

**B.Sc. (Computer Science) – First Year(w.e.f. 2011-12)**

Paper No.	Title of Paper	Ext	Int	Ma	Exam Durations
		ern	ern	xim	
		al	al	um	
		Ma	Ass	Ma	
		rks	ess	rks	
			me		
			nt		
I	Computer Fundamentals & Programming in 'C'	40	10	50	3hrs
II	Logical Organization of Computer-I	40	10	50	3hrs
III	Practical (Programming in 'C')			50	3hrs
<b>Semester II</b>					
IV	PC-Software	40	10	50	3hrs
V	Logical Organization of Computer –II	40	10	50	3hrs
VI	Practical (PC-Software)			50	3hrs

**B.Sc. (Computer Science) - Second Year(w.e.f. 2012-13)**

Paper No.	Title of Paper	Ext	Int	Ma	Exam Durations
		ern	ern	xim	
		al	al	um	
		Ma	Ass	Ma	
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<b>Semester III</b>					
I	Data Structures using 'C'	40	10	50	3hrs
II	Structured System Analysis & Design	40	10	50	3hrs
III	Practical (Implementation of data structure in 'C')			50	3hrs
<b>Semester IV</b>					
IV	Operating Systems	40	10	50	3hrs
V	Programming in Visual Basic	40	10	50	3hrs
VI	Practical (Visual Basic)			50	3hrs

**B.Sc. (Computer Science) - Third Year(w.e.f. 2013-14)**

Paper No.	Title of Paper	Ext	Int	Ma	Exam Durations
		ern	ern	xim	
		al	al	um	
		Ma	Ass	Ma	
		rks	ess	rks	
			me		
			nt		
<b>Semester V</b>					
I	Programming in 'C++'	40	10	50	3hrs
II	Introduction to Data Base Systems	40	10	50	3hrs
III	Practical ('C++')			50	3hrs
<b>Semester VI</b>					
IV	Computer Networks	40	10	50	3hrs
V	Relational Database Management System	40	10	50	3hrs
VI	Practical (SQL)			50	3hrs

Internal assessment will be based on the following criteria:

1. Two Handwritten Assignments : 10%  
(1st Assignment after one month &  
Iind Assignment after two months)
2. One Class Test : 5%  
(one period duration)
3. Attendance : 5%

Marks for Attendance will be given as under:

- (1) 91% onwards : 5 Marks
- (2) 81% to 90% : 4 Marks
- (3) 75% to 80% : 3 Marks
- (4) 70% to 75% : 2 Marks\*
- (5) 65% to 70% : 1 Mark\*

**\*FOR STUDENTS ENGAGED IN CO-CURRICULAR ACTIVITIES OF THE  
COLLEGES ONLY/AUTHENTICATED MEDICAL GROUNDS DULY APPROVED  
BY THE CONCERNED PRINCIPAL.**

# **PAPER-I COMPUTER FUNDAMENTALS AND PROGRAMMING IN 'C'**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

## **UNIT-I**

Computer Fundamentals: Definition, Block Diagram along with its components, characteristics & classification of computers.

Computer hardware & software: Definition of software, relationship between hardware and software, types of software.

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Documentation.

Techniques of Problem Solving: Flowcharting, algorithms, pseudo code, decision table, Structured programming concepts, Programming methodologies viz. top-down and bottom-up programming.

## **UNIT-II**

Overview of C: History of C, Importance of C, Structure of a C Program.

Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant.

Input/output: Unformatted & formatted I/O function, Input functions viz. scanf(), getch(), getche(), getchar(), gets(), output functions viz. printf(), putchar(), puts().

Operators & Expression: Arithmetic, relational, logical, bitwise, unary, assignment, conditional operators and special operators. Arithmetic expressions, evaluation of arithmetic expression, type casting and conversion, operator hierarchy & associativity.

## **UNIT-III**

Decision making & branching: Decision making with IF statement, IF-ELSE statement, Nested IF statement, ELSE-IF ladder, switch statement, goto statement.

Decision making & looping: For, while, and do-while loop, jumps in loops, break, continue statement.

## **UNIT-IV**

Functions: Definition, prototype, passing parameters, recursion.

Storage classes in C: auto, extern, register and static storage class, their scope, storage, & lifetime.

Arrays: Definition, types, initialization, processing an array, Strings & arrays.

## **TEXT BOOKS**

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill
2. Balagurusamy, E., Computing Fundamentals and C Programming, Tata McGraw-Hill

## **REFERENCE BOOKS**

1. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
2. Yashwant Kanetker, Let us C, BPB
3. Rajaraman, V., Computer Programming in C, PHI
4. Yashwant Kanetker, Working with C, BPB

## **PAPER-II LOGICAL ORGANIZATION OF COMPUTER-I**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### **UNIT I**

Information Representation: Number Systems, Binary Arithmetic, Fixed-point and Floating-point representation of numbers, BCD Codes, Error detecting and correcting codes, Character Representation – ASCII, EBCDIC, Unicode

### **UNIT II**

Binary Logic: Boolean Algebra, Boolean Theorems, Boolean Functions and Truth Tables, Canonical and Standard forms of Boolean functions, Simplification of Boolean Functions – Venn Diagram, Karnaugh Maps.

### **UNIT III**

Digital Logic: Basic Gates – AND, OR, NOT, Universal Gates – NAND, NOR, Other Gates – XOR, XNOR etc. NAND, NOR, AND-OR-INVERT and OR-AND-INVERT implementations of digital circuits, Combinational Logic – Characteristics, Design Procedures, analysis procedures, Multilevel NAND and NOR circuits.

### **UNIT IV**

Combinational Circuits: Half-Adder, Full-Adder, Half-Subtractor, Full-Subtractor, Encoders, Decoders, Multiplexers, Demultiplexers, Comparators, Code Converters, BCD to Seven-Segment Decoder.

### **TEXT BOOKS**

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

### **REFERENCE BOOKS**

1. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

## **PAPER-IV PC SOFTWARE**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### **UNIT I**

MS-Windows: Operating system-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

### **UNIT-II**

Documentation Using MS-Word - Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-Word-Mail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

### **UNIT III**

Electronic Spread Sheet using MS-Excel - Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation, Database Management using Excel-Sorting, Filtering, Table, Validation, Goal Seek, Scenario.

### **UNIT IV**

Presentation using MS-PowerPoint: Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds, Inserting Animated Pictures or Accessing through Object, Inserting Recorded Sound Effect or In-Built Sound Effect.

### **TEXT BOOKS**

1. Microsoft Office – Complete Reference – BPB Publication
2. Learn Microsoft Office – Russell A. Stultz – BPB Publication

### **REFERENCES BOOKS**

1. Courter, G Marquis (1999). Microsoft Office 2000: Professional Edition. BPB.
2. Koers, D (2001). Microsoft Office XP Fast and Easy. PHI.
3. Nelson, S L and Kelly, J (2002). Office XP: The Complete Reference. Tata McGraw-Hill.

## **PAPER-V LOGICAL ORGANIZATION OF COMPUTER-II**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### **UNIT I**

Sequential Logic: Characteristics, Flip-Flops, Clocked RS, D type, JK, T type and Master-Slave flip-flops. State table, state diagram and state equations. Flip-flop excitation tables

### **UNIT II**

Sequential Circuits: Designing registers – Serial Input Serial Output (SISO), Serial Input Parallel Output (SIPO), Parallel Input Serial Output (PISO), Parallel Input Parallel Output (PIPO) and shift registers. Designing counters – Asynchronous and Synchronous Binary Counters, Modulo-N Counters and Up-Down Counters

### **UNIT III**

Memory & I/O Devices: Memory Parameters, Semiconductor RAM, ROM, Magnetic and Optical Storage devices, Flash memory, I/O Devices and their controllers.

### **UNIT IV**

Instruction Design & I/O Organization: Machine instruction, Instruction set selection, Instruction cycle, Instruction Format and Addressing Modes. I/O Interface, Interrupt structure, Program-controlled, Interrupt-controlled & DMA transfer, I/O Channels, IOP.

### **TEXT BOOKS**

1. M. Morris Mano, Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. V. Rajaraman, T. Radhakrishnan, An Introduction to Digital Computer Design, Prentice Hall of India Pvt. Ltd.

### **REFERENCE BOOKS**

1. Andrew S. Tanenbaum, Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
2. Nicholas Carter, Schaum's Outlines Computer Architecture, Tata McGraw-Hill

## PAPER – I DATA STRUCTURES USING ‘C’

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

The concept of data structure, Abstract data type, data structure operations, algorithms complexity, time-space tradeoff. Introduction to strings, storing strings, string operations, pattern matching algorithms.

### UNIT – II

Linked list: Introduction and basic operations, Header nodes, Doubly Linked List, Circular Linked List, Applications of Linked List. Stack: primitive operation on stack, Representation of Stack as Linked List and array, Stacks applications.

### UNIT – III

Introduction to queues, Primitive Operations on the Queues, Circular queue, Priority queue, Representation of Queues as Linked List and array, Applications of queue.

Trees - Basic Terminology, Binary Trees, Tree Representations using Array & Linked List, Basic operation on Binary tree, Traversal of binary trees:- In order, Preorder & post order, Applications of Binary tree.

### UNIT – IV

Introduction to graphs, Definition, Terminology, Directed, Undirected & Weighted graph, Representation of graphs.

Searching: linear search, Binary search, Sorting: Insertion sort, Selection sort, Quick sort, Bubble sort.

### TEXT BOOKS

1. Seymour Lipschutz, “Data Structures”, Tata McGraw- Hill Publishing Company Limited, Schaum’s Outlines, New Delhi.
2. Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, “Data Structures Using C”, Prentice Hall of India Pvt. Ltd., New Delhi.

### REFERENCE BOOKS

1. Trembley, J.P. And Sorenson P.G., “An Introduction to Data Structures With Applications”, Mcgraw- Hill International Student Edition, New York.
2. Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City. Prentice- Hall Of India Pvt. Ltd., New Delhi.

## PAPER – II STRUCTURED SYSTEM ANALYSIS AND DESIGN

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

System Concept: Definition, Characteristics, Elements of system, Physical and abstract system, open and closed system, man-made information systems.

System Development Life Cycle: Various phases of system development, Considerations for system planning and control for system success.

Role of system analyst.

### UNIT – II

System Planning: Bases for planning in system analysis: Dimensions of Planning.

Initial Investigation: Determining user's requirements and analysis, fact finding process and techniques.

Tools of structured Analysis: Data Flow diagram, data dictionary, IPO and HIPO charts, Gantt charts, pseudo codes, Flow charts, decision tree, decision tables.

Feasibility study: Technical, Operational & Economic Feasibilities.

### UNIT – III

Cost/Benefit Analysis: Data analysis cost and benefit analysis of a system.

Input/ Output and Form Design, File Organization and database design: Introduction to files and database, File structures and organization, objectives of database design, logical and physical view of data.

### UNIT – IV

System testing: Introduction, objectives of testing, test planning, testing techniques.

Quality assurance: Goal of quality assurance, levels of quality assurance

System implementation and software maintenance: primary activities in maintenance, reducing maintenance costs.

### TEXT BOOKS:

1. Awad M. Elias, "System Analysis and Design", Galgotia Publication.

### REFERENCE BOOKS:

1. Igor Hawryszkiewycz, "Introduction to System Analysis and Design", 4th edition, Prentice-Hall.
2. Jeffrey L. Whitten, and Lonnie D. Bentley, "Systems analysis and Design Methods", 4th edition, Tata McGraw-Hill.
3. Mark Lejk, and David Deeks, "An Introduction to System Analysis Techniques", Prentice Hall.
4. Don Yeates, Maura Shields and David Helmy, "System Analysis and Design", Longman group limited, 1994.



## PAPER – IV OPERATING SYSTEMS

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

Introductory Concepts: Operating system functions and characteristics, historical evolution of operating systems, Real time systems, Distributed systems, Methodologies for implementation of O/S service system calls, system programs.

### UNIT – II

Process management: Process concepts, Process states and Process Control Block.

CPU Scheduling: Scheduling criteria, Levels of Scheduling, Scheduling algorithms, Multiple processor scheduling.

Deadlocks: Deadlock characterization, Deadlock prevention and avoidance, Deadlock detection and recovery, practical considerations.

### UNIT – III

Concurrent Processes: Critical section problem, Semaphores, Classical process co-ordination problems and their solutions, Inter-process Communications.

Storage Management: memory management of single-user and multiuser operating system, partitioning, swapping, paging and segmentation, virtual memory, Page replacement Algorithms, Thrashing.

### UNIT – IV

Device and file management: Disk scheduling, Disk structure, Disk management, File Systems: Functions of the system, File access and allocation methods, Directory Systems: Structured Organizations, directory and file protection mechanisms.

### TEXT BOOKS:

1. Silberschatz A., Galvin P.B., and Gagne G., “Operating System Concepts”, John Wiley & Sons, Inc., New York.
2. Godbole, A.S., “Operating Systems”, Tata McGraw-Hill Publishing Company, New Delhi.

### REFERENCE BOOKS:

1. Deitel, H.M., “Operating Systems”, Addison- Wesley Publishing Company, New York.
2. Tanenbaum, A.S., “Operating System- Design and Implementation”, Prentice Hall of India, New Delhi.

## PAPER – V PROGRAMMING IN VISUAL BASIC

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

Introduction to VB: Visual & non-visual programming, Procedural, Object-oriented and event-driven programming languages, The VB environment: Menu bar, Toolbar, Project explorer, Toolbox, Properties window, Form designer, Form layout, Immediate window. Visual Development and Event Driven programming.

### UNIT – II

Basics of Programming: Variables: Declaring variables, Types of variables, Converting variables types, User-defined data types, Forcing variable declaration, Scope & lifetime of variables. Constants: Named & intrinsic. Operators: Arithmetic, Relational & Logical operators. I/O in VB: Various controls for I/O in VB, Message box, Input Box, Print statement.

### UNIT – III

Programming with VB: Decisions and conditions: If statement, If-then-else, Select-case. Looping statements: Do-loops, For-next, While-wend, Exit statement. Nested control structures. Arrays: Declaring and using arrays, one-dimensional and multi-dimensional arrays, Static & dynamic arrays, Arrays of array. Collections: Adding, Removing, Counting, Returning items in a collection, Processing a collection.

### UNIT – IV

Programming with VB: Procedures: General & event procedures, Subroutines, Functions, Calling procedures, Arguments- passing mechanisms, Optional arguments, Named arguments, Functions returning custom data types, Functions returning arrays.

Working with forms: Adding multiple forms in VB, Hiding & showing forms, Load & unload statements, Activate & deactivate events, Form-load event, menu designing in VB

Simple programs in VB.

### TEXT BOOKS:

1. Steven Holzner, “Visual Basic 6 Programming: Black Book”, Dreamtech Press.
2. Evangelos Petroustos. “Mastering Visual Basic 6”, BPB Publications.
3. Julia Case Bradley & Anita C. Millspaugh, “Programming in Visual Basic 6.0”, Tata McGraw-Hill Edition

### REFERENCE BOOKS:

1. Michael Halvorson, “Step by Step Microsoft Visual Basic 6.0 Professional”, PHI
2. “Visual basic 6 Complete”, BPB Publications.
3. Scott Warner, “Teach Yourself Visual basic 6”, Tata McGraw-Hill Edition
4. Brian Siler and Jeff Spotts, “Using Visual Basic 6”, Special Edition, PHI.

## **PAPER I      PROGRAMMING in 'C++'**

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### **UNIT – I**

Introduction to Programming C++: Object-Oriented Features of C++, Class and Objects, Data Hiding & Encapsulation, Structures, Data members and Member functions, Inline Functions, Static Data Members and Member Functions, Friend Functions, Preprocessor Directives, Namespace, Comparing C with C++.

### **UNIT – II**

Constructors & Destructors: Roles and types of Constructors, Roles of Destructors, Dynamic Memory Allocation: Pointers and their Manipulation, new and delete Operators 'this' Pointer. Console I/O: Formatted and Unformatted I/O, Manipulators.

### **UNIT – III**

Compile-Time Polymorphism: Unary and Binary Operators overloading through Member Functions and Friend Functions, Function Overloading.

Inheritance: Types of Derivations, Forms of Inheritance, Roles of Constructors and Destructors in Inheritance.

### **UNIT – IV**

Genericity in C++: Template Function, Template Class, Inheritance and Templates.

Exception Handling: try, throw and catch constructs, rethrowing an exception, catch all Handlers.

### **TEXT BOOKS:**

1. Herbert Schildt, C++, The Complete Reference, Tata McGraw-Hill
2. Robert Lafore, Object Oriented Programming in C++, PHI

### **REFERENCE BOOKS:**

1. Bjarne Stroustrup, The C++ Programming Language, Pearson.
2. Balaguruswami, E., Object Oriented Programming In C++, Tata McGraw-Hill

## PAPER – II INTRODUCTION TO DATABASE SYSTEMS

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

Basic Concepts – Data, Information, Records and files. Traditional file –based Systems-File Based Approach-Limitations of File Based Approach, Database Approach-Characteristics of Database Approach, Database Management System (DBMS), Components of DBMS Environment, DBMS Functions and Components, Advantages and Disadvantages of DBMS.

Roles in the Database Environment - Data and Database Administrator, Database Designers, Applications Developers and Users.

### UNIT – II

Database System Architecture – Three Levels of Architecture, External, Conceptual and Internal Levels, Schemas, Mappings and Instances.

Data Independence – Logical and Physical Data Independence.

Classification of Database Management System, Centralized and Client Server architecture to DBMS.

Data Models: Records- based Data Models, Object-based Data Models, Physical Data Models and Conceptual Modeling.

### UNIT – III

Entity-Relationship Model – Entity Types, Entity Sets, Attributes Relationship Types, Relationship Instances and ER Diagrams.

Basic Concepts of Hierarchical and Network Data Model.

### UNIT – IV

Relational Data Model:-Brief History, Relational Model Terminology-Relational Data Structure, Database Relations, Properties of Relations, Keys, Domains, Integrity Constraints over Relations, Base Tables and Views.

### TEXT BOOKS:

4. Elmasri & Navathe, “Fundamentals of Database Systems”, 5th edition, Pearson Education.

### REFERENCE BOOKS:

1. Thomas Connolly Carolyn Begg, “Database Systems”, 3/e, Pearson Education
2. C. J. Date, “An Introduction to Database Systems”, 8<sup>th</sup> edition, Addison Wesley N. Delhi.

## PAPER IV COMPUTER NETWORKS

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

Introduction to Computer Communications and Networking Technologies; Uses of Computer Networks; Network Devices, Nodes, and Hosts; Types of Computer Networks and their Topologies; Network Software: Network Design issues and Protocols; Connection-Oriented and Connectionless Services; Network Applications and Application Protocols; Computer Communications and Networking Models: Decentralized and Centralized Systems, Distributed Systems, Client/Server Model, Peer-to-Peer Model, Web-Based Model, Network Architecture and the OSI Reference Model; Example Networks: The Internet, X.25, Frame Relay, ATM;

### UNIT – II

Analog and Digital Communications Concepts: Representing Data as Analog Signals, Representing Data as Digital Signals, Data Rate and Bandwidth, Capacity, Baud Rate; Digital Carrier Systems; Guided and Wireless Transmission Media; Communication Satellites; Switching and Multiplexing; Dialup Networking; Analog Modem Concepts; DSL Service;

### UNIT – III

Data Link Layer: Framing, Flow Control, Error Control; Error Detection and Correction; Sliding Window Protocols; Media Access Control: Random Access Protocols, Token Passing Protocols; Token Ring; Introduction to LAN technologies: Ethernet, switched Ethernet, VLAN, fast Ethernet, gigabit Ethernet, token ring, FDDI, Wireless LANs; Bluetooth; Network Hardware Components: Connectors, Transceivers, Repeaters, Hubs, Network Interface Cards and PC Cards, Bridges, Switches, Routers, Gateways;

### UNIT – IV

Network Layer and Routing Concepts: Virtual Circuits and Datagrams; Routing Algorithms; Congestion Control Algorithms; Internetworking; Network Security Issues: Security threats; Encryption Methods; Authentication; Symmetric –Key Algorithms; Public-Key Algorithms;

#### TEXT BOOKS:

1. Michael A. Gallo, William M. Hancock, “Computer Communications and Networking Technologies”, CENGAGE Learning.
2. Andrew S. Tanenbaum, “Computer Networks”, Pearson Education.

#### REFERENCE BOOKS:

1. James F. Kurose, Keith W. Ross, “Computer Networking”, Pearson Education.
2. Behrouz A Forouzan, “Data Communications and Networking”, McGraw Hill.

## PAPER – V RELATIONAL DATABASE MANAGEMENT SYSTEM

**Note:** Examiner will be required to set Nine Questions in all. First Question will be compulsory, consisting of six (objective type/short-answer type) questions covering the entire syllabus. In addition to that eight more questions will be set, two questions from each Unit. A candidate will be required to answer five questions in all, selecting one question from each unit in addition to compulsory Question No. 1. All questions will carry equal marks.

**Maximum Marks: 50**

**External: 40**

**Internal: 10**

**Time: 3 hours**

### UNIT – I

Relational Model Concepts, Codd's Rules for Relational Model,  
Relational Algebra:-Selection and Projection, Set Operation, Renaming, Join and Division.  
Relational Calculus: Tuple Relational Calculus and Domain Relational Calculus.

### UNIT – II

Functional Dependencies and Normalization:-Purpose, Data Redundancy and Update Anomalies.  
Functional Dependencies:-Full Functional Dependencies and Transitive Functional Dependencies,  
Characteristics of Functional Dependencies.  
Decomposition and Normal Forms (1NF, 2NF, 3NF & BCNF).

### UNIT – III

SQL: Data Definition and data types, Specifying Constraints in SQL, Schema, Change statement,  
Basic Queries in SQL, Insert, Delete and Update Statements, Views.

### UNIT – IV

PL/SQL-Introduction, Advantages of PL/SQL,  
The Generic PL/SQL Block: PL/SQL Execution Environment,  
PL/SQL Character set and Data Types,  
Control Structure in PL/SQL.

### TEXT BOOKS:

1. Elmasri & Navathe, "Fundamentals of Database Systems", 5th edition, Pearson Education.
2. Ivan Bayross, "SQL, PL/SQL-The Programming Language of ORACLE", BPB Publications 3<sup>rd</sup> edition.

### REFERENCE BOOKS:

1. C. J. Date, "An Introduction to Database Systems", 8<sup>th</sup> edition, Addison Wesley N. Delhi.