

STD XII

COMPUTER SCIENCE SYLLABUS

UNIT NO	NAME OF TOPIC	MAX MARKS
1	PROGRAMMING IN C++	20
2	DATA STRUCTURES USING C++	12
3	FILE HANDLING	08
4	BOOLEAN ALGEBRA	08
5	COMPUTER NETWORKS	07
TOTAL		55

SUGGESTED ASSIGNMENTS (any one)

1. Programs in C++ (Minimum 2), involving concepts related to Classes & Objects, Function Overloading, Inheritance, Constructors and Destructors.
2. Problem solving in Stack, Queues, Arrays and Linked list.

For Example-Evaluation of postfix expression
Conversion from infix to postfix expression
Problems on Stacks and Queues etc.
3. Programs on basic file operations (Read, Write, Update, Search, Append etc)
4. Problems based on SQL (Given a table ,writing queries using SQL commands)
5. Problems based on: K-MAPS
Implementation of NAND –NOR & NOR-NAND logic
Designing circuits using universal gates.
6. Presentations can be prepared on any topic related to computer networks.

N.B. Viva can be conducted on any of the related topics

The criteria for the evaluation of the assignments should be based on the following. (As applicable for the appropriate assignments).

1. Understanding of concepts
2. Knowledge w.r.t. the assignment given
3. Content (for presentations)
4. Logic (for programs)
5. Test Cases- Programs should be tested for different set of inputs.

UNIT-I : PROGRAMMING IN C++(20 MARKS)

1. C++ Fundamentals:

- C++ character set
- Identifiers and Keywords
- Data Types: int, float, char, double, void
- Qualifiers: short, long, signed, unsigned, const
- Constants (Integer, Floating point, character, string, enumeration constants, symbolic constants)
- Escape Sequence (\b, \t, \n, \v, \a, \f, \r, \0)
- Variables and Declaration, Dynamic initialization of variables, reference

Variables

2. Operators and Expressions:

- Unary Operators: unary minus, ++, --, !, sizeof(), typecast
- Arithmetic Operators: *, /, %, +, -
- Relational Operators: <, <=, >, >=
- Equality Operators: ==, !=
- Logical Operators: &&, ||
- Conditional Operator: ?:
- Assignment Operator: =, +=, -=, *=, /=, %=
- Scope resolution operators (::)
- Memory management operators: new(), delete()
- Operator precedence and associativity

3. Data Input and Output

- Header file <iostream.h>
- Using cin and cout with Insertion and extraction operators
- Manipulators:

Definition, Header file <iomanip.h>

setw, endl, setprecision, setfill, setiosflags, resetiosflags

Flags : ios::left, ios::right, ios::scientific, ios::fixed, ios::showpos, ios::showpoint, ios::skipws, ios::unitbuf.

4. Use of editor, basic commands of editor, Compilation, Linking and Execution of Program, Debugging.

5. Control Statements :

If-else statements, while statement, do-while statement, for statement, switch statement.
break statement, continue statement

Comma operator.

6. Functions:

Definition, Concept, General Form, Function Declaration, Function Call (pass by value, pass by reference using pointers and pass by reference using reference variable), function definition, Calling function with arrays as parameters, Return by Reference, Inline Functions, Functions with Default Parameters, Function overloading, Local and Global variables

Built-in Functions: <string.h>: strlen(), strcmp(), strcat(), strcpy()

<math.h> : log(), log10(), pow(), sqrt(), sin(), cos(), abs()

<ctype.h>: isalnum(), isdigit(), islower(), isupper(), tolower(), toupper(), isalpha(), isspace().

<stdio.h>: gets(), puts(), getchar(), putchar()

<conio.h>: clrscr(), getch()

7. Basic concepts of Object Oriented Programming:

Definition, Objects, Classes, Data Abstraction, Data Encapsulation, Inheritance, Polymorphism

Characteristics of Object Oriented Programming

8. Classes and Objects:

Definition of class and object, Declaration of class, Defining member functions (inside the class and outside the class), Creating Objects, Accessing Class Members, Array of objects, Objects as function argument, Functions returning objects.

9. Constructors and Destructors:

Definition and characteristics of constructors, Default Constructor, Constructor with Default Arguments, Parameterised constructors (explicit call, implicit call), Constructor overloading, Copy Constructor, Dynamic Constructor, Dynamic Initialization of objects, Destructor Definition and characteristics.

10. Inheritance:

Definition, Concept of Inheritance: Base, and derived classes, Type of Inheritance: single, multiple, multilevel, hierarchical and hybrid. Defining Derived Class: Visibility modes (public, private, protected), Public Derivation, Private Derivation, Protected Derivation, Virtual base classes, Abstract classes, Constructors in Derived classes, Containership.

UNIT II : DATA STRUCTURES USING C++ (12 MARKS)

1) Arrays

- **One Dimensional arrays**

Definition, Declaration, Reading, Displaying, Accessing.

Algorithm and Program for inserting and deleting an element in an array.

Memory allocation.

Sorting: Definition, sorting techniques (Insertion Sort, Selection Sort, Bubble Sort- algorithms and programs)

Searching: Definition, Searching Techniques (Linear Search, Binary Search- Algorithms and Programs)

Merging: Definition, Algorithm and Program to merge two sorted arrays

Applications: Insertion of an element in a sorted array, Displaying common elements of two single dimensional arrays and other applications.

- **Two Dimensional Arrays**

Definition, Declaration, Reading, Displaying, Accessing.

Applications: Matrix Addition, Transpose of a matrix, Matrix Multiplication, Representation of sparse matrix in 3- Tuple form, and other applications.

2) Structures and Pointers:

- **Pointers-** Definition, Concept, Declaration, Pointer to one and two dimensional array.

- **Structures-** Definition, Concept, Declaration, Structure variable, array of structures, pointer to a structure variable, pointer to array of structures.

3) LINKED LISTS

- **Singly Linked list:**

Concept, Definition, Diagram, Operations (Creation, Display, Deletion of a node at any position, Insertion of a node at any position).

- **Circular Linked list:**

Concept, Definition, Diagram.

- **Doubly Linked List:**

Concept, Definition, Diagram

- Applications of singly linked list- Linear search and other applications.

- **Stacks:**

Concept, Definition, and implementation of a stack using linked list(PUSH,POP and display).

Applications of stacks (Infix, Postfix and Prefix Notations of expressions, Conversion of infix to postfix using stacks [Algorithms and problems only], Evaluation of postfix expressions[Algorithms and problems only]).

- **Queues:**

Linear queue- Concept, Definition, Implementation of queue using linked list(Add, Delete and Display).

Circular Queue- Concept, Definition.

UNIT III: FILE HANDLING (08 MARKS)

- **Files:**
Definition, Types of files-Text and Binary.
- **Stream Classes and their Member Functions.**
Ifstream- get(),getline(),read(),seekg(),tellg(), Open(),close(),eof()
Ofstream- put(),seekp(),tellp(),write(),Open(),close().
Fstream.
- **File Modes**-ios:: app, ios::ate, ios::in,ios::out,ios::binary, ios::trunc,ios::nocreate, ios::noreplace
- **Opening a file using constructor and using open member function.**
- **Closing a file.**
- **Detecting the end of a file.**
- **File Pointer and their manipulation.**
- **Text Files:**
Creation, Display and File Processing (Character and String based processing)
- **Binary Files:**
Creation, Display and File Processing (Appending, Inserting, Deleting, Updating, Searching, Splitting and Merging)

UNIT IV: BOOLEAN ALGEBRA (08 marks)

- **Basics of Boolean Algebra :-**
Evolution of Boolean Algebra , Basic Terminology – logical statements, logical constants, binary valued quantities , compound statements, Truth table.
- **Logical operators:-**
NOT, AND, OR , switch, switching circuits (NOT, AND, OR).
- **Postulates of Boolean algebra:-** Closure Property, Commutative Property , Associative Property
Distributive Property , Identity Property , Inverse Property .
- **Laws of Boolean Algebra :** Idempotent Law, Distributive Law, Absorption Law, Involution law.
- **DeMorgan's Law and their applications.**
- **Principle of Duality in Boolean algebra.**
- **Derivation of Boolean expression:**
- **Minterm , maxterm , shorthand notation, canonical form, sum of product form (SOP), product of sum form (POS), conversion of SOP to POS and vice versa, simplification of Boolean expressions using postulates and laws of Boolean algebra.**
- **Karnaugh Maps:**
Two variable K map, Three variable K map, Four variable K map, pairing , quads, octet in K map, Simplification of K maps up to four variables , overlapping groups , map rolling, eliminating redundant groups, use of K map for simplification and conversion of Boolean expression.
- **Logic gates:**
Fundamental gates: AND gate, OR gate, NOT gate (definition, symbol, truth table)
- **Derived gates:**
NOR gate, NAND gate, X-OR gate, X-NOR gate (definition, symbol, truth table), NAND and NOR gates as universal gates. Constructing logic circuits using basic gates and universal gates.

- **Adder circuits:**

Half adder and full adder – Definition, Truth table, obtaining simplified expression for sum and carry ,circuit diagrams, obtaining full adder from half adders.

UNIT V: COMPUTER NETWORKS (07 MARKS)

- **Networks:**
Definition, Components (nodes, server, network interface unit), Need for networking.
- **Types of Networks:**
LAN, MAN, WAN- Basic concepts.
- **Communication Channel:**
Physical Channel: Twisted Pair Cable, Co-axial Cable, Optical Fibre Cable (Diagram, description, application).
Wireless Channel: Microwave, Radio wave, Satellite Links.
- **Data Switching Techniques:**
Circuit Switching , Message Switching and Packet Switching.
- **Data Communication Terminologies:**
Baud, Baud rate, Bit rate, Bandwidth, Data Transfer rate, Bit rate (KBPS,MBPS GBPS, TBPS)
- **Network Devices and their uses:**
Modem, Hub, Repeaters, Bridge, Router , Gateway, Switch.
- **Network Topologies:**
Definition, Types of topologies (Bus, Tree, Star, Ring).
- **Client Server Model:**
Concept of client, server ,client server model, and Backbone Network.
- **Protocols:** Definition, File Transfer Protocol(FTP), Hyper Text Transfer Protocol (HTTP), Transmission Control Protocol/Internet Protocol(TCP?IP), Simple Mail Transfer Protocol(SMTP), Post Office Protocol(POP),Remote Login(Telnet).
- **Application of Networks:** Email, E-commerce, Chat Services, Video Conferencing, Usenet.
- **Internet Related Terminologies:**
Internet, Requirements of Internet, Internetworking, Internet Service Providers , Internet Addressing, World Wide Web(WWW), Uniform Resource Locator(URL), Web Server, Webpage, Web Server, Website, Web Browser, HTML, DHTML,XML, Search Engine, Downloading and Uploading files on/from the net, Hacking, Cracking, Cookies.