# 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

- o 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)**
  - o Analogue and Digital Communication
  - o Modes of Communication: Simplex, Half Duplex and Full Duplex Communication
  - o Types of Network – LAN, MAN, WAN
  - o Network Architecture : Client Server & Peer-to-Peer Networks
  - o Serial and Parallel Communication
  - o Bandwidth, Channel Capacity, Baud
  - o Synchronous and Asynchronous Transmission Modes
  - o Baseband and Broadband Networks

- **Components of a Network**
  - o Servers (File server, Communication Server, Print Server) and Workstation
  - o NIC
  - o Guided Media
    - Cables – UTP, STP, Co-axial, Fibre Optic
  - o Unguided Media
    - Infra-red, Radio & Microwave Communication, Satellite
  - o Network Operating System – Characteristics

- **Network Topologies -**
  - o Bus
  - o Ring
  - o Star
  - o Mesh

- **Network Connecting Devices –**
  - o Hub
  - o Repeater
  - o Bridge
  - o Switch
  - o Router
  - o 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

- o Normalisation – Definition, Different Normal Forms (Normalising a Relation up to 3NF)
- ▪ **Relational Algebra**
  - o Selection Operation
  - o Projection Operation
  - o Set Operation
  - o Cartesian Product
  - o Natural Join Operation

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

## E. Introduction to Object Oriented Programming           (10 Marks)
- ▪ **Basic Concept of OOP**
  - o Data Abstraction
  - o Encapsulation
  - o Inheritance
  - o Polymorphism
- ▪ **Implementing OOP using C++**
  - o Basic input / output, branching, looping (simple programs)
  - o Definition of a Class
  - o Members of Class – Data Members and Member Functions;
  - o Concept of Constructor and Destructor (Programming not required)
  - o Object Creation and accessing members of a Class (simple programs)

## F. Practical                                                      (30 marks)
- ▪ **Programming in C (Coding, Execution)           (10 marks)**
  - o 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)
  - o 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)**

  o **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)**