## **Computer Science (Code 083)**

"...It is unworthy of excellent men to loose hours like slaves in the labour of calculation which could safely be regulated to anyone else if machines were used.." said Leibnitz in the beginning of seventeenth Century.

Farsighted vision, in-depth study accompanied by target-oriented effort of such torchbearers have ushered in an age of computers.

Be it Science or Engineering, medical world or launching Space Shuttles, Study of Universe or global communications, Research and Development or Edutainment – the core ingredient is computer.

#### Learning Objectives:

- 1. To understand the problem statement
- 2. To develop logic for problem solving
- 3. To understand the concept of Object Oriented Methodology
- 4. To implement Object Oriented Programming using C++
- 5. To understand the concept of working with Relational Database
- 6. To understand the basic concept of algebra of logic
- 7. To understand and explore the world of communication and networks

#### **Competencies:**

#### The student will be proficient in the following:

- 1. Identification of a system
- 2. Categorisation of parts of an objective system
- 3. Problem Solving
- 4. Designing an efficient logic using object oriented approach for solution
- development
- 5. Database handling
- 6. Logic Circuit designing

## **Class XI (Theory)**

Duration: 3 hours		Total Marks: 70	
Unit No.	Unit Name	5	Marks
1.	COMPUTER FUNDAMENTALS		06
2.	PROGRAMMINGMETHODOLOGY		10
3.	INTRODUCTION TO PROGRAMMING IN C++	~	44
4.	COMPUTER SYSTEM ORGANISATION		10
			70

#### UNIT 1: COMPUTER FUNDAMENTALS

Evolution of computers; Basics of computer and its operation: Functional Components and their inter-connections, concept of Booting, Use of Operating System for directory listing, hierarchical directory structure, renaming, deleting files/folders, formatting floppy, copying files, concepts of path and pathname, switching between tasks, installation/removal of applications;

Software Concepts:

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

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

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;

Note: The above-mentioned Operating System specific tasks can be illustrated and implemented using any operating system.

## 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 PROGRAMMING IN C++

"Object Oriented Technology is regarded as the ultimate paradigm for the modeling of information, be that information data or logic. The C++ has by now shown to fulfill this goal."

### Programming by Example In C++ Language :

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: Arithematic 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++ shorthands (+=, -=, \*=, /=, %=);

### 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;

#### 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/Initilaisaion of a String, string manipulations (counting vowels/consonants/digits/special characters, case conversion, reversing a string, reversing each word of a string); String and Character related Library functions: isalnum(), isalpha(), isdigit(), islower(), isupper(), tolower(), toupper(), strcpy(), strcat(), strlen(), strcmp(), strcmpi();

Declaration/initialisation 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 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;

#### Mathematical and Other Functions:

Header Files-math.h, stdlib.h;

Functions: fabs(), log(), log10(), pow(), sqrt(), sin(), cos(), abs(), randomize(), random();

### **Event programming: Games as examples**

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

### UNIT 4: COMPUTER SYSTEM ORGANISATION

Number System: Binary, Octal, Decimal, Hexadecimal and conversion between two different number systems. Integer, Floating Point, 2's complement of number from base-2;

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

Microprocessor: Basic concepts, Clock speed (MHz, GHz), 16 bit, 32 bit, 64 bit processors; Types – CISC, RISC; Concept of System Buses, Address bus, Data bus,

Concepts of Accumulator, Instruction Register, and Program Counter;

Commonly used CPUs and CPU related terminologies: Intel Pentium Series, Intel Celeron, Cyrix, AMD Series, Xeon, Intel Mobile, Mac Series; CPU Cache; Concept of heat sink and CPU fan, Motherboard; Single, Dual and Multiple processors;

Types of Memory: Cache (L1,L2), Buffer, RAM (DRAM, SDRAM, RDRAM, DDRAM), ROM (PROM, EPROM), Access Time;

Input Output Ports/Connections: Power connector, Monitor Socket, Serial (COM) and Parallel (LPT) port, Universal Serial Bus port, PS-2 port, SCSI port, PCI/MCI socket, Keyboard socket, Infrared port (IR), audio/speaker socket, Mic socket; data Bus; external storage devices connected using I/O ports;

Power Supply: Switched Mode Power Supply (SMPS): Elementary Concept of Power Supply: Voltage, Current, Power (Volt, Ampere, Watt), SMPS supplies – Mother Board, Hard Disk Drive, Floppy Disk Drive, CD/DVD Drive;

Power Conditioning Devices: Voltage Stabilizer, Constant Voltage Transformer (CVT), Uninterrupted Power Supply (UPS)-Online and offline.

# **Class XI (Practical)**

## **Duration: 3 Hours**

#### **Total Marks: 30**

10

## 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	:	5 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

#### 2 Project Work

(As mentioned in general guidelines for project, given at the end of the curriculum)

### 3 Practical File

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

### 4 Viva Voce

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

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