COMPUTER SCIENCE SYLLABUS
STD XII
ACADEMIC YEAR-2020-2021

UNIT NO	NAME OF UNIT	MAX MARKS
1	PROGRAMMING IN C++	30
2	DATA STRUCTURES USING C++	25
3	COMPUTER NETWORKS	15
		TOTAL 70

UNIT-I: PROGRAMMING IN C++ (30 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::skipus, ios::unitbuf.

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

5. **Control Statements**:

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

6. **Functions:**

Definition, Concept, General Form, Function Declaration, Function Definition

Scope of a variable, Local and Global variables

Function Call (pass by value, pass by reference using pointers and pass by reference using reference variable)

Calling Function with arrays as parameters, Return by Reference, Inline Functions, Functions with Default Parameters, Function overloading

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), Constructer overloading, Copy Constructor, Dynamic Constructor, Dynamic Initialisation of objects, Destructor Definition and characteristics.

10. **Inheritance:**

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

UNIT II : DATA STRUCTURES USING C++ (25 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 V: COMPUTER NETWORKS (15 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, and 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, Web page, Web Server, Website, Web Browser, Hyper Text Mark-up Language (HTML), Dynamic Hyper Text Mark-up Language (DHTML),Extended Mark-up Language (XML), Search Engine, Downloading and Uploading files on/from the net, Hacking, Cracking, Cookies.

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 Arrays.

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. Logic (for programs)
4. Test Cases- Programs should be tested for different set of inputs.