COMPUTER SCIENCE (COMS)

Class - XII

Full Marks 100

THEORY (70 Marks)

A. Sequential Logic Circuits: (15 Marks)

- Concept of Asynchronous and Synchronous Circuits
- Positive and Negative Edge Triggers
- Concept of Latch and Flip Flops
- SR Flip Flops using NAND and NOR gates
- D, JK, T and Master-Slave Flip Flops
- Serial and Parallel Registers :
    - SISO, SIPO, PIPO, PISO
- Concept of Asynchronous and Synchronous Counters
    - Block diagram and working of Asynchronous Counter (Up / Down Ripple Counter)
    - Block diagram and working of Decode Counter
    - Block diagram and working of Synchronous Counter
    - Block diagram and working of Ring Counter
    - Block diagram and working of Johnson Counter

B. Programming in C and Data Structures: (15 Marks)

- Pointers in C- Definition, Pointers and Arrays, Array of Pointers, Pointer to an Array, Pointer and Strings, Pointer and 2D array, Pointer and Structures, Pointers and Functions, Dynamic Memory Allocation
- Command Line Arguments
- I/O File Handling in C (Text Files and Binary Files)
    - Concept of File Pointer
    - Modes of opening in file
    - Use of functions open, close, put, puts, print, fgetc, gets, scan, tell, seek, rewind, write, read
- Data Structures in C (Both Algorithm and Program)
    - Single Linked List– Create, Display, Add and Delete Nodes from a List, Search from a list, Reverse a list (physically reverse a list, display list in reverse order)
    - Stack using Arrays; Push and Pop Operations
    - Queue using Arrays; Store and Retrieve Operations (only simple linear queue)
    - Application of Linked List :
        - Creating Stack and Queue using Linked List

- Application of Stack:
  - Infix, Prefix and Postfix notations
  - Infix to Postfix conversion (only conversion using rules, program not required)
  - Evaluation of Postfix expression (only evaluation using rules, program not required)

C. Networking: (15 Marks)

- **Introduction to Networking (Definition, Advantage, Disadvantage, Application)**
  - Analogue and Digital Communication
  - Modes of Communication: Simplex, Half Duplex and Full Duplex Communication
  - Types of Network – LAN, MAN, WAN
  - Network Architecture : Client Server & Peer-to-Peer Networks
  - Serial and Parallel Communication
  - Bandwidth, Channel Capacity, Baud
  - Synchronous and Asynchronous Transmission Modes
  - Baseband and Broadband Networks
- **Components of a Network**
  - Servers (File server, Communication Server, Print Server) and Workstation
  - NIC
  - Guided Media
    - Cables – UTP, STP, Co-axial, Fibre Optic
  - Unguided Media
    - Infra-red, Radio & Microwave Communication, Satellite
  - Network Operating System – Characteristics
- **Network Topologies -**
  - Bus
  - Ring
  - Star
  - Mesh
- **Network Connecting Devices –**
  - Hub
  - Repeater
  - Bridge
  - Switch
  - Router
  - Gateways

- **LAN Protocols**
  - Ethernet (CSMA /CD) and Token Ring Protocol
- **Switching Technique**
  - Circuit, Message and Packet Switching
- **Use of MODEM**
- **TCP / IP Protocols**
  - TCP, IP, UDP, FTP, HTTP, TELNET
- **IP Addressing**
  - Class A, Class B, Class C IP addresses
- **Domain Name System**
- **URL**
- **Introduction to Internet**
  - Basic requirement for connecting to the Internet, ISP
  - Services provided by Internet– www, browser, e-mail, search engine, social networking
  - Networking Security – Computer Virus, Concept of Firewall, Password
- **HTML**
  - Basic Page Design, Using Ordered and Unordered Lists, Using Image, Hyperlinking, Using Tables

D. Database Management System (15 Marks)

- **Introduction of Database :**
  - Definition of Database
  - Database Languages (DDL, DML, DCL)
  - DBMS and its components
  - Various Data Models – ER Model, Hierarchical Model, Network Model, Relational Model (only concepts)
- **Relational Model**
  - Concept of Relation, Tuple, Attribute, Domain, Degree, Cardinality
  - Concept of Keys – Key, Super Key, Candidate Key, Primary Key, Alternate Key
  - Concept of Relationships – 1:1, 1:N, N:M relationships
  - Database Constraints – Equity Integrity Constraint, Domain Constraint, Referential Integrity Constraint and Concept of Foreign Key
  - Functional Dependency – Full, Partial, Transitive and Trivial Dependencies
  - Database Anomalies – Insertion, Deletion and Updation Anomaly

- Normalisation – Definition, Different Normal Forms (Normalising a Relation up to 3NF)

- **Relational Algebra**
  - Selection Operation
  - Projection Operation
  - Set Operation
  - Cartesian Product
  - Natural Join Operation

- **SQL**
  - CREATE TABLE, ALTER TABLE, DROP TABLE
  - INSERT, DELETE, UPDATE
  - SELECT (DISTINCT, FROM, WHERE, AND, OR , IN, NOT, IN, BETWEEN, LIKE, GROUP BY, HAVING, ORDER BY)
  - SUM, AVG, COUNT, MAX, MIN
  - GRANT, REVOKE, ROLLBACK

E. Introduction to Object Oriented Programming (10 Marks)

- **Basic Concept of OOP**
  - Data Abstraction
  - Encapsulation
  - Inheritance
  - Polymorphism
- **Implementing OOP using C++**
  - Basic input / output, branching, looping (simple programs)
  - Definition of a Class
  - Members of Class – Data Members and Member Functions;
  - Concept of Constructor and Destructor (Programming not required)
  - Object Creation and accessing members of a Class (simple programs)

F. Practical (30 marks)

- **Programming in C (Coding, Execution) (10 marks)**
  - One programming problem in C to be developed and tested in computer during the examination. Marks are allotted on the basis of the following:
    - Logic (5 marks)
    - Documentation (2 marks)
    - Output presentation (3 marks)
  - Types of problems to be given will be of application type from the following topics:

- Linked List manipulation
- Stack using array and linked implementation
- Queue using array and linked implementation (only linear queue)
- Text and Binary File operations (creation, display, searching, modification)

- **Web Page design using HTML and SQL (command as per theory syllabus) (5 marks)**
- **Project Work (one project using C and one project using HTML) (5 marks)**
  - **Suggestive Topics:**
    - Application of C (Program on any one of following topics):
      - Problem related to Numerical Analysis–Bisection Method, Trapezoidal Rule
      - Creation and manipulation of telephone index using concept of files
      - Creation and addition of polynomials using Linked Lists
    - Web page designing using HTML (minimum 5 linked pages)
      - Travel and Tourism
      - Festivals
      - Book Catalogue
      - Pollution and pollution control

- **Laboratory Copy (5 marks)**

- **Viva Voce (5 marks)**