loss and discount i.Introduction to basics ii.Introduction to discount iii.Probems related on the topics Iv. Workshee1 and Worksheet 2	6	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving exercises in linear, circular, and matrix arrangements.	1,2

- 4. Barrett, Grant. 2016. *Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking*, Zephyros Press.
- 5. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 6. A Modern Approach to Logical Reasoning All Exams
- 7. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 8. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 9. Fast track Objective mathematics for Competitive exam by Arihant
- 10. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8
3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7,9&10
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

	SEMESTER – V									
Course	Techno Professional Skills-IV									
Title										

Course	22BTCM317R Total credits: 2		L	T	P	S	R	O/F	С				
code	ZZDI CNISI/K	Total hours: 20P	0	0	2	0	0	0	1				
Pre-	Nil	Co-requisite			1	Ni	il						
requisite		•											
Programm	n	B.Tech Civil Engineering											
e													
Semester		Fall/ V semester of fir											
Course		1. Introduce students to the fundamental principles and techniques of engineering graphics relevant to civil engineering.											
Objective (Minimun		engineering. 2. Develop students' ability to create accurate and detailed engineering drawings using basic graphical											
3)	_	tools.											
	representation.			_				0 0 1					
CO1	Understand the basic prin	nciples and standards of eng	gineerin	g grapl	nics.								
CO2	Develop proficiency in us	sing basic drawing tools and	d techni	ques f	or civil e	enginee	ring app	lications.					
CO3	led 2D engineering drawing												
CO4	_		ugh graphical representation.										
CO5		ics skills in practical civil e	ngineer Conta										
Unit-	Unit- Content				Lea	rning	Outco	me	KL				
No.		1	t Hou	r	Understand the principles and 1								
I	Introduction to Engine	_	5		Understand the principles and								
	Overview of engineering			sta	standards of engineering								
	drawing standards, and			gr	graphics.								
	Importance in civil engi	neering.											
II	Basic Drawing Tools a	nd Techniques:	5	D	evelop	profic	iency i	n using	2, 3				
	Introduction to drawing	instruments,		ba	basic drawing tools and								
	scales, and basic constru	action techniques.		te	chniqu	es.							
	Use of lines, angles, and	l geometric shapes.											
III	Orthographic Projecti	ons: Principles of	5	Cı	eate ac	ccurate	orthog	graphic	3, 4				
	orthographic projection,	multi-view		pr	ojectio	ns and	sectio	nal					
	drawing, and sectional v	views.		vi	ews of	ws of civil structures.							
IV	Isometric and Perspec		5	In	terpret	and vi	sualize	2	4, 5				
	Techniques for creating	isometric and		en	gineer	ing des	signs th	nrough					
	perspective drawings. V	isualization of 3D	isometric and perspective					-					
	objects on 2D planes.		drawings.										
V	Practical Applications	and Projects:	5	Apply engineering graphics									
	Hands-on projects involving the cre		skills in practical					-	5				
	of detailed engineering				engineering projects.								
	engineering applications				<i>U</i> - 2-1	<i>6</i> 1	J						
	- 60 -FF 6 wasan												

	CO PO Mapping										
SN	Course Outcome (CO)	Mapped Program Outcome									
1	Understand the basic principles and standards of engineering graphics.	5, 7									
2	Develop proficiency in using basic drawing tools and techniques for civil engineering applications.	8									
3	Create accurate and detailed 2D engineering drawings of civil structures.	7.9,10									
4	Interpret and visualize engineering designs through graphical representation.	11,12									
5	Apply engineering graphics skills in practical civil engineering projects.	10									

MAPPING TABLE (5TH SEM)

Subject Code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM311R	Environmental Engineering	3	3	2	2	2	2	3					
22BTCM312R	Mechanics of Materials	3	2	2	2	2	2	1					2
22BTCM313R	Structural Analysis I	3	2	3	1	1	1	1					3
22BTCM314R	Transportation Engineering	3	3	3	1	2	2	2					2
22BTCM315R	Hydrology and Water Resource Engineering	3	2	3	2	2		1					2
22BTCM316R	Construction Engineering& Management	3	3	2		2	2						3
22BTCM317R	Hydraulics Engineering	3	2	2	2	3	3	2					2
22UBPD314R	Competent English for	3	2	3	2	2		1					2

	Engineers										
22UBCC311	Co-curricular	3	3	2		2	2				3
22UBEC311	Extra- curricular	3	2	2	2	3	3	2			2
22MOCE221R	MOOCS IV- Excel Skills for Business: Essentials	3	2	3	2	2		1			2
22BTCM317R	Techno- Professional Skills IV										

SEMESTER – VI														
Course T	itle '				of RC St	ructur								
Course co	ode	22BTCM321R	Total cred		L	T	P	S	R	O/F	C			
7	• • •	270	Total hour		2	1	0	0	0	0	3			
Pre-requi		Nil		requisite		CI 11 T			Nil					
Program Semester		To			nology in				****					
Course				r/ VI semester of third year of the programme part knowledge and abilities to the students to:										
Objective	es			oreciation for basic concepts in the behavior and										
		design of reinforced concrete systems and elements.												
,		2. Differentiate between w												
		3.Understand the basic cor		inforced co	oncrete sect	ional d	esign n	nainly	in					
		accordance with ultimate s		1	41 4:	- C: (4						
		 Assess the structural and and elements. 							•					
CO1		Understand the general me	echanical be	havior of r	einforced c	oncrete	in acco	ordanc	e with					
		IS456:2000.												
CO2		Identify and apply the app	licable indus	stry design	codes relev	vant to	the des	ign of						
		reinforced concrete member		, 0001811	3 2 200 1010			0 0-						
CO3		Analyze and design reinfo	rced concret	te flexural	members w	ith deta	ailing.							
CO4		Design and check for servi	iceability (ci	rack and de	eflection) a	nd ultin	nate lin	nit state	2					
		conditions.	•											
005		A .1		11 '	. 1 1				C	1				
CO5		Assess the stresses and desconcrete members with de		and norizo	ontai snear i	reinior	ements	s in rei	niorce	a				
Unit-		Content	· · · · · · · · · · · · · · · · · · ·	Contact		Le	arning	Outcor	ne		BL			
No.		C DC D	XX 1 '	Hour	**			.4			1.2			
I		ncepts of RC. Design – ess Method - Limit State								, student				
		terial StressStrain Curves								applying d and the				
		ors - Characteristic valu	•	10						design o				
		ck parameters – IS – 4.		10						including				
		ams: Limit state anal			beams, c					•				
		ign of singly reinforced					,	,		J				
II		forced, T and L beam se			Ctudonto	,,;11 L	o obla	to c==	1,,,,,,,,	nd dagi ==	1 2 2			
"		nit state analysis and o tion for shear and t			reinforce				-	ınd desigi for botl				
		cept of bond, anchor			flexural		shea				·			
		elopment length, I.								They wil				
		visions. Design exar		10						g variou				
	simply supported and continuous					•			_	al loads				
	bea	ms, detailing; Design of	canopy.		uniaxial		bending							
					scenarios						1 1, 2, 3,			
III		ort and Long columns				•								
	axial loads, uniaxial bending and biaxial bending – I S Code				have acquired skills in detailing reinforced concrete elements such as beams and									
		visions.	s code	8						eams and ith design				
	pro	v1510115.			specifica			_		integrity				
					requirem		unu	Siruc	uuu	intogrit;				
	l			l	requirem									

IV	Footings: Different types of footings		Students will be capable of designing	2, 3, 4
	 Design of isolated, square, 		different types of footings (isolated,	
	rectangular, circular footings and		square, rectangular, circular, and	
	combined footings.		combined footings) to support varying	
		7	loads and soil conditions. They will also	
			be proficient in designing one-way slabs,	
			two-way slabs, and continuous slabs,	
			considering IS coefficients and limit state	
			design principles.	
V	Design of one-way slab, Two-way		Upon completion of the course, students	2, 3, 4,
	slabs and continuous slab Using I S		will be able to assess and design	5
	Coefficients Limit state design for		reinforced concrete structures while	
	serviceability for deflection,	10	ensuring compliance with safety factors,	
	cracking and codal provision. Design		characteristic values, and codal provisions	
	of doglegged staircase.		related to serviceability criteria such as	
			deflection, cracking, and durability.	

- 1 Reinforced concrete design by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill, New Delhi.
- 2. Limit state designed of reinforced concrete P. C. Varghese, Prentice Hall of India, New Delhi.
- 3. Limit state designed of reinforced concrete P. C. Varghese, Prentice Hall of India, New Delhi

Reference Books:

- 1. Design of Reinforced Concrete Structures by I. C. Syal and A. K. Goel, S. Chand & company.
- 2. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers
- 3. Design of concrete structures Arthus H. Nilson, David Darwin, and Chorles W.

Dolar, Tata McGraw-Hill, 3rd Edition, 2005.

OTHER LEARNING RESOURCES:

<u>Design Of Reinforced Concrete Structures - Course (nptel.ac.in)</u>

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Understand the general mechanical behavior of reinforced concrete in accordance with IS456:2000.	1,3 & 4							
2	Identify and apply the applicable industry design codes	1,2							

	relevant to the design of reinforced concrete members.	
3	Analyze and design reinforced concrete flexural members with detailing.	7.9,10
4	Design and check for serviceability (crack and deflection) and ultimate limit state conditions.	5,7
5	Assess the stresses and design vertical and horizontal shear reinforcements in reinforced concrete members with detailing.	5,8

		SEMESTER – VI Engineering Economics, Estimation and Costing								
Course		44DEC1 /444D				1			0/5	
Course	code	22BTCM322R	Total credits: 2 Total hours: 30T	<u>L</u>		P 2	S 0	R	O/F 0	<u>C</u>
Pre-req	nisite	Nil	Co-requisite		U	<i>L</i>	Ŭ	Vil	U	
Prograi		1111	Bachelor of	Technolos	ov in Civ	il Engi		,		
Semeste			Fall: Winter/ VI se						ne	
Course		1. Summarize	the basic principal							ntities in
Objecti		estimating.								
(Minim	um 3)		the detailed estima	te of buil	ldings ar	nd wor	kout ra	ate ar	nalysis of th	e various
		items ofwork								
			he material require							
			valuation of builds of items of building			ae pra	icticai	Kno	wieage of	standard
		specification	s of items of building	igs consu	uction.					
CO	1	Have an idea of E	conomics in genera	ıl. Econoi	mics of I	ndia p	articul	arly f	or public se	ector
			ate sector businesse					,	1	
CO			stand the technical		tions for	vario	ıs wor	ks to	be perform	ned for a
		project and hov	w they impact the co	ost of a st	ructure				•	
CO	3		fy the worth of a st					es of	constituen	s, derive
			and build up the ov							
CO			tand how competiti	ve biddir	ng works	and h	ow to	subn	nit a compe	titive bid
CO		proposal.	to of minor stays	4,,,,,	نىدنىداد ا			:	-44i	42 for a
CO			te of minor struc			_				
		standard Governn	ouilding by approx	xiiiiate ii	lemous	and pro	eparau	on o	i vaiuation	report in
Unit-		Conter		Contact		Lea	rning (Outco	me	KL
No.				Hour						
I		_	Methodology of		Б		c.			1, 2
			and/Supply –		Demoi					
		-	ent Policies and						various	
			of the Firm and						nd activities	,
		ket Structure.			using	mausu	y-stan	Jaru	methods.	
		omic Concep								
			sable Income)							
			ooth closed and							
	_	_	gregate demand							
). Price Indices	_						
	Indir	* *	rates, Direct and Public Sector	5						
		our Market. (e, Externalities, Components of							
			ancial System,							
		•	tary Aggregates;							
			, ,							
		Commercial Banks & their functions; Capital and Debt Markets.								
		_								
		onetary and Fiscal Policy Tools &								
		lation and Phillips Curve								
II					Under	stand	the	imno	ortance an	d 1, 2,
			ness/Managerial	_						
	Econ	nomics and	forms of	5	application of specifications in different types of construction					
			& Cost Control –		unitere	πι ιy	pes	OI	constructio	n

				,
	Techniques, Types of Costs,			
	Lifecycle costs, Budgets, Break even			
	Analysis,			
	1 1111111111111111111111111111111111111			
	Capital Budgeting, Application of			
	Linear Programming. Investment			
	Analysis – NPV, ROI, IRR, Payback			
	Period, Depreciation, Time value of			
	money (present and future worth of			
	cash flows). Business Forecasting –			
	,			
	Elementary techniques. Statements –			
	Cash flow, Financial.Case Study			
	Method. Indian economy - Brief			
	overview of post-independence			
	period – plans. Post reform Growth,			
	Structure of productive activity.			
	Issues of Inclusion - Sectors,			
	States/Regions, Groups of people			
	(M/F), Urbanization. Employment-			
	Informal, Organized, Unorganized,			
	Public, Private. Challenges and			
	Policy Debates in Monetary, Fiscal,			
	Social, External sectors.			
III	Estimation / Measurements for		Be capable of conducting rate	1, 2,
	various items- Introduction to the		analysis for accurate cost estimation	3, 4,
	process of Estimation; Use of		and budgeting.	5
	relevant Indian Standard			
	Specifications for the same, taking			
	out quantities from the given			
	requirements of the work,			
	comparison of different alternatives,			
	•			
	Bar bending schedules, Mass haul			
	Diagrams, Estimating Earthwork and			
	Foundations, Estimating Concrete	10		
	and Masonry, Finishes, Interiors,			
	MEP works; BIM and quantity take-			
	offs; adding equipment costs; labour			
	costs; rate analysis; Material survey-			
	Thumb rules for computation of			
	materials requirement for different			
	materials for buildings, percentage			
	breakup of the cost, cost sensitive			
	index, market survey of basic			
	materials. Use of Computers in			
	quantity surveying			
IV	Specifications-Types, requirements		Gain practical skills in preparing	2, 3,
	and importance, detailed		tender documents, including bid	4
	specifications for buildings, roads,	5	price formulation and contract	
	minor bridges and industrial		management.	
	structures. Rate analysis-Purpose,			
1	and and an area,		j	1

	importance and necessity of the same, factors affecting, task work, daily output from different equipment/ productivity			
V	Tender- Preparation of tender documents, importance of inviting tenders, contract types, relative merits, prequalification. general and special conditions, termination of contracts, extra work and Changes, penalty and liquidated charges, Settlement of disputes, R.A. Bill & Final Bill, Payment of advance, insurance, claims, price variation, etc. Preparing Bids- Bid Price buildup: Material, Labour, Equipment costs, Risks, Direct & Indirect Overheads, Profits; Bid conditions, alternative specifications; Alternative Bids. Bid process management. Introduction to Acts pertaining to-Minimum wages, Workman's compensation, Contracts, Arbitration, Easement rights	5	Acquire knowledge of relevant legal aspects and Acts related to construction contracts and labor rights in the industry.	2, 3, 4, 5

- 1. Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
- 2. V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill
- 3. Misra, S.K. and Puri (2009), *Indian Economy*, Himalaya
- T4. Pareek Saroj (2003), Textbook of Business Economics, Sunrise Publishers

Reference Books:

- 1. M Chakravarty, Estimating, Costing Specifications & Valuation
- 2. Joy P K, Handbook of Construction Management, Macmillan
- 3. B.S. Patil, Building & Engineering Contracts
- 4. Relevant Indian Standard Specifications.

OTHER LEARNING RESOURCES:

Engineering Economic Analysis - Course (nptel.ac.in)

CO PO Mapping	

SN	Course Outcome (CO)	Mapped Program Outcome
1	Have an idea of Economics in general,	1,3 & 4
	Economics of India particularly for public sector	
	agencies and private sector businesses	
2	Be able to understand the technical specifications	1,4
	for various works to be performed for a project	
	and how they impact the cost of a structure	
3	Be able to quantify the worth of a structure by evaluating	7.9,10
	quantities of constituents, derive their cost rates and	
	build up the overall cost of the structure.	
4	Be able to understand how competitive bidding works and	5,7
	how to submit a competitive bid proposal.	
5	Detailed estimate of minor structure and deriving	5,8
	an approximate estimate for a multi-storeyed	
	building by approximate methods and preparation of	
	valuation report in standard Government form	

		SEMEST	ER – VI						
Course T	itle	Strue	ctural Engi	neerin	g				
Course co	ode 22BTCM323R	22BTCM323R Total credits: 3 L T P S R O/F						C	
		Total hours: 45T	3	0	0	0	0	0	3
Pre-requi	site Nil	Co-requisite]	Nil		•
Programi		Bachelor of Te							
Semester		l: Winter/ VI seme							
Course	1. Students will develop								
Objective									
(Minimu									
	frames, with a focus of reactions.	on understanding th	e distribution	n of sh	ear for	ce, bei	nding	moment	, and support
	3. Students will be equip	pped to analyze di	ferent types	of arc	hes and	l susp	ensior	system	s, taking into
	account settlement, ter and apply plastic theor indeterminate structure	ry to determine pla							
CO1	Demonstrate their kno	wledge of struc	tural mech	anics	in ad	dressi	ing d	esign r	roblems of
	structural engineering.	wiedge of struc	turur moon		III uu	ar coo.			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
CO2	Distinguish the varying	materials and di	fferent load	ling sv	cteme	inas	truct	lire	
CO3	Classify structures and								orcos acting
003	on it.	explain their bei	iavioui by i	urawn	ilg its t	Jonipe	JHEIH	is allu l	orces acting
CO4	Apply the design concer	ots to develop a I	R.C.C. memb	ers.					
CO5	Explain the basic conce	pts of special str	ıctures.						
Unit- No.	Content	Contact Hour		Lear	ning O	utcom	e		KL
I	Influence lines for reactions in determinate beams – Influence shear force and bending me Calculation of critical stress and due to concentrated and demoving loads – absolute rebending moment - influence member forces in pin jointer frames.	lines for oment – resultants istributed maximum lines for	Upon con demonstra interpretin shear force forces in beams and	ate prong ng influce, benc deterr	oficiency uence I ling mo minate	y in o ines fo ment, and in	lerivii or rea and n ndeter	ng and actions, nember minate	1, 2

П	Muller Breslau's principle— Influence line for Shearing force, Bending Moment and support reaction components of propped cantilever, continuous beams (Redundancy restricted to one), and fixed beams	10	Students will be able to analyze various types of arch structures, including three-hinged, two-hinged, and fixed arches, considering settlement and temperature effects, and applying equilibrium principles specific to arch geometry.	1, 2, 3, 4
Ш	Equilibrium of cable – length of cable - anchorage of suspension cables – stiffening gird	5	By the end of the course, students will understand the principles governing cables and suspension bridges, including the equilibrium of cables, determination of cable length, and the role of stiffening girders in suspension bridge design.	1, 2, 3, 4, 5
IV	Equilibrium of cable – length of cable – anchorage of suspension cables – stiffening girders – cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders	5	Students will gain proficiency in plastic analysis techniques for statically indeterminate structures, including determining plastic moment of resistance, plastic modulus, and understanding the behavior of plastic hinges and mechanisms under loading conditions.	2, 3, 4
V	Plastic theory - Statically indeterminate structures - Plastic moment of resistance - Plastic modulus - Shape factor - Load factor - Plastic hinge and mechanism - collapse load - Static and kinematic methods - Upper and lower bound theorems - Plastic analysis of indeterminate beams and frames.	5	Upon completion, students will be able to apply theoretical concepts such as Muller Breslau's principle, plastic theory, and influence line analysis to solve practical engineering problems related to structural analysis, including beams, arches, cables, and suspension bridges.	2, 3, 4, 5

- 1. Analysis Of Structures S. Ramamrutham., DhanpatRai Publishing Co Pvt Ltd
- 2. Analysis Of Structures N. Subramanian

Reference Books:

1. Analysis of Indeterminate Structures by C.K. Wang.

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - Structural Analysis II

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Demonstrate their knowledge of structural mechanics in addressing design problems of structural engineering.	1,2							
2	Distinguish the varying materials and different loading systems in a structure.	1,2, 3, 4							
3	Classify structures and explain their behaviour by drawing its components and forces acting on it.	7.9,10							
4	Apply the design concepts to develop a R.C.C. members.	5,7							

			5	SEMESTE	ER – VI								
Course Title				Pav	ement Ma	terials	3						
Course co	ode	22BTCM324E	Total cred		L	T	P	_	S	R	O/F		C
_		2702	Total hour									3	
Pre-requ		Nil		requisite		G: 11	- ·	•		Nil			
Program Semester		E.	Bacne all: Winter		hnology in					mmo			
Course			standing di									stics	
Objective (Minimu		2. To ha aggregate and bi	ve knowled tumen for t derstand a	dge about the design	the variou of bituming	is tests ous mix	whick es and	h neo d pav	ed eme	to be ents.	carrie	d out	
CO		Classify different types	of soil an	d differen	it laborato	ry test	to est	timat	e s	oil st	rength		
CO2	2	Explain different tests	related to	characteri	zation of a	aggreg	ates						
CO3		Describe different type											
CO4		Explain different chara condition				es and	l desig	gn bi	itur	ninoı	ıs mix	es fo	r various
COS	5	Explain different comp	osition of		re								
Unit-		Content		Contact		Lea	rning (Outco	me				KL
No. I	Soil:			Hour	Students	wil	gai	n n	rof	icien	cv in		1, 2
-	Classification, characterization, evaluation of soil strength-shear test, 5 classifying saggregates, u				ng so es, ut to ev	vill gain proficiency in soils and characterizing utilizing a range of testing evaluate their mechanical							
п	Source aggree Abra Soun gravi Strip grada	regate: ce, Characterization, regate-Crushing streng sion Test, Impact dness test, Shape Test, ty and water absorpt ping value test, Aution, voids in agent Concrete	10	By completing this lesson, students will be able to identify different types of bitumen, understand their properties, and conduct various tests to assess their suitability for construction applications.							, 2, 3, 4		
Ш	Bitun Source bitun on ducti purity	Bitumen: Source, Characterization, Cutback bitumen, Bitumen emulsion, Tests			Upon completion, students will demonstrate competence in designing bituminous mixes, applying rheological models, and optimizing bitumen content to meet specified performance criteria.						igning plying mizing		2, 3, 4, 5
IV	Mix for a mode mode Gene	sphalt mix- Two component ls, Maxwell model, Kelvin l, Three component models, ralized models, Linear elasticity, Time-temperature Students will learn to apply Superpave concepts in asphalt mix design, including binder and aggregate selection, volumetric analysis, compaction methods, and performance evaluation.								2, 3, 4			

	superposition, Selection of Optimum bitumen content, Marshall method, Numerical examples, Mix Specification, Stiffness modulus and fatigue performance of bituminous mix			
V	Concept of Superpave: Components, Binder Selection, Aggregate selection, Superpave volumetrics, Compaction, Evaluation of mix performance	7	This lesson aims to integrate theoretical knowledge with practical applications, preparing students for effective utilization of soil, aggregate, bitumen, and bituminous mixes in civil engineering projects.	2, 3, 4, 5

- 1. Principles of Transportation Engineering- Partha Chakroborty, Animesh Das
- 2. Pavement Analysis and Design-Yang H Huang
- 3. Analysis of Pavement Structures- Animesh Das

Reference Books:

- 1. Principles of Pavement design- Yoder and Witezak
- 2. IRC: 37-2012 and IRC: 58-2011

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - NOC:Pavement Materials (Under Pavement Engineering)

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Classify different types of soil and different laboratory test to estimate soil strength	1, 4
2	Explain different tests related to characterization of aggregates	2,3
3	Describe different types of bituminous material and their characterization	7.9,10
4	Explain different characteristics of bituminous mixes and design bituminous mixes for various condition	5,7
5	Explain different composition of super pave	5,8

Total hours: 30T 2 0 0 Pre-requisite Nil Co-requisite	S R 0 0	O/F 0	C		
Total hours: 30T 2 0 0 Pre-requisite Nil Co-requisite	0 0 Nil	_			
Pre-requisite Nil Co-requisite	Nil	0			
1 1			2		
Programme Bachelor of Technology in Civil Engineerin	- 1				
Semester Fall: Winter/ VI semester of third year of the programme of the p	gramme				
Course The course should enable the students to:		1.			
Objectives I. Develop knowledge of material science and behavior of various building m	naterials i	used in co	onstruction.		
(Minimum 3) II. Identify the construction materials required for the assigned work. III. Provide procedural knowledge of the simple testing methods of cement, 1	ime and	concrete	etc		
IV. List the requirements and different types of stairs	iiic and	Concrete	cic.		
CO1 Recognize the various phases associated with simple residential and co	ommerc	ial const	truction		
Troognize the valious phases associated with simple residential and t	011111010	101 00115			
CO2 Identify and use correctly a wide variety of hand and power tools ass	ociated	with the	construction		
industry.					
CO3 Understand current construction industry trends and become familia	ar with	standard	ls for quality		
construction and trends in building technology.			- •		
CO4 Understand construction procedure of different components					
CO5 Understand the property, use, advantage and disadvantage of	differer	nt mate	rial used in		
construction.					
Unit- Content Contact Learning Outc	ome		KL		
No. Hour I Introduction- Objectives, Requirements Understanding the o	bjectives	and	1, 2		
Of Foundation, Aim Of Superstructure, requirements of foundation			1, 2		
Types Of Construction, Aim Of Site 5	Constru	ction.			
Inspection, Laying Out The Building Plan					
At Site For Foundation					
	and ty	pes of	1, 2, 3, 4		
Specifications, details and sequence of superstructure construction	ı				
activities and construction co-ordination –					
Site Clearance – Marking – Earthwork -					
masonry – stone masonry – Bond in masonry - concrete hollow block masonry					
- flooring - damp proof courses -					
construction joints — movement and					
expansion joints – pre cast pavements –					
Building foundations – basements –					
temporary shed – centering and shuttering					
- slip forms - scaffoldings - de-shuttering					
forms – Fabrication and erection of steel trusses – frames – braced domes – laying					
brick — weather and water proof – roof					
finishes – acoustic and fire protection.					
III UNIT III SUB STRUCTURE			1, 2, 3, 4, 5		
CONSTRUCTION Implementing effective site	e inspect	ion			
Techniques of Box jacking – Pipe Jacking techniques					
-under water construction of diaphragm					
walls and basement-Tunneling techniques					
- Piling techniques - well and caisson - sinking cofferdam - cable anchoring and					
grouting-driving diaphragm walls, sheet					
piles - shoring for deep cutting - well					
points -Dewatering and stand by Plant					
equipment for underground open					
excavation.					

IV	UNIT IV SUPER STRUCTURE		Planning and executing the layout of	2, 3, 4
	CONSTRUCTION		building plans for foundations at a	
	Launching girders, bridge decks, off shore		construction site.	
	platforms – special forms for shells -			
	techniques for heavy decks – in-situ pre-			
	stressing in high rise structures, Material	5		
	handling - erecting light weight			
	components on tall structures - Support			
	structure for heavy Equipment and			
	conveyors -Erection of articulated			
	structures, braced domes and space decks.			
V	UNIT V CONSTRUCTION		Applying specifications and coordinating	2, 3, 4, 5
	EQUIPMENT		activities for efficient construction	
	Selection of equipment for earth work -		practices	
	earth moving operations - types of			
	earthwork equipment - tractors, motor			
	graders, scrapers, front end waders, earth	5		
	movers – Equipment for foundation and	3		
	pile driving. Equipment for compaction,			
	batching and mixing and concreting -			
	Equipment for material handling and			
	erection of structures - Equipment for			
	dredging, trenching, tunnelling.			

- 1 Building construction: metric volume 1 by WR McKay.
- 2 Fundamentals of building construction: materials and methods by Edward Allen and Joseph Iano.

Reference Books:

1 Building materials and construction book with reference to B.C.Rangawala, Sushil Kumar, B.P.Bindra, A.Kamala.

OTHER LEARNING RESOURCES:

NPTEL :: Civil Engineering - Civil Engineering - Building materials and Construction

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Recognize the various phases associated with simple residential and commercial construction.	1,3 & 4
2	Identify and use correctly a wide variety of hand and power tools associated with the construction industry.	1,2
3	Understand current construction industry trends and become familiar with standards for quality construction and trends in building technology.	7.9,10
4	Understand construction procedure of different components	5,7

5	Understand the property, use, advantage and disadvantage	5,8
	of different material used in construction.	

	SEMESTER – VI										
Course				onstruction						T	
Course	code	22BTCM324E	Total cred		L 2	T 0	P 0	S 0	R	0/F 0	C 2
Dro noo					<u> </u>	U	U		U Nil	U	<u> </u>
		NII		requisite lor of Tech	nology in (Tivil E	nainos		NII		
Programme Bache Semester Fall: Winter									mme		
Course		1. To train the st								chang	ing fields of
	Objectives Construction Engineering								prary	chang	ing neras of
(Minim		2. To prepare the						ement	the	best ens	gineering and
		management pra			•		•				,
		3. To continually		_	•				•	ffective	ness and the
		opportunities for									
CO		Proficiently apply con		-		s to s	ystem	atical	lly ch	noose t	echnologies,
		define tasks, and estim		•							
CO		Proficiently plan and	_				-		ig re	esource	allocation,
aggregation, and leveling strategies for optimal project efficiency. CO3 Apply PERT, CPM, and GERT techniques to analyze project networks, identify cr											
0				-	o analyze	proje	ect net	work	s, ide	entify ci	itical paths,
CO		and determine project			- t				-1	_:	J
		Analyze and manage co			cts, encon	ipassi	ng a c	ompr	enen	sive un	derstanding
of construction costs considerations. CO5 Proficiently apply cost analysis techniq				e incorn	aratin	ຕ ຕາເລໄ	ity ar	nd ca	foty co	neiderations	
in construction projec			-	tecinique	:s, ilicoi po	Jiatiii	g quai	ity ai	iu sa	iety coi	isiderations
Unit-		Content	٥.	Contact		Lear	ning O	utcome	<u> </u>		KL
No.				Hour							
I	INTR	ODUCTION; Basic Conce	pts in the		Apply co	re cor	ncepts	to sc	hedu	le and	1, 2
		lopment of Construction			plan cons	structi	on pro	jects.			
	Choic	0,									
		truction Method – Defin	-								
	Tasks	•	ecedence	5							
		ionships among Acti									
	I	nating Activity Dura									
		nating Resource Requ									
		ork Activities – Coding S									1 2 2 1
II			SANIZING		Allocate		•				1, 2, 3, 4
		STRUCTION SITE	AND llocation,		efficient	constr	uction	opera	ations	5.	
			10								
		ırce aggregation and r									
levelling											
777		_	T14405:40								1 2 2 4 5
III	PERT	CPM AND GERT NET			Utilize ne			•		•	1, 2, 3, 4, 5
III	PERT	CPM AND GERT NE- epts of PERT, CPM ar	nd GERT,	_	project so			•		•	1, 2, 3, 4, 5
III	PERT conce analy	CPM AND GERT NE epts of PERT, CPM ar sis of network and det	nd GERT, ermining	5				•		•	1, 2, 3, 4, 5
III	PERT conce analy the c	CPM AND GERT NEtepts of PERT, CPM are sis of network and determinations of path and durations.	nd GERT, ermining	5	project so			•		•	1, 2, 3, 4, 5
III	PERT conce analy the conce	CPM AND GERT NEtepts of PERT, CPM are sis of network and determinations of path and durations.	ermining on of the	5	project so	chedu	les and	ident	tify cr	ritical	2, 3, 4

	AND CONSTRUCTION COSTS: Make up of construction costs including capital costs operational costs and life cycle cost		understand cost implications throughout the project lifecycle.
V	UNIT V CONSTRUCTION EQUIPMENT Selection of equipment for earth work - earth moving operations - types of earthwork equipment - tractors, motor graders, scrapers, front end waders, earth movers - Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunnelling.	5	Select and utilize appropriate equipment for various construction tasks.

- 1. Saurabh Kumar Soni (2013), "Building construction and management", S.K Kataria and Sons.
- 2. Denis Lock (2010), "Project management in construction", Pearson Education,
- 3. Sidney M. Levy (2009), "project control and Practice", Pearson Education,

Reference Books:

- 1. Calin M. Popescu, Chotchai Charoenngam, "Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications", Wiley, New York, 1995.
- 2. Chitkara, K.K. "Construction Project Management: Planning, Scheduling and Control", McGraw-Hill Publishing Company, New Delhi, 1998.
- 3. Chris Hendrickson and Tung Au, "Project Management for Construction Fundamental Concepts for Owners, Engineers", Architects and Builders, Prentice Hall, Pittsburgh, 2000.
- 4. Halpin, D. W., "Financial and Cost Concepts for Construction Management", John Wiley & Sons, New York, 1985.
- 5. Willis, E. M., "Scheduling Construction Projects", John Wiley & Sons, 1986.

OTHER LEARNING RESOURCES:

NPTEL:: Civil Engineering - Civil Engineering - Building materials and Construction

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Proficiently apply construction planning principles	1,3 & 4
	to systematically choose technologies, define	
	tasks, and estimate activity durations.	
2	Proficiently plan and organize construction sites	1,2
	by mastering resource allocation, aggregation, and	
	leveling strategies for optimal project efficiency.	
3	Apply PERT, CPM, and GERT techniques to analyze	7.9,10
	project networks, identify critical paths, and	
	determine project durations.	
4	Analyze and manage construction contracts,	5,7
	encompassing a comprehensive understanding of	
	construction costs considerations.	
5	Proficiently apply cost analysis techniques,	5,8
	incorporating quality and safety considerations in	
	construction projects.	

		SEMESTER	-VI											
Course Title	(CORPORATE PROFICIENCY FOR ENGINEERS												
Course code	22UBPD324R	Total credits: 2	L	T	P	S	R	O/F	C					
		Total hours: 30P	0	0	4	0	0	0	2					
Pre-requisite	Nil	Co-requisite	Co-requisite Nil											
Programme		B.Tech C												
Semester		Fall/ VI semester of t	third yea	r of th	e progr	amme								
Course														
Objectives		s' abilities in technical w												
(Minimum 3)	engineering concepts and		etronic a	pplicat	ions in	civil	enginee	ring for de	signing,					
	constructing, and maintain	ing infrastructure.												
	_	professional resumes and	d cover le	tters ta	ilored f	or engi	neering p	positions, im	proving					
	students' chances of securi	ng employment.												
		1 1992		1		.1								
	C	vork abilities and prepare			ıntervi	ews thr	ough pra	actical exerci	ises and					
	targeted training, enhancing	ig their readiness for engii	neering ca	ireers.										
CO1	Demonstrate clear and	d concise technical c	ommuni	cation	in bo	oth wi	itten a	nd oral fo	rmats.					
	incorporating industry-s								,					
CO2	Develop expertise in cr		letters a	nd tea	hnical	reports	s to effe	ectively sho	wcase					
	engineering qualificatio					rop or c.	, 10 0111	occi, cij siic	W Case					
CO3	Acquire proficiency in		ng impa	ctful	present	ations	utilizi	ng visual a	ids to					
	convey engineering con	•		ctrur	present		GUIIZI	ing visual c	iras to					
CO4	Cultivate effective inte			ve tea	mwork	emnl	nasizino	active list	ening					
							ilusiziii e	, active his	eming,					
CO5							riences	and career	conflict resolution, and clear communication within engineering contexts.					
	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals,													
005						•	,		goals,					
Unit-No.	addressing both technica	al and behavioral questi		identl	y.		g Outco		goals,					

I	Writing Skills i. Paragraph Writing & Narratives ii. Letter Writing iii. Technical Writing Pipe and cistern iii. Introduction of pipes and cistern iii. Solving different types of questions iv. Workshee1 and Worksheet 2 Self-Management Skills	7	Develop proficiency in various forms of writing, including paragraph and narrative construction, letter writing, and technical documentation. Gain competency in solving practical	1,2
n	 i. SWOT Analysis ii. Goal Setting and Personal Hygiene Mixture allegation and Clock i.Introduction of basics ii.Solving questions on mixture and alligationion. iii.Workshee1 and Worksheet 2 	7	problems related to pipes and cisterns, mixtures and alligations, clocks, and profit, loss, and discounts through targeted practice and worksheets.	1,2
III	Vocabulary Development i.Understanding different aspects of a word (such as the use of say, tell, speak). ii. Learning strategies to develop vocabulary iii Contextual vocabulary learning iv. Use of phrasal verbs and idioms in a conversation v. Effectively using dictionary, thesaurus Statement and Course of action i.Revision of syllogism ii.Statement and conclusion Iii. Course of action based on statement Iv. Workshee1 and Worksheet 2	7	Enhance personal effectiveness through SWOT analysis, goal setting, and maintaining personal hygiene.	1,2
IV	Interview Skills & Dress Code Ethics i. Types of interview- telephonic, virtual & face to face online interview, personal interview, Panel interview, Group interview ii. Common interview questions and answering strategies iii. Dress Code Ethics during Interviews iv. Mock Interview Session Sitting arrangement (puzzle) i.Linear arrangement puzzle ii.Circular arrangement puzzle iii.Matrix Iv. Workshee1	7	Improve vocabulary through understanding word usage, contextual learning, and effective dictionary use, and strengthen logical reasoning with practice in syllogisms, statements, conclusions, and courses of action.	1,2
V	Grammar (Flipped Classroom) i. Word-stress, Syllables Practice Session: Common Errors (testing the students' grammar already learnt)	7	Master interview techniques for various formats, understand dress code ethics, and improve performance through mock interviews and puzzle-solving	1,2

Profit loss and discount	exercises in linear, circular, and
i.Introduction to basics	matrix arrangements.
ii.Introduction to discount	
iii.Probems related on the topics	
Iv. Workshee1 and Worksheet 2	

- 1. Barrett, Grant. 2016. Perfect English Grammar: The Indispensible Guide to Excellent Writing and Speaking, Zephyros Press.
- 2. McDowell, Gayle Laakmann.2008. Cracking the Coding Interview (Indian Edition)
- 3. A Modern Approach to Logical Reasoning All Exams
- 4. General Mental Ability & Logical Reasoning Compendium

Reference Books:

- 1. Zinsser, William. (2006) On Writing Well: The Classic Guide to Writing Nonfiction
- 2. Fast track Objective mathematics for Competitive exam by Arihant
- 3. General Mental Ability & Logical Reasoning Compendium By R.S. Agarwala

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Demonstrate clear and concise technical communication in both written and oral formats, incorporating industry-specific terminology.	5, 7					
2	Develop expertise in crafting resumes, cover letters, and technical reports to effectively showcase engineering qualifications.	8					

3	Acquire proficiency in creating and delivering impactful presentations, utilizing visual aids to convey engineering concepts to diverse audiences.	7.9,10
4	Cultivate effective interpersonal skills for collaborative teamwork, emphasizing active listening, conflict resolution, and clear communication within engineering contexts.	11,12
5	Prepare for engineering job interviews by articulating qualifications, experiences, and career goals, addressing both technical and behavioral questions confidently.	10

		SEMESTER	– VI						
Course Title	CO-CURRICULAR ACTIVITIES								
Course code	22UBCC321	Total credits: 1 Total hours: 30P	L	T	P	S	R	O/ F	С
	270	g	0	0	0	4	0	0	1s
Pre-	Nil	Co-requisite		Nil					
requisite Programme		R Took (ivil Emgine	Encode and a					
Semester		Fall/ VI semester of			rogram	me			
Course	<u> </u>	rani vi semestel ul	iiii u yeal o	i me pi	ogi alli	1110			
Objectives (Minimum 3)	1. 1. Meeting the abilities and talents.	needs of the stud	ents and covering a broad/wide range of their						
	2.To stimulate the interests in the students and provide equal opportunities to								
	all the students to participate								
	3.To enhance the learning experience of the students and help in recognizing								
			kills such	s such as leadership qualities, creative or					
		e skills etc.							
CO1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.								
CO2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.								
CO3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.								
CO4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.								
CO5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.				foreseen				
Unit-No.	Content		Contact Hour	S					

I	AdtU has included co-curricular activities as an integral and mandatory part of the curriculum with an aim to encourage team work and the spirit of self-reliance among the students.		Engage in mandatory co- curricular activities to foster teamwork and self-reliance, enhance understanding of the curriculum, and improve performance through organizing	1, 2
	Students will plan and organize various programs like Workshop, Project Exhibition, Guest Lectures, Soft-skill and Aptitude Test etc. These activities will provide a common platform for the students to exchange ideas and information on the topics of their interest e.g. curriculum, employment / higher educational opportunities, emerging trends, new development etc. Such activities will enhance the understanding and the degree of association of students with their prescribed curriculum and help them perform better from a 360 degree perspective.	30	and participating in various programs and events.	

	CO PO Mapping						
SN	Course Outcome (CO)	Mapped Program Outcome					
1	Apply foundational acclimatization principles to adapt effectively in diverse environments and situations.	5, 7					
2	Analyze environmental factors influencing acclimatization, demonstrating a comprehensive understanding of adaptation mechanisms.	8					
3	Evaluate personal adaptability through practical exercises, fostering a proactive approach to acclimatization challenges.	7.9,10					
4	Synthesize acclimatization strategies for varying contexts, demonstrating creativity and flexibility in response.	11,12					

5	Demonstrate mastery in acclimatization techniques, utilizing critical thinking to address unforeseen challenges.	10

		SEMESTER	R – VI					
Course Title	Extra-curricular Activities							
Course code	22UBEC321	Total credits: 1	L	T P	S	R	O/F	C
		Total hours: 30P	0	0 0	4	0	0	1s
Pre-requisite	e Nil	Co-requisite			N	il		
Programme B.Tech Civil Emgineering								
Semester Course	Fall/ VI semester of third year of the programme							
Objectives	1. Equip students with effective time management and prioritization skills, fostering leadership qualities and a commitment to their endeavors.						qualities	
	2. Encourage explo cultivating well-rounded in	ration of interests beyon ndividuals capable of mal		_	_			ctivities,
	while integrating learning		ansferable s	skills across	s various	activitie	es.	·
CO1	Learn to a plan so that manage their time and p	riorities.						
CO2	Transform passionate academics.				_		•	
CO3	Learn to participate in development.							
CO4		Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.						
CO5	Demonstrate and practic transferable skills.	ces different activities,	by Integra	ting learni	ing expe	riences	by demon	strating
Unit-No.	Conte	nt	Contact Hour		Learnin	g Outco	me	KL
I	AdtU encourages a radiuside the regular curto meet learner's interest are aimed to develop the skills and promote a hold of the learners, Keeping degree learning method are engaged in different under different clubs with the photography, drama, students are encouraged regular club activities competitions as per thobbies, The student club are trained regularious inter University national level competitional level competitions are investigated are investigated.	rriculum intended st, These activities he social and soft listic development g in mind the 360 ology the students t activities headed iz. Dance, music, literary etc., The d to participate in sies, workshops, heir interest and members of the present AdtU in sity student and titions, Renewed	30	Particip activities soft ski develop exposur and cor experts	es to de lls, achi oment, a re throu npetitio	velop s eve ho and gai gh wo	ocial and listic n ckshops	1,2

workshops that benefit the members and students by giving them the platform to learn from experts in the respective fields.	

CO PO Mapping					
SN	Course Outcome (CO)	Mapped Program Outcome			
1	Learn to a plan so that they can make meaningful contributions, maintain a commitment, and manage their time and priorities.	5, 7			
2	Transform passionate students who demonstrate leadership and pursue interests beyond their academics.	8			
3	Learn to participate in various co-curricular activities leading to their multifaceted personality development.	7.9,10			
4	Express their ideas, views, In-depth evaluation and analysis clearly in the topic of their interest.	11,12			
5	Demonstrate and practices different activities, by Integrating learning experiences by demonstrating transferable skills.	10			

MAPPING TABLE

Subject Code	Course Name	РО	PO	PO	РО	PO	PO	РО	РО	РО	PO1	PO1	PO1
		1	2	3	4	5	6	7	8	9	0	1	2
22BTCM32 1R	Design of RC Structure	3	2	3	1	1	1	1					1
22BTCM32 2R	Engineering Economics, Estimation and Costing	3	3	3	2					1		1	1
22BTCM32 3R	Structural Engineering	3	3	2	2	2				1			3
22BTCM324 E	Pavement Materials	2	2	1	1	1	1	1					
22BTCM324 E	Construction Engineering Materials/Buildi ng Construction Practice	2	2	1	1	3	1	1	1				1
22UBPD324 R	Corporate Proficiency for Engineers								1	1	1	1	
22UBCC321	Co-curricular	_								1	1		1
22UBEC321	Extra- curricular									1	1		1

			SEN	1ESTER – Y	VII						
Course Tit	tle		Construct	ion Safety	and l	Risk M	Ianage	ment			
Course coo	de	22BTCM411R	Total credits:	2	L T P S R						С
			Total hours:	30T	2	0	0	0	0	0	2
Pre-requis	site	Nil	Co-requ	iisite				N	il		
Programm	Programme B.Tecl					gineerir	ıg				
Semester			Fall/ VII sem	ester of fou	rth ye	ear of tl	he prog	ramme	!		
Course Object (Minin 3)	tives	 To provide an management. To equip stude projects. To foster know. 	ents with the	skills to id	entify	, asses	ss, and	mitiga	ite risks	s in con	struction
CC)1	Understand the impo	rtance of cons	truction saf	ety ar	nd the 1	egulato	ory frai	nework	s govern	ing it.
CO CO CO)3)4	Apply hazard identif Analyze the compon Evaluate construction Create comprehensi	ents of safety in safety praction	managemen ces and tech	ıt syst	tems ar	nd their nsure w	imple: orkpla	mentation	on. y.	egal and
Unit-	Con	ethical standards. ntent		Contact	Lea	rning	Outcor	ne			KL
No.	Intr	oduction to Construc	otion Sofaty:	Hour	Unc	lerstan	d the	imr	ortance	and	1, 2
	Imp safe Hist safe	ortance of construction ortance of construction of construction of concepts and torical perspective on of the context of the context of the context of con	n safety; Key terminology; construction construction	5	fund safe hist	dament ety. C orical	al cond Gain l	cepts c knowle	of consta dge o		1, 2
II	Haz Asso cons iden	ard Identification essment: Types of struction; Techniques tification; Risk hodologies; Risk	and Risk hazards in	10	con	structio	on pro t tech	ojects.	Apply	ent in risk valuate	1, 2, 3, 4
III	Safe Con syst obje lead	ety Management nponents of a safety em (SMS); Safety	policies and ulture and	10	safe Unc	ety derstan	manaş d the r	gement ole of	ent ef sy safety ting safe	stems.	1, 2, 3, 4, 5
IV	Con Tecl equi and educ	istruction Safety Principles: Personal ipment (PPE); Safe was procedures; Safety cation; Emergency response	protective ork practices training and	10	effe	ctively		are an	work pr d responcies.		2, 3, 4

V	Legal and Ethical Aspects of		Understand legal responsibilities and	2, 3,
	Construction Safety: Legal		ethical considerations in construction	4, 5
	responsibilities and liabilities; Ethical		safety, Analyze case studies to learn	
	issues in construction safety; Case	10	from past construction safety	
	studies on construction accidents and		incidents.	
	legal outcomes; Best practices for			
	compliance and ethical conduct			

Goetsch, D. L. (2013). Construction safety management and engineering (2nd ed.). Pearson.

Goetsch, D. L. (2013). Construction safety and health (3rd ed.). Pearson.

Reference Books:

Hislop, R. D. (1999). Construction site safety: A guide for managing contractors. CRC Press.

Li, R. Y. M. (Ed.). (2020). Handbook of construction safety, health, and well-being in the industry 4.0 era. Springer.

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Understand the importance of construction safety and the regulatory frameworks governing it.	1,3 & 4						
2	Apply hazard identification and risk assessment techniques to construction projects.	1,2						
3	Analyze the components of safety management systems and their implementation.	7.9,10						
4	Evaluate construction safety practices and techniques to ensure workplace safety.	5,7						
5	Create comprehensive safety plans and risk management strategies that comply with legal and	5,8						

ethical standards.	

		SEMESTER	– VII						
Course Tit	le	Professional Elective-IV Concrete Technology							
Course cod	le 22BTCM412E	Total credits: 3	L	T	P	S	R	O/F	C
		Total hours: 40T	3	0	0	0	0	0	3
Pre-requisi	ite Nil	Co-requisite			<u> </u>	N	il		
Programm	e	B.Tech C	ivil Emg	ineerii	ng				
Semester		Fall/ VII semester of fo	ourth ye	ar of t	he prog	ramme	!		
CO1 CO2 CO3 CO4	concrete performance 2. Learn the principles of the durability and str 3. Explore various type concretes, and their self-self-self-self-self-self-self-self-	of concrete mix design, pro- ength of concrete structures es of concrete, such as a pecific applications in diffed their roles in concrete, incorporationing concrete ing a conducting tests to assess ctices like alternative mate	oduction s. normal serent concluding corredients fresh and	strengtl struction ement, for design	n, high on proje aggregative production of the correct curing the correct curing the correct curing the correct curing the curing th	strengt octs. ates, wa operties acrete p	y contro th, light ter, and like str roperties ods in co	l measures to weight, and admixtures. rength, work	special ability,
CO5	Learn to conduct tests to	maintain industry standards	s and ens	ure saf	e constr	uction p	oractices	S.	
Unit-No.	Conto	ent	Contac Hour	t	L	earnin	g Outco	me	KL
I	Basics: Historical backgroncrete, general note or recent practice and future tr	n strength mechanism,	historical background, composition,				composition, recent	1,2	
II	Constituent of Concrete: composition, hydration, heastructure, various types cement as per Indian sta Utility in concrete, cla geometry & texture, properties, moisture cont bulking of sand, deleter analysis, various grading ar sampling & testing as per Water - General Requirement impurities. 4. Admixture admixtures, types, necession.	at of hydration, hydrated of cement, testing of indard. 2. Aggregates - assification, effect of strength, mechanical ent, water absorption, ious substances, sieve ad grading requirements, er Indian Standards. 3. ents & limiting values of ees - Additives and	8	an wa	d roles	of c	ement,	ies, testing, aggregates, in concrete	1,2

	admixture - Fly ash, silica fume, blast furnace slag, and other pozzolanic materials. Chemical admixtures - Accelerator, retarder, water reducing elements, plasticizer and super-plasticizer, their functions and usage			
III	Fresh concrete: Methods of mixing, transporting and placing of concrete. Workability – Definition and requirement, factors affecting workability, various tests as per IS and ASTM. Segregation and bleeding, stiffening, re-tempering. Curing: necessity and various methods, micro-cracking.	7	Understand the methods of mixing, transporting, placing, and curing concrete, along with the factors affecting workability and methods to measure it.	1,2
IV	Hardened concrete: Compressive and tensile strength and their relationship, various tests as per IS and ASTM. Factors affecting strength – water cement ratio, gel space ratio, aggregate cement ratio, properties of ingredients, effect of age, maturity, aggregate cement-paste inter-face, various finishes of concrete. Introduction to aspects of elasticity, shrinkage and creep. Tests for strength of concrete: Destructive, semi destructive and non-destructive tests with their limitations, test methods as per IS and ASTM. 5 Durability and permeability of concrete: Definitions, causes, carbonation, cracking.	9	Develop knowledge of the strength properties of hardened concrete, factors affecting its strength, and various destructive and non-destructive testing methods.	1,2
V	Concrete in aggressive environment: Alkali – aggregate reaction, sulphate attack, chloride attack, acid attack, effect of sea water, special coating for water proofing, sulphate chloride and acid attack, concrete for hot liquids.	8	Explore the definitions, causes, and impacts of durability and permeability, including the effects of aggressive environments on concrete structures.	1,2

- 1. M S Shetty; Concrete Technology, S.Chand Publication New Delhi 2. P Kumar Mehta, Monteiro;
- 2. Concrete Technology, Indian Concrete Institute

Reference Books:

- 1. A.M.Neville; Properties of Concrete, Pearson Education
- 2. M L Gambhir; Concrete Technology, Tata McGraw Hill
- 3. IS 456-2000 7.
- 4. IS 269-1989
- 5. IS 516-1959 9
- 6. IS 1786-1985 10
- 7. IS 1893-2002
- 8. IS 12269-1987
- 9. IS 9103-1999
- 10. IS 8112-1989

	CO PO Mapping							
SN	Course Outcome (CO)	Mapped Program Outcome						
1	Learn the constituents and their roles in concrete, including cement, aggregates, water, and admixtures.	1,3 & 4						
2	Develop proficiency in proportioning concrete ingredients for desired properties like strength, workability, and durability.	1,2						
3	Develop practical skills in conducting tests to assess fresh and hardened concrete properties.	7.9,10						
4	Integrate eco-friendly practices like alternative materials and efficient curing methods in concrete technology.	5,7						
5	Learn to conduct tests to maintain industry standards and ensure safe construction practices.	5,8						

			SEMESTER – VII							
Course Title	rrse Title Professional Elective IV Surface Hydrology									
Course code		22BTCM413E	Total credits: 3	L	Т	Р	S	R	O/F	С
			Total hours: 45T	3	0	0	0	0	0	3
Pre-requisite		Nil	Co-requisite		<u> </u>		Nil			
Programme		Bachelor of Technology in Civil Engineering								
Semester		Fall: Winter/ VII semester of fourth year of the programme								
Course Objectives (Minimum 3)	5.	precipitation, stream modeling technique Explore the Hydro water availability ac Apply Hydrologica	logical Processes and Mode in flow measurement, hydrogiss. logic Cycle: Examine how cross different regions over ti 1 Principles in Decision Sup and environmental management	compone me.	ysis, sto nts like	orm rui	noff, fl	ood es	runoff a	and affect
CO1	Explair	the different concept	ts in hydro-metrology.							

CO	hydrological processes.		re applied appreciation of monitoring and mod	_
CO:	measurements, as well as more detailed hydrograph analysis, storm runoff and conce Explain the relevance of various component temporal distribution of water availability in	investigation in the property in floor in the property in the	rologic cycle, which are responsible for spati n. ydrologic principles can be applied to suppl	ement,
Unit- No.	Content	Contact Hour	Learning Outcome	KL
1	Hydrometeorology: Hydrologic cycle – Global water budget – Practical applications – Hydrometeorology – Constituents of atmosphere – Vertical structure of the atmosphere – general circulation, – Air mass – Air front – cyclones – Formation of precipitation – Types and forms of precipitation – Climate and Weather – Meteorological Observations.	10	Students will demonstrate a comprehensive understanding of the hydrologic cycle and global water budget, including its practical applications in various contexts. They will be able to analyze the constituents and vertical structure of the atmosphere, interpret general circulation patterns, and differentiate between air masses, air fronts, and cyclones. Additionally, students will identify the processes involved in the formation of precipitation, recognize different types and forms of precipitation, and comprehend the relationships between climate and weather. They will also be proficient in conducting and interpreting meteorological observations essential for understanding and predicting weather patterns and phenomena.	1, 2
II	Precipitation: Measurement of rainfall – Rain gauges – Radar Measurement of rainfall - Rainfall Hyetograph – Intensity Duration and Frequency analysis – Consistency – Missing data – Rain gauge network – Average depth of rainfall analysis.	10	By the end of this unit on precipitation, students will be able to effectively measure rainfall using both traditional rain gauges and radar technology. They will learn to analyze rainfall data using techniques such as creating rainfall hyetographs, conducting Intensity Duration Frequency (IDF) analysis, assessing data consistency, and handling missing data. Students will also gain proficiency in designing and managing rain gauge networks to collect accurate precipitation data and perform analysis to determine average depths of rainfall over specified periods.	2, 3, 4
III	Abstractions: Water losses - Initial losses - Interception and depression storage - Evaporation - Evaporimeters - Estimation of Evaporation - Evapotranspiration - Field Measurement - Empirical Equations - Infiltration - Infiltrometers - Infiltration Equations - Infiltration Indices.	10	Upon completion of this unit, students will demonstrate proficiency in understanding and applying concepts related to water losses and abstractions in hydrology. They will be able to analyze initial losses including interception and	1, 2, 3,4

			depression storage, evaluate methods of measuring evaporation using evaporimeters, and estimate evapotranspiration through empirical equations and field measurement techniques. Additionally, students will gain practical skills in assessing infiltration using infiltrometers and interpreting infiltration equations and indices, thereby developing a comprehensive understanding of the factors influencing water movement and losses in natural and engineered environments.	
IV	Streamflow Measurement: Stage and Velocity Measurement – Gauges – Current meter and Doppler flow velocity meter - Discharge measurement – Area Velocity method - Area Slope method – Discharge Measuring Structures - Dilution Technique – Stage Discharge relationship – Selection of a Stream Gauging Site	10	Upon completion of this unit on Streamflow Measurement, students will be able to demonstrate a comprehensive understanding of various methods and technologies used in the measurement of streamflow. They will proficiently describe and apply principles related to stage and velocity measurement using gauges, current meters, and Doppler flow velocity meters. Additionally, students will be able to calculate discharge using both the Area Velocity method and the Area Slope method, and identify appropriate Discharge Measuring Structures for different scenarios. They will also gain competence in applying the Dilution Technique and establishing Stage Discharge relationships. Furthermore, students will be capable of evaluating and selecting suitable stream gauging sites based on specific criteria and considerations relevant to hydrological studies and water resource management.	1, 2
V	Runoff and Water Conservation: Concept of catchment – Linear, Areal and Relief Aspects – Detailed study of Runoff process – Factors affecting Runoff – Hydrograph – Unit Hydrograph – Synthetic Hydrograph –Runoff estimation - Strange and SCS methods – Water Conservation – Rain water and Runoff Harvesting in Rural and Urban Areas - Reservoir Sedimentation.	5	By the end of this unit on Runoff and Water Conservation, students will be able to comprehensively understand the concept of catchment areas, including their linear, areal, and relief aspects. They will have detailed knowledge of the runoff process and the factors influencing it, as well as the ability to analyze hydrographs and apply methods such as Unit Hydrograph and Synthetic Hydrograph for runoff estimation. Furthermore, students will gain practical insights into water conservation strategies, including rainwater and runoff harvesting techniques applicable to both rural and	2, 3, 4, 5

	urban environments, and grasp the challenges and methods related to
	reservoir sedimentation management.

- 1 Chow V.T., Maidment D.R., Mays L.W., "Applied Hydrology", McGraw Hill Publications, New York, 1995.
- 2 Subramanya K., "Hydrology, Tata McGraw Hill Co., New Delhi, 1994.
- 3 Patra.K.C, "Hydrology and Water Resources Engineering", Narosa Publications, 2008, 2nd Edition, New Delhi.

Reference Books:

- 1 Jeya Rami Reddy.P, "Hydrology, Laxmi Publications, New Delhi, 2004".
- 2 Larry W. Mays, "Water Resources Engineering", Wiley Publication"

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	Explain the different concepts in hydro-metrology.	3,2							
2	Discuss the key aspects of hydrology, along with a more applied appreciation of monitoring and modelling hydrological processes.	1,2							
3	Generalize knowledge on topics ranging from climatology, atmospheric circulation and meteorological measurements, as well as more detailed investigations into precipitation, stream flow measurement, hydrograph analysis, storm runoff and concepts in flood estimation and routing.	1,4							
4	Explain the relevance of various components of hydrologic cycle, which are responsible for spatial and temporal distribution of water availability in any region.	7.9,10							
5	Develop students' in-depth understanding on how hydrologic principles can be applied to supplement decision support system for water and environmental management.	5,7							

			SEMESTER	– VII										
Course Title	?	Generic Elective II Nano-science & Technology												
Course code	e 22BTCM	414E	Total credits: 3	L	T	P	S	R	O/F	'	С			
		Total hours: 40			0	0	0	0	0		3			
Pre-requisit	e Nil		Co-requisite				N	il	I					
Programme		B.Tech Civil Emgineering												
Semester		Fall/ VII semester of fourth year of the programme												
Course Objectives (Minimum 3	2. Learn nanosc 3. Dive in	about the	ng of the core principles a unique and unexpected prother thods for creating nanoma	roperties	that en	nerge w	hen ma	terials a	re engin	eered	at the			
CO1	fields Learn about the	basics of	Nanotechnology.											
CO2	Understand the	Understand the concepts of extraordinary properties exhibit at nanoscale.												
CO3	Learn different	Learn different synthesis/ fabrication techniques of nanomaterials.												
CO4	Learn about dif	Learn about different characterization methods of nanomaterials.												
CO5	Learn the softw	are used fo	or analysis of characterized	d data.										
Unit-No.		Conte	nt	Contac Hour	t	L	earning	g Outcor	ne		KL			
I	Basics of Nanotechnology: Importance of Nanotechnology, History of Nano-Technology, Properties of Nano materials, Difference between Bulk and Nanomaterial, Molecular building blocks for nanostructure systems, Forces between atoms and molecules - Particles and grain boundaries – strong Intermolecular forces – Electrostatic and Vander Waals forces between surfaces. Gain foundational knowledge of nanotechnology, including its history, significance, unique properties of nanomaterials, and the distinction between bulk and nanoscale materials.							1,2						
II	nanoparticles, nanotubes, nanowires, nanodots etc.; electronic and optical characteristic properties of quantum dots, quantum wires and quantum wells; concept of quantum confinement: 0D, 1D and 2D nanostructures; Size effects – Fraction of Surface Atoms – specific Surface Energy and Surface Stress. Nanofluidics, Nanophotonics, Nanothermodynamics, Plasmonics – plasmons and			nanoparticles, nanotubes, nanowires, nanodots etc.; electronic and optical characteristic properties of quantum dots, quantum wires and quantum wells; concept of quantum confinement: 0D, 1D and 2D nanostructures; Size effects – Fraction of Surface Atoms – specific Surface Energy and Surface Stress. Nanofluidics, Nanophotonics, Nanothermodynamics, Plasmonics – plasmons and surface plasmons, SPR, Core-shell quantum dots						like and heir ies,	1,2			
III	•		ques of nanomaterials: graphy – electron beam	7		arn ab ttom-up		ne top- approach		and for	1,2			

	and ion beam techniques, Etching – wet and dry etching, Bottom up approach - Solvent based and template based synthesis, other important synthesis methods like CVD, PVD etc.; Doping, Nucleation, Growth and Stability of colloidal nanoparticles, concept of self assembly.		nanomaterial synthesis/fabrication. Explore techniques like lithography, etching, self-assembly, and methods like CVD and PVD.	
IV	Characterization methods: Transmission electron microscopy (TEM), Scanning electron microscopy (SEM), Atomic force microscopy (AFM) and X-ray diffraction Spectroscopy (XRD).	9	Master characterization methods for nanomaterials such as TEM, SEM, AFM, and XRD.	1,2
V	Applications: Nanosensors and nanoelectronics, Micro & Nano electromechanical systems, Photonic crystals, Nano pizotronics, Nanomedicine.	8	Discover applications of nanotechnology in various fields like sensors, electronics, MEMS/NEMS, photonics, pieztronics, and nanomedicine.	1,2

- 1. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanoscience, CRC Press.
- 2. G. L. Hornyak, J. Dutta, H. H. Tibbals, A. Rao, Introduction to Nanotechnology, CRC Press.

Reference Books:

- 1. T. Pradeep, Nano: The essentials, McGraw Hill.
- 2. D. Maclurcan & N. Radywyl (Eds.), Nanotechnology and global sustainability, CRC Press.
- 3. E. Lichtfouse, J. Shwarzbauer, D. Robert, Environmental chemistry for sustainable world, vol.2, Springer verlag.

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Learn about the basics of Nanotechnology.	1,3 & 4								
2	Understand the concepts of extraordinary properties exhibit at nanoscale.	1,2								
3	Learn different synthesis/ fabrication techniques of nanomaterials.	7.9,10								
4	Learn about different characterization methods of nanomaterials.	5,7								

5	Learn the software used for analysis of characterized data.	5,8
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MAPPING TABLE (7th Semester)

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
22BTCM411E	Design of												
	Steel	3	2	2	2	1		2					1
	Structure												
22BTCM412E	Concrete Technology	2	2	2	2	2		2					3
22BTCM413E	Surface Hydrology	3	2	2	2	1		2					1
22BTCM414E	Nano- science & Technology	2	2	2	3	2							1

				ESTER – V								
Course				onal Electiv								
Course	code	22BTCM421R	Total credits:	l.	L	T	P	S	R	O/F		C
			Total hours: 3		2	0	0	0	0	0		2
Pre-req		Nil	Co-requ					N	il			
Program				f Technolog								
Semeste			l: Winter/ VIII									
Course Objectiv		1. To Develop an advanced understanding of soil behavior, encompassing exploration										
(Minim		methods, laboratory testing, and hydraulic characteristics, with a focus on stress distribution, consolidation theory, and shear strength analysis.										
(171111111	uiii 5)		ency in geotecl	•		_	•		clone	ne and i	ratain	ina
			plying principle									
		equilibrium m		s such as	ocariii	g capt	icity, s	Cttleffic	iit aii	ary 515, a	.110 11	11111
		*	ed geotechnical	concepts by	integr	ating g	eosvnť	hetics i	n rein	forced st	ructui	res.
			ound improvem									
			plication of soil					U				Ü
CO)1	To Conduct advanced so					oloying	labora	tory-t	esting te	chniq	ues to
		determine soil properties							-			
CO	2	To Analyze stress distrib						ettleme	ents th	rough co	nsoli	dation
~~	2	theory and assessing she								•, -		
CO	3		To Design shallow and deep foundations, applying principles of bearing capacity and settlement									
CO	1	analysis, while also demonstrating competence in slope stability analysis and design. To Apply earth pressure theories to design effective retaining walls and bulkheads, incorporating										
	7	reinforced soil structures				Ctamm	ig wan	.s and	Ouiki	icaus, iii	corpo	nating
CO	5	To Demonstrate proficie				s into s	oil eng	ineerin	g prac	tices, uti	lizing	them
		in the design and constr										
		effectively										
					1							
Unit- No.		Content		Contact Hour			Learn	ing Ou	itcom	e		KL
			1:				will l	nave	a co	mprehen		KL 1, 2
No.	INTE	Content			unde	erstand	will l	nave geotech	a com	mprehen: engineer	ing,	
No.		Content UNIT RODCUTIONOverview echnical Engineering:	of		unde incl	erstand uding	will ling of g	nave geotech	a connical	mprehen engineer scope,	ing, and	
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No.		Content UNIT RODCUTIONOverview echnical Engineering: Definition, importance of engineering. Historical and key contributors in Interrelation	scope, and geotechnical developments in the field.		under inches sign history the relate geot grass conditions.	erstand uding ificance orical of field, tionship echnic p fu cepts,	will ling of gits of e. They context as be all engundame such	nave geotech lefinition will be and k well stween ineerinal as	a connical on, see families con george. Storil	mprehens engineer scope, iliar with ntributor ne esser blogy sudents mecha proper	ing, and the s to ntial and will nics ties,	
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No.		Content UNIT RODCUTIONOverview echnical Engineering:	scope, and geotechnical developments in the field. between geotechnical		unde inclusign histe the relat geot gras cone class com	erstand uding ificance orical of field, tionship echnic p fu cepts, sification positio	will ling of gits of e. They context as be all engundame such on, mon of so	nave geotech definition will be and k well streen ineering as pisture bil pha	a connical on, se families ey con as the georg. St soil soil contesses (s	mprehenerscope, iliar with ntributor ac esser blogy rudents mechal proper ent, and olids, wa	ing, and the s to ntial and will nics ties, the ater,	
No.		Content UNIT RODCUTIONOverview echnical Engineering. Definition, importance of engineering. Historical and key contributors in Interrelation geology and engineering. Basic Soil Mechanic Fundamenta	scope, and geotechnical developments in the field. between geotechnical sconcepts:		under inches sign history the relate geot grass come class come and	erstand uding ificance orical of field, tionship echnic p fucepts, sification position air). A	will ling of gits of e. They context as be all engindame such on, more so ddition	nave geotech definition will be and k well structure as posture bil pha ally, the	a connical on, se families ey con as the georg. Standard soil contesses (sey will	mprehenerscope, iliar with ntributor e esser blogy sudents mechal proper ent, and olids, wall underst	ing, and the s to ntial and will nics ties, the nter, and	
No.		UNIT RODCUTIONOverview echnical Engineering: Definition, importance of engineering. Historical and key contributors in Interrelation geology and engineering. Basic Soil Mechanic Fundamenta soils (particle	scope, and geotechnical developments in the field. between geotechnical se Concepts: l properties of size, soil	Hour	under inches sign histor the relate geot grass constant command basi	erstand uding ificance orical of field, tionship echnic p fu cepts, sification position air). A c soil	will ling of gits of e. They context as be all engundame such on, more so ddition behall behall behall in the so that the sound of so ddition behall behall in the sound of so ddition behall behall so the sound of so ddition behall behall so the sound of so ddition behall so the sound of so the so the sound of so the sound of so the so the so the sound of so the s	nave geotech definition will b and k well tween ineerin ntal as oisture oil pha ally, th	a connical on, se families ey con as the george. Still soil contesses (seey will and	mprehenerscope, iliar with ntributors e esser blogy sudents mechar properent, and olids, wall underst stress-st	ing, and the s to ntial and will nics ties, the nter, and rain	
No.		Content UNIT RODCUTIONOverview echnical Engineering: Definition, importance of engineering. Historical and key contributors interrelation geology and engineering. Basic Soil Mechanic Fundamenta soils (particle classification, moisture	scope, and geotechnical developments in the field. between geotechnical se Concepts: I properties of size, soil re content).	Hour	undo inclusign histo the relati geot grass come class come and basi relati	erstand uding ificanc orical of field, tionship echnic p fu cepts, sificatio positio air). A c soil tionship	will ling of gits of e. They context as be all engundame such on, mod so ddition behabs. The	nave geotech definiti will b and k well tween ineerin ntal as bisture bil pha ally, th avior	a connical on, se families ey coras the george. St soil soil contesses (see y will and will al	mprehenerscope, iliar with ntributor e esser blogy sudents mechal proper ent, and olids, wall underst	ing, and the s to ntial and will nics ties, the ater, and rain the	
No.		Content UNIT RODCUTIONOverview echnical Engineering: Definition, importance of engineering. Historical and key contributors in Interrelation geology and engineering. Basic Soil Mechanic Fundamental soils (particle classification, moistur Soil phases:	scope, and geotechnical developments in the field. between geotechnical se Concepts: l properties of size, soil	Hour	undo inclusign histo the relati geot grass come class come and basi relati	erstand uding ificanc orical of field, tionship echnic p fu cepts, sificatio positio air). A c soil tionship and re	will I ing of gits of e. They context as be all engindame such on, more oddition behaves. The esponsi	nave geotech definition will be and k well streem ineering as bisture bill pha ally, the avior e unit we bilities	a connical on, se family ey co as the georg. St soil contesses (see y will and of a	mprehenerscope, iliar with ntributor are esserology audents mecha proper ent, and olids, wall underst stress-st	ing, and the s to ntial and will nics ties, the ater, and rain the ical	
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	engineering in civil projects.			
II			Upon completing this unit, students will	1, 2,
	UNIT 2: SHALLOW FOUNDATION AND BEARING CAPACITY Types of Shallow Foundations: Overview of different types of shallow foundations (spread footings, mat foundations). Selection criteria based on soil conditions and structural requirements. Bearing Capacity Basics: Definition of bearing capacity. Factors influencing bearing capacity: soil strength, foundation geometry, and loading conditions. Ultimate and allowable bearing capacity. Terzaghi's Bearing Capacity Equation: Derivation and application of Terzaghi's bearing capacity equation. Practical considerations and limitations of the equation.	10	have a comprehensive understanding of shallow foundations, including an overview of various types such as spread footings and mat foundations, along with criteria for selecting appropriate foundation types based on soil conditions and structural requirements. They will grasp the concept of bearing capacity, factors influencing it, and the differentiation between ultimate and allowable bearing capacity. Additionally, students will learn the derivation and application of Terzaghi's bearing capacity equation, recognizing its practical considerations and limitations, thus equipping them with essential knowledge for assessing and designing shallow foundations in civil engineering projects.	3, 4
III	UNIT 3: BEARING CAPACITY THEORIES AND APPLICATION Other Bearing Capacity Theories: Introduction to other bearing capacity theories (Meyerhof, Hansen). Comparative analysis of different bearing capacity theories. Influence of Water Table: Effect of the water table on bearing capacity. Application of correction factors in bearing capacity analysis. Foundation Settlement: Causes and types of foundation settlement. Methods for predicting and mitigating settlement.	5	Upon completing Unit 3: Bearing Capacity Theories and Application, students will gain a comprehensive understanding of various bearing capacity theories, including those proposed by Meyerhof and Hansen, and will be able to conduct comparative analyses of these theories. They will learn how the presence of a water table influences bearing capacity and how to apply correction factors in such scenarios. Additionally, students will explore the causes and types of foundation settlement, and develop skills in predicting and mitigating settlement issues, enabling them to make informed decisions in geotechnical engineering practice.	1, 2, 3, 4, 5
IV	UNIT 4: SETTLEMENT OF FOOTING Immediate and Consolidation Settlement: Distinction between immediate and consolidation settlement.	5	Upon completing Unit 4: Settlement of Footing, students will be able to distinguish between immediate and consolidation settlement, understanding the respective calculation methods for each. They will grasp the time-rate of settlement and its implications, predicting	2, 3, 4

	 Calculation methods for each type of settlement. Time-Settlement Behavior: Time-rate of settlement and its implications. Settlement prediction using empirical and analytical methods. Practical Applications and Case Studies: Real-world examples of footing settlement in various construction projects. Analysis of lessons learned from case studies. 		settlement behavior using both empirical and analytical methods. Through practical applications and case studies, students will analyze real-world examples of footing settlement in various construction projects, extracting valuable lessons from these case studies to enhance their understanding and application of settlement principles in geotechnical engineering.	
V	UNIT 5: SOIL EXPLORATION AND STABILITY ANALYSIS Methods of Soil Exploration: Overview of geotechnical site investigation techniques (boring, sampling, in-situ tests). Selection of exploration methods based on site conditions. Stability Analysis of Slopes: Slope stability analysis methods (infinite slope, circular failure). Factors affecting slope stability. Case Studies in Soil Exploration and Stability: Application of soil exploration data in slope stability analysis. Review of case studies demonstrating the importance of thorough soil investigation in stability assessments.	5	Upon completing Unit 5: Soil Exploration and Stability Analysis, students will be able to proficiently conduct geotechnical site investigations using various methods such as boring, sampling, and in-situ tests, selecting appropriate techniques based on specific site conditions. They will gain a comprehensive understanding of slope stability analysis methods, including infinite slope and circular failure, and will be able to identify and evaluate the factors affecting slope stability. Additionally, students will apply soil exploration data to practical slope stability assessments and critically review case studies that highlight the critical role of detailed soil investigation in ensuring stability and safety.	2, 3, 4, 5

- 1 "Principles of Geotechnical Engineering" by Braja M. Das,1994
- 2 "Foundation Design: Principles and Practices" by Donald P. Coduto, William A. Kitch, and Man-chu Ronald Yeung, $2001\,$

Reference Books:

- 1 "Soil Mechanics and Foundations" by Muni Budhu: 1999
- 2 "Geotechnical Engineering: Principles and Practices" by Donald P. Coduto, Man-chu Ronald Yeung, and William A. Kitch: $2005\,$

3 "Introduction to Geotechnical Engineering" by Robert D. Holtz, William D. Kovacs, and Thomas C. Sheahan, $1981\,$

OTHER LEARNING RESOURCES:

https://archive.nptel.ac.in/courses/105/101/105101084/

	CO PO Mapping								
SN	Course Outcome (CO)	Mapped Program Outcome							
1	To Conduct advanced soil exploration and characterization, employing laboratory-testing techniques to determine soil properties accurately.	1,3 & 4							
2	To Analyze stress distribution in soils in three dimensions, predicting settlements through consolidation theory and assessing shear strength using critical state soil mechanics.	1,2							
3	To Design shallow and deep foundations, applying principles of bearing capacity and settlement analysis, while also demonstrating competence in slope stability analysis and design.	7.9,10							
4	To Apply earth pressure theories to design effective retaining walls and bulkheads, incorporating reinforced soil structures into geotechnical solutions.	5,7							
5	To Demonstrate proficiency in incorporating geosynthetics into soil engineering practices, utilizing them in the design and construction of reinforced structures, and applying ground improvement techniques effectively	5,8							

SEMESTER – VIII Course Title Professional Elective V - Earthquake Engineering												
		44DTEC \$ 444D								0.75		
Course	code	22BTCM422R	Total credit Total hours		L 2	T 0	P 0	S 0	R	O/F 0		<u>C</u>
Pre-req	uisite	Nil		quisite		ı v			Nil	Ů		
Prograi		2 122		lor of Tech	nology in	Civil	Engine					
Semeste		Fa	all: Winter/ V						ramn	ne		
Course		This course exp										
Objecti	ves	2. Students analyze SDOF and MDOF systems' response to vibration and earthquakes, study										stiffness,
(Minim	um 3)	damping, and lateral forces generated during seismic events.										
			They also learn ductile detailing for RC structures and earthquake-resistant design principles								orinciples,	
~~		essential for cre								1 11		
CO	01	Determine the response of	of SDOF & M	IDOF struc	tural syste	em sub	jected 1	to vibra	ition 1	ncluding	earth	quake.
CO	2	Discuss the concept of st	iffness and da	amping.								
CO	3	Determine the lateral for				to eart	hquake					
CO		Apply the concept of duc										
CO	5	Apply the concept of Ear	thquake Resi	stant Desig	n & conce	ept of	ateral 1	oad dis	tribut	ion on bu	ildin	gs.
Unit-		Content		Contact		I	_earnir	g Out	come			KL
No.				Hour								
I	seism tector eartho eartho Seisn	-	arth, plate uences of meters of nsity, scales, ages caused	5	comprel including studying activities concept of fautearthquate between such a understathem. A about the dar worldwand mit	hensively hensively hensively he he he he he he he he he he he he he	e under scope Earth' ey will te tector and Students assic paragnitud e variou nally, t mic zor cause anhancin	rstanding and so interest the constant of the	ng of sign able to be natuconsed earn to be sused li gain India past abilited risters of the sused li gain to be sused li gain the sused l		ogy, in onic the rpes of uish kes, and sure dge yze ukes sess	1, 2
П	Static control system build: v/s build: like damp build: Respo	ified single degree of m, mathematical mo- ings, natural frequency increased response, re- ings to different types of free and forced, dampe ed vibration, response of ing to earthquake grou- onse to multi degree of freedom systems u	10	Earthqu will be betweer force an They v complex freedom modelin characte determi the phe respons respons vibratio undamp be cap building understa	ake V able able station and dis will ga k strue a (SDC ag build eristics ane nat anomer e. The es of as, inc ed vib able (gs to e and the egrees)	ibration to under and control	lerstandlynamicent conficience into tems a panalyzents requence resonary learnings to free, for Addilyzing ake groior of redom seconds.	Building and a load and a load and a load a	damentalings, stude I distinguals, include mechanis simplify degree athematic ir vibratic be able and recogned increasevaluate bus types damped, ly, they response motions degree (uns, include	ents usish ling ms. ring of ally onal to nize used the of and of and p to	1, 2, 3, 4	

III			By the end of this unit, students will have a	1, 2, 3,
	Design Philosophy: Philosophy of earthquake resistant design, earthquake proof v/s earthquake resistant design, four virtues of earthquake resistant structures (strength, stiffness, ductility and configuration), seismic structural configuration, Introduction to IS: 1893 (Part I), IS: 875(Part V). Seismic load: Seismic Coefficient Method – base shear and its distribution along height. Introduction to Response spectrum, IS code provisions.	5	comprehensive understanding of the philosophy behind earthquake-resistant design, distinguishing it from earthquake-proof design. They will learn the critical attributes of earthquake-resistant structures, namely strength, stiffness, ductility, and configuration, and how these contribute to a building's resilience. The unit will cover the principles of seismic structural configuration and introduce key Indian Standards (IS: 1893 Part I and IS: 875 Part V) relevant to seismic design. Students will gain practical knowledge of calculating seismic loads using the Seismic Coefficient Method, including determining base shear and its vertical distribution. Additionally, they will be introduced to the concept of the response spectrum and the associated IS code provisions, equipping them with the necessary skills to design structures that can withstand seismic forces effectively.	1, 2, 3, 4, 5
IV	Lateral Loads on Buildings: Lateral Load Distribution (SDOF): Rigid diaphragm effect, centers of mass and stiffness, torsionally coupled and uncoupled system. Lateral Load Analysis: Analysis of frames using approximate methods like portal & cantilever methodsdrawing of small residential buildings.	5	By the end of this unit on "Lateral Loads on Buildings," students will be able to analyze the behavior of buildings under lateral loads. They will understand the principles of lateral load distribution in structures with rigid diaphragms, including the effects of centers of mass and stiffness. Students will be proficient in distinguishing between torsionally coupled and uncoupled systems and will be capable of conducting lateral load analysis of frames using approximate methods such as portal and cantilever methods. Additionally, they will be able to apply these concepts to draw preliminary designs for small residential buildings.	2, 3, 4
V	Ductile Detailing: Concepts of Detailing of various structural components as per IS: 13920 provisions.	5	By the end of this unit on Ductile Detailing, students will demonstrate a proficient understanding of detailing principles for structural components based on IS: 13920 specifications. They will be able to apply these concepts effectively to ensure ductile behavior and enhance the structural integrity of reinforced concrete elements. Students will be capable of interpreting and implementing the guidelines for detailing reinforcement in beams, columns, slabs, and other structural elements, thereby contributing to safer and more resilient structural designs in accordance with established standards.	2, 3, 4, 5

1. Manish Shrikhande & Pankaj Agrawal; Earthquake resistant design of structures, PHI Publication, New Delhi.

Reference Books:

- 1. A.K.Chopra; Dynamics of structures, Pearson, New Delhi
- 2. Clough & Penzin; Dynamics of structures

3. C V R Murthy - Earthquake Tips, NICEE

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Determine the response of SDOF & MDOF structural system subjected to vibration including earthquake.	1,2 & 4								
2	Discuss the concept of stiffness and damping.	1,3								
3	Determine the lateral forces generated in the structure due to earthquake.	7.9,10								
4	Apply the concept of ductile detailing in RC structures.	5,6								
5	Apply the concept of Earthquake Resistant Design & concept of lateral load distribution on buildings.	5,7								

			SE	MESTER -	VIII								
Course	Title		Ra	ilway and A	irport	Engin	eering						
Course	code	22BTCM423R	Total credits		L	T	P	S	R	O/F		C	
			Total hours:		3	0	0	0	0	0		3	
Pre-req		Nil	Co-rec						Nil				
Prograi				elor of Technology in Civil Engineering VIII semester of fourth year of the programme									
Semeste	er												
Course		5. The course "Railwa										ehensive	
Objecti		understanding of the design, construction, and maintenance of railway and airport infrastructure. 6. It focuses on equipping students with the technical skills and knowledge needed to address											
(Minim	um 3)						is and	Knowi	eage	needed t	io addi	ress the	
challenges and innovations in transportation engineration. CO1 Describe different components of the rail track, the							and its	oner	ation	evetom v	with ro	spect to	
		construction and engineeri			ien run	ictions	and its	s opera	ation	system v	vitii ie	spect to	
CO		Identify different failures of			nt whee	l and a	xis arra	ngeme	nts.				
		<u> </u>		•									
CO		Design different geometric Design different types of R			•								
CO		Explain essential features a				o of sid	malina	and int	orloal	zina arrata			
	<u> </u>		ina requireme		ent type:	S OI SIE					žIII.		
Unit-		Content		Contact			Learn	ing Ot	itcom	e		KL	
No.				Hour	Dv. +1	ha an	d of	thic 1	ınit	students	,,,;11	1, 2	
	Development of the permanent of the perm	anent way and rail onents, different gauges ing of wheels, Functions bonents - Rails, Sleepers - types of rails, rail section creep of rails, rail fings, rail joints and weld ers – types, spacing and derpes, advantages and dirade – Requirement, emban	in India, way track in India, of various and Ballast, as, defects in ixtures and ing of rails, asity, Ballast sadvantages, ikment.	10	of the includer railwar to expused wheel function composition of the includer	e deviling the system of the s	elopment e evolute e evolute k compute signification and lents with and such as ein type analyzes of value e control be ablerstand behind	nt of ion of onents ficance the pll iden charactrils, see the prious irementative to ic rail crail j	railw perm. The c of di proces tify ar teristic sleepe cing, e ad- types nts for on. dentify eep, a oints	rs, and ba and dens vantages of ballas subgrade Addition common nd explai and we	India, y and able auges nning be the key allast, sities. and at and e and nally, n rail in the		
П	trains defici wider Switc of Transitation of T	netric design of rails ents, grade compensation on curves, super elevating on curves. Tracking on curves. Tracking on curves. Tracking, Scissors crossing. Railway traction ance, stresses in railway ters, ballast. It is and crossings — turnoutings. Track junctions — tond, gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet, scissor and gauntlet. Scissor and crossings — turnouted the science of th	10	desigr to ana incorp speed of su efficie of ca elevat track profic variou crossi turnou operat consid includ	n of rai alyze a consting consideration, a design iency is trainings (sings), its).	ilway trand design gradiderations devations. They will efficience applying a few layers and ture they requires for raction a	acks, sign ratents, go for cut to e ll under y any then ermore igning outs it is diarrmouts will irementailway, and traints trainty and trainty in the sign of the	studen ilway grade urves, enhance erstand d ne n app e, stud and includ mond (incl com ets static ck res	the geonts will be track la compensa and prince safety different will implement and sciuding deprehend and dons and yourstance, strails, sleet	e able youts ation, ciples and acepts super ly to gain enting tches, issors ouble the lesign yards, stress	1, 2, 3, 4		

			1.11.4)	1
***	signals and points.		ballast), and the equipment necessary in yards. Additionally, students will grasp the fundamentals of signaling and control systems, their objectives, classifications, and the principles of interlocking signals and points to ensure safe railway operations.	1.2
m	AIRPORT ENGINEERING: General: History, development, policy of air transport, aircrafts, aerodromes, air transport authorities, air transport activities, air crafts and its characteristics, airport classifications as per ICAO. Airport Planning: Regional planning-concepts and advantages, location and planning of airport as per ICAO and FAA. Airport Master plan, Airport site selection, Zoning laws, Airport Elements - airfield, terminal area, zoning laws, classification of obstructions, approach zone, turning zone, airport capacity, runway capacity, estimation of future air traffic, development of new airport, requirements of an ideal airport layout.	10	The learning outcome of the unit on air transport and airport planning encompasses a comprehensive understanding of the historical evolution, regulatory frameworks, and operational aspects of air transport systems worldwide. Students will gain knowledge of aircraft types and their characteristics, aerodrome classifications, and the roles of air transport authorities. They will develop proficiency in airport planning principles according to international standards (ICAO and FAA), covering regional planning concepts, airport master planning, site selection criteria, zoning laws, and the design and classification of airport elements such as airfields and terminals. Additionally, students will learn to assess airport and runway capacities, estimate future air traffic demands, and apply principles for developing new airports, culminating in the ability to conceptualize ideal airport layouts.	1, 2, 3, 4, 5
IV	Run Way Design: Wind rose and orientation of runway, wind coverage and crosswind component, factors affecting runway length, basic runway length and corrections to runway length, runway geometrics and runway patterns (configurations), Runway marking, threshold limits cross section of runway. Taxiway Design: Controlling factors, taxiway geometric elements, layout, exit taxiway, location and geometrics, holding apron, turnaround facility. Aprons locations, size, gate positions, aircraft parking configurations and parking systems, hanger-site selection, planning and design considerations, Fuel storage area, blast pads. Wind direction indicator. LCN system of Pavement Design, Airfield Pavement – Failures, Maintenance and Rehabilitation	10	Upon completion of this unit on Airfield Design and Planning, students will be able to demonstrate comprehensive knowledge and skills in various critical aspects of airfield infrastructure. They will understand the principles of runway design, including the influence of wind orientation and coverage on runway orientation and length requirements, as well as factors affecting runway length determination and geometric configurations. Students will be proficient in designing taxiways, considering geometric elements, layout, and exit strategies, as well as planning apron locations, sizes, and configurations for efficient aircraft parking and turnaround operations. Additionally, they will grasp the essentials of pavement design using the LCN system, comprehend common airfield pavement failures, and formulate strategies for maintenance and rehabilitation. This unit will equip students with the necessary expertise to contribute effectively to the planning, design, and operational efficiency of airfield facilities.	2, 3, 4
V	Terminal Area: Elements and requirements, terminal building functions, space requirements, location planning concepts, vehicular parking area and circulation network, Grading and Drainage: Airport grading-importance, operations, airport drainage aims, functions, special	5	By the end of this unit, learners will demonstrate a comprehensive understanding of terminal area planning and design within an airport context. They will be able to analyze and apply the fundamental elements and requirements of terminal buildings, including functional spaces and spatial requirements.	2, 3, 4, 5

characteristics, basic requirements, Deign of	Students will also grasp essential concepts in	
drainage - surface and subsurface drainage	vehicular parking area design and circulation	
systems, Air Traffic Control and Visual	networks, incorporating considerations for	
Aids: Need of Air traffic control, Air traffic	efficient operations and user experience.	
control network, Air traffic control aids -	Furthermore, they will comprehend the	
landing information system, airport	significance of airport grading and drainage	
markings and lighting.	systems, understanding their roles in ensuring	
	operational safety and efficiency.	

Books:

- 1. A text book of railway engineering , By S.C.Saxena and M.G.Arora
- 2. Railway Engineering by Satish Chandra & MM Agrawal, Oxford University Press.
- 3. Transportation Engineering, Volume-II- Railways, Airports, Docks and Harbours, Bridges and Tunnels by C. venkatramaih, Universities Press
- 4. Air-port Engineering by S.K.Khanna and M.G.Arora

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Describe different components of the rail track, their functions and its operation system with respect to construction and engineering applications.	1,3 & 5
2	Identify different failures of rails and explain different wheel and axis arrangements.	1,4
3	Design different geometric features of railway track	7.9,10
4	Design different types of Railway Point and Crossing	5,8
5	Explain essential features and requirements of different types of signaling and interlocking system.	5,7

		SEMESTER -	VIII						
Course Tit	le	Economic	s for E	ngine	eers				
Course cod		Fotal credits: 3	L	T	P	S	R	O/F	C
		Total hours: 36T	3	0	0	0	0	0	3
Pre-requisi		Co-requisite					Nil		
Programm	e	Bachelor of Techno		Civi	l Eng	ineerir	ıg		
Semester	1. The section 1 does here's	- C.E	VII						
Course Objectives	1. To understand the basics								
	2. To Apply the concepts of 3. To understand the Industr	ial Laws	ring						
CO1	Understand the principles of								
Apply the concepts of Economics in Engineering				S					
CO3	ehend the working hour	and ov	er du	tv					
CO4	Illustrate the ways to mitiga								
CO5	Appraise the financial aspec	ts of projects							
Unit-No.	Content		Cont	act]	Learnin	g Outcor	ne
			Hot	ır					
I	Introductory Macroecone	omics: What is			Und	erstand	l the pri	nciples of	economics
	Macroeconomics, Basic	concepts in							
	macroeconomics: significance		5						
	meaning, demand and supply.								
	of supply. Difference of r	nacroeconomics and							
TT	microeconomics	an malata d ta Matiamal			A	1 41		-4£ E	
II	Economic Indexes : Aggregat Income: Gross National P					concep g proble		conomics in	
				Ding	meerm	s proofe	1113		
		National Product (NNP), Gross Domestic Product							
		GDP) and Net Domestic Product (NDP). Fixed, Variable, Marginal & Average Costs, Recurring							
	and Nonrecurring Costs, Br								
	ROI, Payback period	Timely sis,							
III	<u> </u>	easures of central			Exp	lain th	e rights	s to con	nprehend the
	tendency, Relation between				_		_	over duty	1
	mode, Measure of dispersion,								
	Kurtosis, Probability dis	tribution, Binomial							
	distribution, Poisson dist	ribution, Test of							
	hypothesis, Chi-square distrib	oution, application of	10)					
	chi square test, ANOVA test,	Level of confidence,							
	Regression model, Simple	_							
	analysis, coefficient of coefficient								
	coefficient, Mean absolute de	viation (MAD), Mean							
	squared error(MSE)								
IV	Industrial laws: Laws re						•	_	te the hurdles
		Relations and Industrial Disputes: Industrial				iuiaii E	conomy		
	disputes act, 1947: definition								
	awards, settlement, strike								
	retrenchment and closure. The	8							
	1926, Laws related to health The Workmen's Compen	•							
	Provisions, and Social Legisla								
	Insurance Act 1948: De	- •							
	mourance Act 1940. De	inition, employees							

	provident fund. Miscellaneous Provision Act 1948: Schemes, Administration and determination of dues, Laws related to compensation management: The payment of Wages Act 1948: Objectives, Definition, and Authorised Deductions.		
V	Challenges in Indian Economy: Poverty- Main programmes for poverty alleviation, Human Capital Formation: How people become resource; Role of human capital in economic development; alternative farming - organic farming Employment: Growth and changes in work force participation rate in formal and informal sectors; Energy and Health: Sustainable Economic Development: Meaning, Effects of Economic Development on Resources and Environment, including global warming.	8	Appraise the financial aspects of projects

TEXT BOOKS:

- 1 Mankiw Gregory N. (2002), Principles of Economics, Thompson Asia
- 2 V. Mote, S. Paul, G. Gupta(2004), Managerial Economics, Tata McGraw Hill

REFERENCE BOOKS:

1: M Chakravarty, Estimating, Costing Specifications & Valuation

	CO PO Mapping									
SN	Course Outcome (CO)	Mapped Program Outcome								
1	Understand the principles of economics	1,3								
2	Apply the concepts of Economics in Engineering problems	1,2								
3	Explain the rights to comprehend the working hour and over duty	7,9								
4	Illustrate the ways to mitigate the hurdles to Indian Economy	6,7								
5	Appraise the financial aspects of projects	8.10								

		SEMEST	TER – VIII										
Course T	itle	History o	of Science and	d Engine	ering								
Course co	ode 22BTCM425E		L	T	P	S	R	O/F		C			
D	• • • • • • • • • • • • • • • • • • • •	Total hours: 36T		0	0	0	0	0		3			
Pre-requ		Co-requi		C' IF	•	•	Ni	<u> </u>					
Program Semester		Bachelor of Technology in Civil Engineering											
Course		VIII Develop a culture of critical reflection, intellectual curiosity, tolerance of ambiguity, scholarly											
Objective		d learning together	m, micriceta	ai cario	sity, t	oiciai	ice of	amore	surry,	scholarry			
(Minimu	m 3) 2. Identify and undevelop skills for 3. Make use of the	derstand tools to inquire or using these tools se tools to problematize on both oneself and others	different persp	pectives	as well	as sy	nthesi	ze persj	pectiv	es to form			
CO1	and in modern period Students will study Bhaskaracharya, Van	y the biography of dif rahamihira, Nagarjuna etc	fferent scient	ist like	Baud	hayar	ı, Ary	abhtatta					
CO3		e various research organi											
CO4		to study the Medical Sci											
CO5	It explores how scien	nce and technology have l	been used to r	nake sen	se of th	ne wo	rld, ar	id to coi	ntrol i	t.			
Unit- No.	Con		Contact Hour		Learn					KL			
I	Historical Perspective: and technology, Roo technology in India, Scientists and society, So rise of applied sciences.	ots of science and Science and society,	5	Students will understand the Beginning and Development in different field of science in ancient medieval, and in modern period						1,2			
П	Science and Technolo Development in differen	t branches of Science in conomy, Mathematics, one 2. Developments in oper, Bronze and Iron in copment of Geography:	5	Students differen Aryabht Bhaskar Nagarju	t sciei atta, achary	ntist	like B		yan, ıpta,	1,2			
III	Developments in Scien Medieval India: 1. Scier Developments in Medie the Islamic world and maktabs, madrasas and Developments in the Chemistry, Astronomy Innovations in the field crops introduced new tetc.	etific and Technological eval India; Influence of Europe; The role of karkhanas set up. 2. Fields of Mathematics, and Medicine. 3. If of agriculture - new	10	Student will study the various research organization like DRDO, CSIR, IRC, ISRO etc.						1,2			
IV	Developments in Science and Technology in Colonial India: 1. Early European Scientists in Colonial India- Surveyors, Botanists, Doctors, under the Company's Service. 2. Indian Response to new Scientific Knowledge, Science Students will be able to stude Medical Science of Ancient (Ayurveda & Yoga) (Ayurveda & Yoga)									1,2			

	and Technology in Modern India 3. Development of research organizations like CSIR and DRDO; Establishment of Atomic Energy Commission; Launching of the space satellites.			
V	Prominent scientist of India since beginning and their achievement: 1. Mathematics and Astronomy: Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna 2. Medical Science of Ancient India (Ayurveda & Yoga): Susruta, Charak, Yoga & Patanjali 3. Scientists of Modern India: Srinivas Ramanujan, C.V. Raman, Jagdish Chandra Bose, Homi Jehangir Bhabha and Dr. Vikram Sarabhai.	8	It explores how science and technology have been used to make sense of the world, and to control it.	1,2

TEXT BOOKS:

- 1 Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi -58
- 2 Srinivasan, M., Management of Science and Technology (Problems & Prospects), East-West Press (P) Ltd., New Delhi.

REFERENCE BOOKS:

1: Ramasamy, K.A., and Seshagiri Rao, K., (Eds), Science, Technology and education for Developlemnt, K., Nayudamma Memorial Science Foundation, Chennai -8

	CO PO Mapping	
SN	Course Outcome (CO)	Mapped Program Outcome
1	Students will understand the Beginning and Development in different field of science in ancient, medieval, and in modern period	1,3 & 4
2	Students will study the biography of different scientist like Baudhayan, Aryabhtatta, Brahmgupta, Bhaskaracharya, Varahamihira, Nagarjuna etc.	1,2
3	Student will study the various research organization like DRDO, CSIR, IRC, ISRO etc.	7.9,10
4	Students will be able to study the Medical Science of Ancient India (Ayurveda & Yoga)	5,7
5	It explores how science and technology have been used to make sense of the world, and to control it.	5,8

MAPPING TABLE (8th Semester)

Course code	Course Name	PO1	PO2	PO3	PO4	PO5	PO6	РО7	PO8	PO9	PO10	PO11	PO12
22BTCM421E	Soil Mechanics- II	3	3	1	1	1		1					1
22BTCM422E	Earthquake Engineering	2	3	2	1	1	1	1					1
22BTCM423R	Railway and Airport Engineering	3	3	1	1	1		1					1
22BTCM424E	Economics for Engineers											2	1
22BTCM425E	History of Science and Engineering		1										2