Cluster University Srinagar

ENTRANCE TEST SYLLABUS FOR ADMISSION TO 5-YEAR INTEGRATED, 3-YEAR HONOR'S & PROFESSIONAL PROGRAMMES SESSION 2019

SYLLABUS CLASS XI

Code : 226

COMPUTER SCIENCE

Maximum Marks: 100
Theory: 70 Marks
Practical: 30 Marks

Time: 3 hours

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, Database Management System; Business software (for example: School Management System, Inventory Management System, Payroll System, Financial Accounting, Hotel Management, and Reservation System); **6 Marks**

UNIT 2: 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, Bharti OO, 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. **6 Marks**

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) **23 Marks**

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 end and set w ( ), 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 (+=, -=, *=, /=, %=); **6 Marks**

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: c type.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();** **6 Marks**

UNIT 5 : 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

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

User-defined Data Types

Need for User defined data type:

Defining a symbol name using type def keyword and defining a macro 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. **23 Marks**

(Practical)

Total Marks: 30 Time: 3 hours

1. Programming in C++

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

Logic

Documentation/Indentation

Output presentation

COMPUTER SCIENCE

Maximum Marks: 100

Theory: Marks 70 **Time: 3 hours**

Practicals: Marks 30

External : 20 Marks

Internal : 10 Marks

- **PROGRAMMING IN C++** **Marks 30**
- **DATA STRUCTURES** **Marks 14**
- **DATABASES AND SQL** **Marks 08**
- **BOOLEAN LOGIC** **Marks 08**
- **COMMUNICATION AND OPEN SOURCE CONCEPTS** **Marks 10**

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; 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 LOGIC

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, Idempotent 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 obtaining minimal form of Boolean expressions (up to 4 variables); Applications of Boolean Logic:

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

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, GHz) 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.

Networking devices:

Modem, RJ45 connector, Ethernet Card, Hub, Switch, Gateway;

Network Topologies and types:

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

Network Protocol:

TCP/IP, File Transfer Protocol (FTP), PPP, Level-Remote Login (Telnet); Wireless/Mobile Communication protocols such as GSM, CDMA, GPRs, WLL; Electronic Mail protocol such as SMTP, POP3, iMAP, Chat, Video Conferencing; VoIP protocols such as Wi-Fi and Wi-Max

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 Services :

Hyper Text Markup Lanuage (HTML), eXtensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; IP Address; 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)

Open Source Terminologies:

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

Practicals : 30 Marks

Duration: 3 hours **Marks: 30**

External : 20 Marks

Internal = 10 Mrks

1. Programming in C++

One programming problem in C++ to be developed and tested in Computer during the examination. Marks are allotted on the basis of following: **Marks 07**

Logic : 3 Marks

Documentation/Indentation : 2 Marks

Output presentation : 2 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 **Marks 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 **Marks 03**

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, Documentation)
- Viva