COMPUTER SCIENCE AND APPLICATION

SYLLABUS FOR HIGHER SECONDARY FINAL YEAR COURSE

Learning Objectives :

1. To develop logic for Problem Solving
2. To understand the concept of Object Oriented Methodology
3. To implement Object Oriented Programming using C++
4. To understand the concept of working with Relational Database
5. To understand the basic concept of Logic of Computing
6. To understand the basic concepts of Communication and Networking technologies
7. To understand Open Source Software

Competencies :

The student will develop the following proficiency :

1. Identifying Computer Components/Subsystems/Peripherals
2. Problem Solving using Object Oriented Programming Database Handling

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Time : 3 hours **Total Marks : 70**

Unit No.	Tittle	Marks	Periods
Unit-I	OBJECT ORIENTED PROGRAMMING IN C++	30	70
Unit-II	DATA STRUCTURE	14	30
Unit-III	DATABASE MANAGEMENT SYSTEM AND SQL	8	20
Unit-IV	BOOLEAN ALGEBRA	8	20
Unit-V	NETWORKING AND OEN SOURCE SOFTWARE	10	20
	Total	**70**	**160**
Unit-VI	PRACTICAL	30	
		100	

Unitwise Distribution of Course Contents :

UNIT 1: OBJECT ORIENTED PROGRAMMING IN C++

REVIEW: C++ covered in HS First Year classes

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, Member

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), 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 Inheritances, Base Class, 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:

Introduction to Pointer, Declaration and Initialization of Pointer; 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 structure: De-reference/Deference operator: *, ->; self referencial structure;

UNIT 2: DATA STRUCTURES

Introduction to data structure, primitive and non-primitive data structure, linear and non-linear structure, static and dynamic data structure.

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) 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):

Introduction to stack (LIFO_Last in First Out Operations) 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):

Introduction to Queue (FIFO - First in First out operations) Operations on Queue (Insert and Delete and its Implementation in C++.

UNIT 3: DATABASE MANAGEMENT SYSTEM AND SQL

Data base Concepts:

Introduction to data base concepts and its need.

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/DECIMAL, CHARACTER/VARCHAR/VARCHAR2, DATE;

SQL COMMANDS

CREATE TABLE, DROP TABLE, ALTER TABLE, UPDATE ….SET…., INSERT, DELETE; SELECT, DISTINCT, FROM, WHERE, IN, BETWEEN, GROUPBY, HAVING, ORDERBY; SQL functions: SUM, AVG, COUNT, MAX AND MIN; Obtaining results (SELECT query) from 2 tables using equi-join, Cartesian product and Union

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

UNIT 4: BOOLEAN ALGEBRA

Role of Logical Operations in Computing. 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 minimization of Boolean expressions (up to 4 variables);

Application of Boolean Logic:

Digital electronic circuit design using basic Logic Gates (NOT, AND, OR, NAND, NOR) Use of Boolean operators (NOT, AND, OR) in SQL SELECT statements Use of Boolean operators (AND, OR) in search engine queries.

UNIT 5: NETWORKING AND OPEN SOURCE SOFTWARE

Evolution of Networking:

ARPANET, Internet, Interspace Different ways of sending data across the network with reference to switching techniques (Circuit and Packet switching);

Data Communication terminologies:

Concept of Channel, 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, Router, Switch, Gateway, wifi card;

Network Topologies and types:

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

Network Protocol:

TCP/IP, File Transfer Protocol (FTP), PPP, Remote Login (Telnet), Internet Wireless/ Mobile Communication protocol such as GSM, CDMA, GPRS, WLL,

Mobile Telecommunication Technologies:

1G, 2G, 3G and 4G Electronic mail protocols such as SMTP, POP3 Protocols for Chat and Video Conferencing VOIP Wireless protocols such as Wi-Fi and WiMax

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;

Introduction To Web services:

WWW, Hyper Text Markup Language (HTML), eXtensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Website, Web browser, Web Servers; Web Hosting, Web Scripting - Client side (VB Script, Java Script, PHP) and Server side (ASP, JSP, PHP), Web 2.0 (for social networking)

Class XII (Practical) -- C++

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

Programming in C++ **10**

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

Logic	:	5 Marks
Documentation/Indentation	:	2 Marks
Output presentation	:	3 Marks

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

- Arrays (One dimensional and two dimensional)
- Class(es) and objects
- Stack using arrays and or linked implementation
- Queue using arrays (circular) and or linked implementation
- Binary File operations (Creation, Displaying, Searching and modification)
- Text File operations (Creation , Displaying and modification)

2. SQL Command **03**

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. Project Work **06**

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 2-4 students)

- Presentation on the computer

- Project report (Listing, Sample, Outputs, Documentations)
- Viva

4. Practical File **06**

Must have minimum 20 programs from the following topics

- Arrays (One dimensional and two dimensional, sorting, searching, merging, deletion' & insertion of elements)
- Class(es) and objects
- Stacks 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:

5. Viva Voce **05**

Viva will be asked from syllabus covered in HS Second Year classes and the project developed by student.

Suggested reading Books

1. A textbook of Computer Science for class XI, by Seema Bhatnagar, PHI Publication
2. A textbook of Computer Science for class XII, by Seema Bhatnagar, PHI Publication
3. Computer Science with C++ Vol. I, by Sumita Arora, Dhanpat Rai & Co
4. Computer Science with C++ Vol. II, by Sumita Arora, Dhanpat Rai & Co
5. Computer Fundamentals and Programming in C, Reema Thareja, Oxford University Press

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