# 2022-23
# COMPUTER SCIENCE(144)

## Class XI

**Duration: 3 hours**                                                              **Total Marks: 70**

| Unit No. | Unit Name | Marks |
|:---:|:---|:---:|
| 1. | COMPUTER  FUNDAMENTALS | 10 |
| 2. | PROGRAMMING  METHODOLOGY | 10 |
| 3. | INTRODUCTION  TO C++ | 15 |
| 4 | PROGRAMMING  IN  C++ | 35 |
| | **Total** | **70** |

## UNIT 1:  COMPUTER FUNDAMENTALS

Evolution of computers; Basics of computer and its operation: Functional Components and their interconnections, concept of Booting.

**Software Concepts:**

Types of Software - System Software, Utility Software and Application Software;

System Software: Operating System, Compilers, Interpreters and Assembler;

Utility Software : Anti Virus, File Management tools, Compression tools and Disk Management tools (Disk Cleanup,Disk Defragmenter, Backup);

Application Software as a tool: Word Processor, Presentation tools, Spreadsheet Package, DatabaseManagement System; Business software (for example: School Management System, Inventory Management System, Payroll System, Financial Accounting, Hotel Management, and Reservation System);

Operating System : Need for operating system, Functions of Operating System (Processor Management, Memory Management, File Management and Device Management), Types of operating system – Interactive (GUI based), Time Sharing, Real Time and Distributed; Commonly used operating systems:

LINUX, Windows, BhartiOO, Solaris, UNIX;

Illustration and practice of the following tasks using any one of the above Operating Systems:

- Opening / Closing Windows
- Creating / Moving / Deleting Files / Folders
- Renaming Files / Folders
- Switching between Tasks

Number System : Binary, Octal, Decimal, Hexadecimal and conversion between two different number systems;

Internal Storage encoding of Characters: ASCII, ISCII (Indian scripts Standard Code for Information Interchange), and UNICODE;

Microprocessor : Basic concepts, Clock speed (MHz, GHz), 16 bit, 32 bit, 64 bit processors; Types – CISC, RISC;

Memory Concepts :

Units : Byte, Kilo Byte, Mega Byte, Giga Byte, Tera Byte, Peta Byte

Primary Memory : Cache, RAM, ROM,

Secondary Memory : Hard Disk Drive, CD / DVD Drive, Pen Drive, Blue Ray Disk;

Input Output Ports / Connections: Serial, Parallel and Universal Serial Bus, PS-2 Port, Infrared port, Bluetooth.

## UNIT 2: PROGRAMMING METHODOLOGY

General Concepts; Modular approach; Clarity and Simplicity of Expressions, Use of proper Names for identifiers, Comments, Indentation; Documentation and Program Maintenance; Running and Debugging programs, Syntax Errors, Run-Time Errors, Logical Errors; Problem Solving Methodology and Techniques: Understanding of the problem, Identifying minimum number of inputs required for output, Step by step solution for the problem, breaking down solution into simple steps, Identification of arithmetic and logical operations required for solution, Using Control Structure: Conditional control and looping (finite and infinite);

## UNIT 3: INTRODUCTION TO C++

### Getting Started:

C++ character set, C++ Tokens (Identifiers, Keywords, Constants, Operators), Structure of a C++ Program (include files, main function); Header files – iostream.h, iomanip.h; **cout**, **cin**; Use of I/O operators (<< and >>), Use of endl and setw(), Cascading of I/O operators, Error Messages; Use of editor, basic commands of editor, compilation, linking and execution; standard input/output operations from C language: gets(), puts() of stdio.h header file;

### Data Types, Variables and Constants:

Concept of Data types; Built-in Data types: **char**, **int**, **float** and **double**; Constants: Integer Constants, Character Constants (Backslash character constants - \n, \t ), Floating Point Constants, String Constants; Access modifier: **const**; Variables of built-in data types, Declaration/ Initialisation of variables, Assignment statement; Type modifier: signed, unsigned, long;

### Operators and Expressions:

Operators: Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment and Decrement Operators (—,++), Relational operators (>,>=,<,<=,==,!=), Logical operators (!, &&, ||), Conditional operator: <condition>?<if true>:<else>; Precedence of Operators; Expressions; Automatic type conversion in expressions, Type casting; C++ shorthand's (+=, -=, *=, /=, %=);

## UNIT 4: PROGRAMMING IN C++

### Flow of control:

Conditional statements: **if-else**, Nested **if**, **switch..case..default**, Nested **switch..case**, break statement (to be used in switch..case only); Loops: **while**, **do - while** , **for** and Nested loops;

### String Functions:

Header File: string.h

Function: **isalnum(), isalpha(), isdigit(), islower(), isupper(), tolower(), toupper()**;

**Character Functions:**

Header File: ctype.h

Functions: **isalnum(), isalpha(), isdigit(), islower(), isupper(), tolower(), toupper(), strcpy(), strcat(), strlen(), strcmp(), strcmpi()**;

**Mathematical Functions:**

Header File-math.h, stdlib.h;

Functions: **fabs()**, **log()**, **log10()**, **pow()**, **sqrt()**, **sin()**, **cos()**, **abs()**,

**Other Functions:**

Header File- stdlib.h;

Functions: **randomize(), random()**;

**User Defined Functions:**

Defining a function; function prototype, Invoking/calling a function, passing arguments to function, specifying argument data types, default argument, constant argument, call by value, call by reference, returning values from a function, calling functions with arrays, scope rules of functions and variables; local and global variables;

**Structured Data Type: Array**

Declaratrion/initialisation of One-dimensional array, Inputting array elements, Accessing array elements, Manipulation of Array elements (sum of elements, product of elements, average of elements, linear search, finding maximum/minimum value); Declaration/Initialization of a String, string manipulations (counting vowels/consonants/digits/ special characters, case conversion, reversing a string, reversing each word of a string);

**Two-dimensional Array :**

Declaration/initialisation of a two-dimensional array, inputting arry elements Accessing array elements, Manipulation of Array elements (sum of elements, finding maximum/minimum values); row element, column elements, diagonal

**User-defined Data Types**

Need for User defined data type:

Defining a symbol name using typedef keyword and defining a m acro using #define directive;

**Structures:**

Defining a Structure, Declaring structure variables, Accessing structure elements, Passing structure of Functions as value and reference argument/parameter, Function returning structure, Array of structures, passing an array of structure as an argument/ a parameter to a function.

# Class XI (Practical)

**Duration: 3 hours**                                                           **Total Marks: 30**

**1.**     **Programming in C++**                                                             **09**

One programming problem in C++ to be developed and tested in Computer during the examination. Marks are allotted on the basis of following:

| | | |
|---|---|---|
| Logic | : | 05 Marks |
| Documentation/Indentation | : | 02 Marks |
| Output presentation | : | 02 Marks |

**2.**     **Project Work**                                                                     **08**

Problems related to String, Number and Array manipulation; General Guidelines : Initial Requirement, developing an interface for user (it is advised to use text based interface screen), developing logic for playing the game and developing logic for scoring points

1. Memory Game : A number guessing game with application of 2 dimensional arrays containing randomly generated numbers in pairs hidden inside boxes.

2. Cross 'N Knots Game : A regular tic-tac-toe game

3. Hollywood/Hangman: A word Guessing game

4. Cows 'N Bulls : A word/number Guessing game

Similar projects may be undertaken in other domains (As mentioned in general guidelines for projects, given at the end of the curriculum in a group of 1-2 students)

**3.**     **Practical File**                                                                      **05**

Must have minimum 15 programs from the topics covered in class XI course.

- 5  Programs on Control structures
- 4  Programs on Array Manipulations
- 4 Programs on String Manipulations
- 2 Programs on structure manipulations

**4.**     **Viva Voce**                                                                           **03**

Viva will be asked from syllabus covered in class XI and the project developed by student.

**5.**     **Continuous Assessment   (Unit Test)**                                                **05**

# 2022-23
# CLASS XII (144)
# COMPUTER SCIENCE
Time : 3 Hours

| One Paper | | Marks : 70 |
|---|---|---|
| **Unit No.** | **Unit Name** | **Marks** |
| 1. | PROGRAMMING IN C++ | 30 |
| 2. | DATA STRUCTURE | 14 |
| 3. | DATABASE AND SQL | 8 |
| 4. | BOOLEAN ALGEBRA | 8 |
| 5. | COMMUNICATION AND OPEN SOURCE CONCEPTS | 10 |
| | | 70 |

## UNIT 1:   PROGRAMMING IN C++
REVIEW: *C++* covered In Class -XI,

**Object Oriented Programming:**

Concept of Object Oriented Programming – Data hiding, Data encapsulation, Class and Object, Abstract class and Concrete class, Polymorphism (Implementation of polymorphism using Function overloading as an example in C++); Inheritance, Advantages of Object Oriented Programming over earlier programming methodologies,

**Implementation of Object Oriented Programming concepts in C++:**

Definition of a class, Members of a class - Data Members and Member Functions (methods), Using Private and Public visibility modes, default visibility mode (private); Member function definition: inside class definition and outside class definition using scope resolution operator (::); Declaration of objects as instances of a class; accessing members from object(s), Array of type class, Objects as function arguments - pass by value and pass by reference;

**Constructor and Destructor:**

Constructor: Special Characteristics, Declaration and Definition of a constructor, Default Constructor, Overloaded Constructors, Copy Constructor, Constructor with default arguments; Destructor: Special Characteristics, Declaration and definition of destructor;

**Inheritance (Extending Classes):**

Concept of Inheritance, Base Class, Derived Class, Defining derived classes, protected visibility mode; Single level inheritance, Multilevel inheritance and Multiple inheritance, Privately derived, Publicly derived and Protectedly derived class, accessibility of members from objects and within derived class(es);

**Data File Handling:**

Need for a data file, Types of data files – Text file and Binary file;

Text File: Basic file operations on text file: Creating/Writing text into file, Reading and manipulation of text from an already existing text File (accessing sequentially);

Binary File: Creation of file, Writing data into file, Searching for required data from file, Appending data to a file, Insertion of data in sorted file, Deletion of data from file, Modification of data in a file; Implementation of above mentioned data file handling in C++; Components of C++ to be used with file handling:

Header file: fstream.h; ifstream, ofstream, fstream
classes; Opening a text file in **in**, **out**, and **app** modes;

Using cascading operators for writing text to the file and reading text from the file; **open()**, **get()**, **put()**, **getline()** and **close()** functions; Detecting end-of-file (with or without using **eof()** function); Opening a binary file using **in**, **out**, and **app** modes;

**open()**, **read()**, **write()** and **close()** functions; Detecting end-of-file (with or without using **eof()** function); **tellg(), tellp(), seekg(), seekp()** functions **Pointers:**

Declaration and Initialization of Pointers; Dynamic memory allocation/deallocation operators: **new, delete;** Pointers and Arrays: Array of Pointers, Pointer to an array (1 dimensional array), Function returning a pointer, Reference variables and use of alias; Function call by reference. Pointer to structures: Deference operator: *, ->; self referencial structures;

## UNIT 2: DATA STRUCTURES
**Arrays:**

One and two Dimensional arrays: Sequential allocation and address calculation;

One dimensional array: Traversal, Searching (Linear, Binary Search), Insertion of an element in an array, deletion of an element from an array, Sorting (Insertion, Selection, Bubble sort), concatenation of two linear arrays, merging of two sorted arrays;

Two-dimensional arrays: Traversal, Finding sum/difference of two NxM arrays containing numeric values, Interchanging Row and Column elements in a two dimensional array;
**Stack (Array and Linked implementation of Stack):**

Operations on Stack (PUSH and POP) and its Implementation in C++, Converting expressions from INFIX to POSTFIX notation and evaluation of Postfix expression;
**Queue: (Circular Array and Linked Implementation):**
Operations on Queue (Insert and Delete) and its Implementation in C++.
## UNIT 3: DATABASES AND SQL
**Database Concepts:**

Relational data model: Concept of domain, tuple, relation, key, primary key, alternate key, candidate key;
Relational algebra: Selection, Projection, Union and Cartesian product;
**Structured Query Language:**

General Concepts: Advantages of using SQL, Data Definition Language and Data Manipulation Language;
Data types: NUMBER, CHARACTER, DATE;
SQL commands:

CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE...SET..., INSERT, DELETE; SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUP BY, HAVING, ORDER BY; SQL functions: SUM, AVG, COUNT, MAX and MIN;

Note: Implementation of the above mentioned commands could be done on any SQL supported software on one or two tables.
## UNIT 4: BOOLEAN ALGEBRA

Binary-valued Quantities, Boolean Variable, Boolean Constant and Boolean Operators: AND, OR, NOT; Truth Tables; Closure Property, Commutative Law, Associative Law, Identity law, Inverse law, Principle of Duality, Idem potent Law, Distributive Law, Absorption Law, Involution law, DeMorgan's Law and their applications;

Obtaining Sum of Product (SOP) and Product of Sum (POS) form from the Truth Table, Reducing Boolean Expression (SOP and POS) to its minimal form, Use of Karnaugh Map for minimisation of Boolean expressions (up to 4 variables);

Basic Logic Gates (NOT, AND, OR, NAND, NOR) and their use in circuits.

## UNIT 5: COMMUNICATION AND OPEN SOURCE CONCEPTS

Evolution of Networking: ARPANET, Internet, Interspace;

Different ways of sending data across the network with reference to switching techniques;

**Data Communication terminologies:**

Concept of Channel, Baud, Bandwidth (Hz, KHz, MHz) and Data transfer rate (bps, kbps, Mbps, Gbps, Tbps);

**Transmission media:**

Twisted pair cable, coaxial cable, optical fiber, infrared, radio link, microwave link and satellite link.

**Network devices:**

Modem, RJ45 connector, Ethernet Card, Hub, Switch,
Gateway; **Network Topologies and types:**

Bus, Star, Tree; Concepts of LAN, WAN, MAN

**Network Protocol:**

TCP/IP, File Transfer Protocol (FTP), PPP, Level-Remote Login (Telnet), Internet, Wireless/ Mobile Communication, GSM, CDMA, WLL, 3G, SMS, Voice mail, Application Electronic Mail, Chat, Video Conferencing;

**Network Security Concepts:**

Threats and prevention from Viruses, Worms, Trojan horse, Spams
Use of Cookies, Protection using Firewall;
India IT Act, Cyber Law, Cyber Crimes, IPR issues, Hacking.

**Web Servers;**

Hyper Text Markup Lanuage (HTML), extensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Protocol Address; Website, Web browser, Web Servers; Web Hosting, WEb Scripting – Client side (VB script, Java Script, PHP) and Server side (ASP, JSP, PHP)

**Open Source Terminologies:**

Open Source Software, Freeware, Shareware, Proprietary software, FLOSS, GNU, FSF, OSI;

## (Practicals)

**Duration: 3 hours**                                                                 **Total Marks: 30**

1.   **Programming in C++**                                                                        **09**

One programming problem in C++ to be developed and tested in Computer during the examination. Marks are allotted on the basis of following:

Logic                                         :                    4 Marks
Documentation/Indentation                     :                    2 Marks
Output presentation                           :                    3 Marks

Notes: The types of problems to be given will be of application type from the following topics

   ☐ Arrays (One dimensional and two dimensional)
   ☐ Array of structure
   ☐ Stack using arrays and linked implementation
   ☐ Queue using arrays (circular) and linked implementation
   ☐ Binary File operations (Creation, Displaying, Searching and modification)
   ☐ Text File operations (Creation, Displaying and modification)

2.   **SQL Commands**                                                                              **04**

Five Query questions based on a particular Table/Reaction to be tested practically on Computer during the examination. The command along with the result must be written in the answer sheet.

3.  **Viva Voce**                                                                                      **02**
    Viva will be asked from syllabus covered in class XII and the project developed by student.


4.  **Project Work**                                                                                   **05**
    The project has to be developed in C++ language with Object Oriented Technology and also should have use of Data files. (The project is required to be developed in a group of 1-2 students)
    - Presentation on the computer
    - Project report (Listing, Sample, Outputs, Documentation)
    - Viva

5.  **Practical File**                                                                                 **05**
    Must have minimum 20 programs from the following topics

    - Arrays (One dimensional and two dimensional, sorting, searching, merging, deletion'& insertion of elements)
    - Arrays of structures, Arrays of Objects
    - Stacks using arrays and linked implementation
    - Queues using arrays (linear and circular) and linked implementation
    - File (Binary and Text) operations (Creation, Updation, Query)
    - Any computational based problems
      15 SQL commands along with the output based on any table/relation

6.  **Continuous Assessment (Unit Test)**                                                              **05**


## Marking Scheme

| External  Examiner | |
| --- | --- |
| 1.  Programming in  C++ | 9 Marks |
| 2.  SQL Commands | 4 Marks |
| 3.  Viva | 2 Marks |
| **Internal  Examiner** | |
| 4.  Project  Work | 5 Marks |
| 5. Practical File | 5 Marks |
| 6. Continuous Assessment (Unit Test) | 5 Marks |