

## SEMESTER IV (B. Sc. IT)

### 0202023: DATABASE CONCEPTS AND SYSTEMS

Full Marks: 100

#### **Database Management System**

Marks: 10

Database: An Introduction; Conventional File Oriented System: Disadvantages of Conventional File Oriented System; Database Organisation; Basic Components of DBMS; Advantages and Disadvantages; Database Design: Design Process, Advantages of Developing a Database Designing Model

#### **Data Modelling**

Marks: 8

Introduction; Types of Data Models: Record Based Data Modelling, Hierarchical Data Model, Network Data Model, Relational Data Models; Object Based Data Model

#### **Introduction to Relational Database Management Systems**

Marks: 10

Relational Database Management System; Relational Data Structure; Keys; Constraints: Domain Constraints, Entity Integrity Constraint, Referential Integrity, Operational Constraints; Codd's 12 Rules

#### **Relational Database Management Systems and Normalisation**

Marks: 12

Relational Database Design; Key Constraints; Introduction to Normalisation: Problems Addressed; Normal Forms: First Normal Form (1NF), Second Normal Form (2NF), Third Normal Form, Boyce-Codd Normal Form, Fourth Normal Form (4NF)

#### **Database Design and Entity-Relationship Modelling**

Marks: 15

Introduction to Design Process: Design Process, Design Alternatives; Entity-Relationship Model; Components of an E-R Model: Entities and Entity Sets, Attributes; Entity-Relationship Diagram: Relationships and Relationship Sets, Terms Associated With Entities and Relationships, Other Styles of ER Diagram; Roles in ER Diagrams; Generalisation; Aggregation

#### **SQL: Queries and Subqueries**

Marks: 15

Introduction; SQL Data Types; Clauses in SQL; Types of Functions; Joining Tables; Subqueries: Predicate Subqueries, Quantified Subqueries, Scalar Subqueries, Correlated Subqueries, Table Subqueries; Grouping Queries; Union Queries; SQL Data Manipulation Language (DML); Data Definition Language (DDL); Views: Updating a View, SQL Dropping a View

#### **Database Security and Integrity**

Marks: 16

Introduction; Database Security Threats: Data Tampering, Identity Threats, Data Theft and Eavesdropping, Password-Related Threats, Unauthorised Access to Tables and Columns, Unauthorised Access to Data Rows; Data Security Requirements: Vulnerability Assessments, Monitoring of Database Protocol Traffic (SQL), Access Control, Authentication, Integrity, Availability; Roles; Granting and Revoking Privileges and Roles; Digital Signatures as Passwords for Data Security; Introduction to Data Integrity; Integrity Constraints: Entity Integrity Constraints, Referential Integrity, Domain Level Integrity, Column Integrity

## **Structure, Components, Functions and Implementation of Database Management System**

Marks: 14

Structure of DBMS; Execution Steps; Components; Functions and Services; Types of Database Systems: Centralised Database System, Parallel Database System, Client/Server Database System, Distributed Database Systems; Database Administrator; Transaction Processing: ACID criteria (Atomicity, Consistency, Isolation, Durability), Benefits of Transaction Processing, Implementation

### **Reference Books:**

1. Atluri, V & Hale, J., 2000. Research advances in database and information systems security: IFIP TC11 WG11.3 Thirteenth Working Conference on Database, Springer.
2. Connolly, T., 2008. Database Systems: A Practical Approach to Design, Implementation and Management, 4th ed., Pearson Education India.
3. Coronel, C., Morris, S., & Rob, P., 2009. Database systems: design, implementation and management, Cengage Learning.
4. Donahoo, J, D. & Speegle, G. D., 2005. SQL: practical guide for developers, Academic Press.
5. Haan, L.D., Daneil, F. & Morton, K., 2009. Beginning Oracle SQL, Apress.
6. Group, I., .Introduction to Database Management Systems, Tata McGraw-Hill Education.
7. McNicholas, M., 2007. Maritime security: an introduction, Butterworth-Heinemann.
8. Majumdar, 2001. Int To Dbms , Tata McGraw-Hill Education.

## **0202011: OPERATING SYSTEM**

Full Marks: 100

### **Introduction to Operating System**

Marks: 10

Introduction; Multiprocessor System; Distributed System; Real Time Systems; Operating System Services; System Calls; Virtual Machine

### **Process Management**

Marks: 8

Process Concept; Process Scheduling; Interprocess Communication; Multithreading Models; Threading Issues; System Thread: Linux Threads, Java Threads

### **CPU Scheduling**

Marks: 8

Basic Concepts of a System; Scheduling Criteria; Scheduling Algorithms; Multi-process Scheduling

### **Process Synchronisation**

Marks: 15

Process Synchronisation Concepts; The Critical-Section Problem; Classic Problems of Synchronisation; Atomic Transactions

### **Deadlocks**

Marks: 17

System Model; Deadlock Characterisation; Methods of Handling Deadlock; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection; Recovery from Deadlock

**Storage Management** Marks: 14

Memory Management Concept; Swapping; Contiguous Memory Allocation; Paging; Segmentation

**I/O Systems** Marks: 14

Application I/O Interface; Kernel I/O Subsystem; Disk Scheduling; RAID Structure

**Protection and Security** Marks: 14

Goals of Protection; Domain of Protection; Access Matrix; The Security Problem; Threats; Program Threats; System Threats

**Reference Books:**

1. Bacon, J. and Harris, T., 2003. Operating systems: concurrent and distributed software design, Addison-Wesley.
2. Bhatt, P. P., 2004. An Introduction to Operating Systems: Concepts and Practice, PHI Learning Pvt. Ltd.
3. Bhatt, P. P., 2007. Introduction To Operating Systems: Concepts And Practice, 2nd ed., PHI Learning Pvt. Ltd.
4. Bic, L. and Shaw, C. A., 2003. Operating systems principles, Prentice Hall.
5. Bosworth, S. and Kabay, E. M., Computer security handbook, John Wiley and Sons.
6. Chaudhury, P., 2009. Operating Systems: Principles and Design, PHI Learning Pvt. Ltd.
7. Cole, E., 2011. Network Security Bible, John Wiley & Sons.

**0202022: C++ and JAVA**

Full Marks: 100

**Object Oriented Programming** Marks: 12

Introduction; Basic Concepts; Paradigms of Programming Languages: Imperative Paradigm, Declarative Paradigm; Characteristics; Advantages

**Classes and Objects** Marks: 12

Introduction to Classes; Specifying; Creating Objects; Defining Member Functions; Static Data Members; Static Member Functions; Pointer to Members; Constructor: Copy Constructor; Destructors

**Inheritance and Polymorphism** Marks: 8

Introduction to Inheritance; Single Inheritance; Multiple Inheritance; Polymorphism

**Templates and Exception Handling** Marks: 14

Introduction to Templates; Function Templates: A Simple Function Template; Class Templates; Exceptions: Exception Syntax, Throwing an Exception, Handling Exceptions

**Introduction to JAVA** Marks: 14

Concept; Origin; A Virtual Machine; Java in Comparison to Other Languages; Object Oriented Programming Concepts in Java; Types concept in JAVA

**Classes, Objects and Methods** Marks: 9

Introduction; Defining a Class; Fields Declaration; Methods Declaration; Creating Objects

**Inheritance and Polymorphism in JAVA**

Marks: 16

Inheritance in JAVA; Protected Access; Overriding Methods: Dynamic Method Dispatching, The Super Keyword, Final Methods and Final Classes; Interfaces: The Implements Declaration; Polymorphism; Method Calling Binding; Producing the Right Behaviour; Extensibility; Overriding vs Overloading; Abstract Classes and Methods; Constructors and Polymorphism: Order of Constructor Calls

**Exception Handling in Java**

Marks: 15

Introduction to Exception Handling; The Classification of Exceptions; Advertising the Exceptions that a Method Throws; How to Throw an Exception; Creating Exception Classes; Catching Exceptions; Catching Multiple Exceptions; Rethrowing Exceptions

**Reference Books:**

1. Anderson, J. & Franceschi, H. 2008. *Java 6 illuminated: an active learning approach*. Jones & Bartlett Learning.
2. Barnes, D. & Barnes, D. J., 2000. *Object-oriented programming with Java: an introduction*, Prentice Hall.
3. Barnes, D. J. & Kolling, M., 2008. *Objects First With Java: A Practical Introduction Using BlueJ*. 4th ed., Prentice Hall.
4. Bronson, G. J., 2005. *Object-Oriented Program Development Using Java: A Class-Centered Approach*, 2nd ed., Course Technology.
5. Skinner, M. T., 1992. *The advanced C++ book, Volume 1*, Silicon Press.
6. Stelting, S., 2004. *Robust Java: Exception Handling, Testing, and Debugging*, Prentice Hall.

**0202133: e-COMMERCE**

Full Marks: 100

**Introduction to E-Commerce**

Marks: 11

E-Commerce Framework; Anatomy of E-Commerce Applications: Multimedia Content, Multimedia Storage Servers and E-Commerce Applications, Client-Server Architecture in Electronic Commerce, Information Delivery/Transport and E-Commerce Applications; E-Commerce Consumer Applications; E-Commerce Organisation Applications

**Electronic Payment System**

Marks: 11

Introduction to E-Payment System; Digital Token; Smart Cards; Credit Cards; Risks in Electronic Payment systems

**Inter Organisational E-Commerce**

Marks: 12

Introduction to EDI; EDI Implementation; Value Added Networks

**Intra Organisational E-Commerce**

Marks: 12

Workflow of Intra Organisational Commerce; Customisation and Internal Commerce; Supply Chain Management

**Corporate Digital Library**

Marks: 9

Document Library; Digital Document Types; Corporate Data Warehouses

**Advertising and Marketing**

Marks: 14

Information Based Marketing; Advertising on Internet; On-Line Marketing Process; Market Research

**Consumer Search and Resource Discovery**

Marks: 17

Information Search: Purchase Consummation Phase, Post Purchase Interaction Phase, Types of Consumer Search Activities; Information Retrieval; Commerce Catalogue; Information Filtering: Email Filtering, Mail-Filtering Agents, News-Filtering Agents

**Multimedia**

Marks: 13

Key Multimedia Concepts; Adapting Retrieval and Authoring Technologies; Digital Video and E-Commerce; Desktop Video Conferencing

**Reference Books:**

1. Armstrong, S. & Barrett, N., 2001. Advertising on the Internet: how to get your message across on the World Wide Web, Kogan Page.
2. Banerjee, K. U., 2008. Management Strategy for Information Technology (IT and management convergence): Based on the Internationally Class-Tested Course, Conducted in China and India, Concept Publishing Company.
3. Bidgoli, H., 2002. Electronic commerce: principles and practice, Academic Press.
4. Chapman, J. R., 2006. Simple tools and techniques of enterprise risk management, John Wiley & Sons.
5. Farhoomand, A. & Lovelock, P., 2001. Global e-commerce: text and cases, Prentice Hall.
6. Goel, R., 2007. E-Commerce, New Age International.
7. Hendry, M., 2001. Smart card security and applications, 2nd ed., Artech House.

**0202158: SOFTWARE ENGINEERING**

Full Marks: 100

**Introduction to Software Engineering**

Marks: 12

The Problem Domain: Industrial Strength Software, Software: Late and Unreliable, Software: Maintenance and Rework; Software Engineering Challenges: Scale, Quality and Productivity, Consistency and Repeatability, Change; Software Engineering Approach: Phased Development Process, Managing the Process, Requirement Analysis, Software Design, Coding, Testing

**Software Process**

Marks: 16

Introduction; Software Process Model: Linear Sequential Model, Prototyping Model; RAD Model 20; Evolutionary Software Process Model: The Incremental Model, The Spiral Model, The Concurrent Development Model; Component Based Model; Process Technology

**Software Development Life Cycle**

Marks: 12

Introduction; Requirement Analysis; Feasibility Study; Coding; Testing; Integration and Testing; Maintenance; Systems Analysis and Design

**Software Requirement Specification**

Marks: 12

Waterfall Model; Prototyping Model; Iterative Model; Spiral Model; Role of Management in Software Development; Problem Analysis; Requirement Specification

**System Design**

Marks: 13

Problem Partitioning; Abstraction; Top-Down and Bottom-Up Design; Structured Approach; Function v/s Object Oriented Approach; Design Specification and Verification

**Coding**

Marks: 10

Top-Down and Bottom Up Approach; Structured Programming; Information Hiding; Programming Style; Internal Documentation

**Testing**

Marks: 10

Levels: Functional Testing, Structural Testing, Test Plan, Test Cases Specifications, Reliability Assessment

**Software Project Management**

Marks: 15

Cost Estimation; Project Scheduling; Staffing: Benefits and drawbacks of IT staffing; Software Configuration Management; Quality Assurance; Project Monitoring; Risk Management

**Reference Books:**

1. Agarwal, B. B, and Tayal, P. S., 2007. *Software Engineering*, Firewall Media.
2. Blum, I. B., 1992. *Software engineering: a holistic view*, Oxford University Press.
3. Craig, D. R. and Jaskiel, P. S., 2002. *Systematic software testing*, Artech House.
4. Desikan, S. and Ramesh, G., 2006. *Software Testing: Principles and Practice*, Pearson Education India
5. Futrell, T. R., Shafer, F. D. and Shafer, L., 2002. *Quality software project management*, Prentice Hall Professional.
6. Jalote, P., 2002. *Software Project Management in Practice*, Pearson Education India.
7. Jawadekar, S. W., 2004. *Software Engineering: Principles and Practice*, Tata McGraw-Hill Education.