

COMPUTER SCIENCE
CLASS-XI
THEORY PAPER

One Paper *3 Hours* *70 Marks*

Unit No.	Unit Name	Marks
1	COMPUTER FUNDAMENTALS	06
2	PROGRAMMING METHODOLOGY	10
3	INTRODUCTION TO PROGRAMMING IN C++	44
4	COMPUTER SYSTEM ORGANISATION	10

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++

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, Variable and Constraints :

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, Variables of built-in data types, Access Modifier : **const**; Variables of built-in data types, Declaration/Initialisation of variables, Assignment statement; Type modifiers : signed, unsigned, long;

Operators and Expressions :

Operators : Arithmetic operators (-,+,*,/,%), Unary operator (-), Increment and Decrement Operator (++,--), 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

Declaration/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/Initialisation 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(), long(), log10(), pow(), sqrt(), sin(), cos(), abs(), randomize(), random();**

Event programming : Games as examples

General Guidelines : Initial Requirement, developing and 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/Connection : 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), audi/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.

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COMPUTER SCIENCE**CLASS XI
PRACTICAL***One Paper**3 Hours**30 Marks*

Unit	Marks									
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 : <table style="margin-left: 20px; margin-top: 10px;"> <tr> <td>Logic</td> <td>:</td> <td>5 Marks</td> </tr> <tr> <td>Documentation/Indentation</td> <td>:</td> <td>2 Marks</td> </tr> <tr> <td>Output presentation</td> <td>:</td> <td>3 Marks</td> </tr> </table> Notes : The types of problems to be given will be of application type from the following topics :	Logic	:	5 Marks	Documentation/Indentation	:	2 Marks	Output presentation	:	3 Marks	10
Logic	:	5 Marks								
Documentation/Indentation	:	2 Marks								
Output presentation	:	3 Marks								
2. Project work (As mentioned in general guidelines for project, given at the end of the curriculum)	10									
3. Practical File Must have minimum 15 programs from the topics covered in Class XI course.	05									
4. Viva voce Viva will be asked from syllabus covered in class XI and the project developed by the student.	05									

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DESIGN
QUESTION PAPER/UNIT TEST

Subject : COMPUTER SCIENCE
Unit/Paper : Theory
Class : XI
Time : 3 Hours
Full Marks : 70

I. WEIGHTAGE TO OBJECTIVES :						
Objectives	K	U	A	S	Total	
Percentage of Marks	35	45	15	05	100	
Marks	25	31	10	04	70	
II. WEIGHTAGE TO FORM OF QUESTIONS :						
Forms of Questions	E	SA-I	SA-II	VSA	O	Total
No. of Questions	03	07	10	10	04	34
Marks Allotted	15	21	20	10	04	70
Estimated Time (in Minutes)	60	42	40	30	08	180
III. WEIGHTAGE TO CONTENT :						
Units/Sub-units						Marks
1.	Computer Fundamentals					6
2.	Programming Methodology					10
3.	Introduction to Programming in C++					44
4.	Computer System Organisation					10
Total :						70
IV. SCHEME OF SECTIONS : Nil						
V. SCHEME OF OPTIONS: Nil						
VI. DIFFICULTY LEVEL :						
Difficult : 15% marks Average : 50% marks Easy : 35% marks						

Abbreviation : K (Knowledge), U (Understanding), A (Application), S (Skill), E (Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O (Objective Type)

DESIGN
QUESTION PAPER/UNIT TEST

Subject : COMPUTER SCIENCE
Unit/Paper : Practical
Class : XI
Full Marks : 30
Time : 3 Hours

Skills/Objectives to be tested.

Sl. No.	Form of Exercise	Nature of Exercise	Booting skills	Program Correctness	Program Presentation	Debugging Skills	Operational Skills	Marks Allotted	Estimated Time (Min)
1.	Short	Project Record	0	2	4	2	2	10	60
2.	Major	Algorithm/Program Writing	0	5	2	2	1	10	100
3.	Short	Viva-Voce	0	0	1	2	2	5	20**
4.	Sessional Record	Record File of Program/Algorithm	0	3	2	0	0	5	x

N.B. : Only one C++ program is to be performed by each student

** No fixed time is allotted for Viva-Voce. It is to be performed during the course of the examination.

COMPUTER SCIENCE
CLASS-XII
THEORY PAPER

One Paper**3 Hours****70 Marks**

Unit No.	Unit Name	Marks
1	PROGRAMMING IN C++	30
2	DATA STRUCTURES	16
3	DATA BASE & SQL	08
4	BOOLEAN ALGEBRA	08
5.	COMMUNICATION & NETWORK CONCEPTS	08

Unit 1 : PROGRAMMING IN C++

REVIEW : C++ covered in Class - XI,

Defining a symbol name using typedef keyword and defining a macro using # define directive; Need for User defined data type;

Structures :

Defining a structure, Declaring structure variables, Accessing structure elements, Passing structure to 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;

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);

Date File Handling :

Need for a data file, Types of data files - Text file and Binary 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); **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 : Dereference operator *, ->; self referential 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.

Unit 4 : BOOLEAN ALGEBRA

Evolution of 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, 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 minimisation of Boolean expressions (up to 4 variables); Basic Logic Gates (NOT, AND, OR, NAND, NNOR) and their use in circuits.

Unit 5 : COMMUNICATION AND NETWORK 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; Different Topologies - Bus, Star, Tree; Concepts of LAN, WAN, MAN;

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 : Cyber Law, Firewall, Cookies, Hackers and Crackers;

Web Pages; Hyper Text Markup Language (HTML), extensible Markup Language (XML); Hyper Text Transfer Protocol (HTTP); Domain Names; URL; Protocol Address : Website, Web browser, Web Servers; Web Hosting.

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COMPUTER SCIENCE

CLASS XII

PRACTICAL

One Paper

3 Hours

30 Marks

Unit No.	Unit Name	Marks
1.	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 problems to be given will be of application type from the following topics	
	<ul style="list-style-type: none"> • Arrays (One dimensional and two dimensional) • Array of structure • Stack using arrays and linked implementation • Queue using arrays (circular) linked implementation • Binary File operations (Creation, Displaying, Searching and modification) • Text File operations (Creation, Displaying and modification) 	
2.	SQL Commands	05
	Five Query questions based on a particular Table/Relation 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	05
	The project has to be developed in C++ language with Object Oriented Technology and also should have use of Data files.	
	<ul style="list-style-type: none"> • Presentation on the computer • Project report (Listing, Sample, Outputs, Documentation) • Viva 	
4.	Practical File	05
	Must have minimum 20 programs from the following topics	
	<ul style="list-style-type: none"> • 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 :

5. Viva Voce 05

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

GUIDELINES FOR PROJECTS (Class XI and XII)

1. Preamble

- 1.1 The academic course in Computer Science includes one Project in each year. The Purpose behind this is to consolidate the concepts and practices imparted during the course and to serve as a record of competence.
- 1.2 A group of two/three students as team may be allowed to work on one project.

2. Project content

- 2.1 Project for class XI can be selected from one of the topics given in event programming.
- 2.2 Project for class XII should ensure the coverage of following areas of curriculum :

- a. Problem Solving
- b. Data Structure
- c. Object Oriented Programming in C++
- d. Data File Handling

Theme of the project can be

- Any subsystem of a System Software or Tool
- Any Scientific or a fairly complex algorithmic situation
- Business oriented problems like Banking, Library information system, Hotel or Hospital management system, Transport query system
- Quizzes/Games;
- Tutor/Computer Aided Learning Systems

- 2.3 The aim of the project is to highlight the abilities of algorithmic formulatin, modular programming, optimized code preparation, systematic documentation and other associated aspects of Software Development.
- 2.4 The assessment would be through the project demonstration and the Project Report, which should portray Programming Style, Structured Design, Minimum Coupling, High Cohesion, Good documentation of the code to ensure readability and ease of maintenance.

PRESCRIBED TEXTBOOK FOR CLASS XI :

Computer Science for class XI
By : Preeti Gehlot & Charu Gupta,
Published by : Oxford University Press

PRESCRIBED TEXTBOOK FOR CLASS XII :

Computer Science for class XII
By : Preeti Gehlot, Charu Gupta,
Published by : Oxford University Press

REFERENCE BOOKS : FOR CLASSES XI AND XII

Computer Organisation and boolean Algebra

1. Rajaraman, FUNDAMENTALS OF COMPUTERS, Prentice Hall of India.
2. C.W.Gear, COMPUTER ORGANISATION AND PROGRAMMING, McGraw Hill Publishing.
3. A.P. Malvino, DIGITAL COMPUTER FUNDAMENTALS, Tata McGraw Hill Publishing Co.Ltd.
4. J. Shelly & Roger Hunt, COMPUTER STUDIES, Wheeler's Publication.
5. C.S. French, COMPUTER STUDIES, Arnold Publishers.
6. Thomas C. Bartee, DIGITAL COMPUTER FUNDAMENTALS, McGraw Hill International.

Problem Solving and Programming in C++

Note : Prior knowledge of C is not required in the learning of C++, even though reference about C are made in some of the books.

1. Robert Lofore, OBJECT ORIENTED PROGRAMMING IN TURBO C++, Galgotia Publication Pvt. Ltd.
2. David Parsons, OBJECT ORIENTED PROGRAMMING WITH C++, BPB Publication.
3. Bjarne Stroustrup, THE C++ PROGRAMMING LANGUAGE, Adison Wesley.
4. AI Stevens, TEACH YOURSELF C++ TECHNIQUES & APPLICATIONS, BPB Publications.
5. Scott Robert Ladd, TURBO C++ TECHNIQUES & APPLICATIONS, BPB Publications.

Operating Environment

1. Ritchi, Operating Systems, BPB Publications.
2. James L. Peterson & Abraham S., OPERATING SYSTEM, Addison-Wesley Publishing Company.

Data Structures

1. M.A., Weiss, Data Structures and Algorithm Analysis in C++, the Benjamin/Cummings Pub. Co., Inc.
2. Scott Robert Ladd, C++ COMPONENTS AND ALGORITHMS, BPB Publications.

Database Management System and SQL

1. Martin Gruber, UNDERSTANDING SQL, BPB Publications.
2. Sheldon M. Dunn x Base Cross Reference Handbook, First Authorised Asian Edition 93, Tech. Publications Pvt. Ltd.
3. C.J. Data, DATABASE PRIMER, Adison Wesley.

Computer Network

1. A.S. Tanenbaum, Computer Network, Prentice Hall of India P. Ltd.
2. Williams Stalling, Data Communication and Networks, Prentice Hall of India P. Ltd.
3. Hancock, Network Concept and Architecture, BPB Publications.

Reference Magazines

PC WORLD, COMPUTER TODAY, PC QUEST, DATA QUEST, COMPUTER WORLD.

Reference Manuals

OPERATING SYSTEM MANUAL, C++ COMPILER MANUAL

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**DESIGN
QUESTION PAPER/UNIT TEST**

Subject : COMPUTER SCIENCE

Unit/Paper : Theory

Class : XII

Time : 3 Hours

Full Marks : 70

I.	WEIGHTAGE TO OBJECTIVES :						
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	Marks	25	31	10	04	70	
II.	WEIGHTAGE TO FORM OF QUESTIONS :						
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	2.	Data Structure					16
	3.	Database & SQL					08
	4.	Boolean Algebra					08
	5.	Communication & Network Concepts					08
Total :						70	
IV.	SCHEME OF SECTIONS : Nil						
V.	SCHEME OF OPTIONS : Nil						
VI.	DIFFICULTY LEVEL :						
	Difficult : 15% marks						
	Average : 50% marks						
	Easy : 35% marks						

Abbreviation : K (Knowledge), U (Understanding), A (Application), S (Skill), E (Essay Type), SA (Short Answer Type), VSA (Very Short Answer Type), O (Objective Type)

DESIGN
QUESTION PAPER/UNIT TEST

Subject : COMPUTER SCIENCE
Unit/Paper : Practical
Class : XII
Full Marks : 30
Time : 3 Hours

Skills/Objectives to be tested.

Sl. No.	Form of Exercise	Nature of Exercise	Booting skills	Program Correctness	Program Presentation	Debugging Skills	Operational Skills	Marks Allotted	Estimated Time (Min)
1.	Short	Project Record	0	3	3	1	1	8	45
2.	Major	Algorithm/Program Writing	0	10	2	2	1	15	120
3.	Short	Viva-Voce	0	0	1	1	0	2	15**
4.	Sessional Record	Record File of Program/Algorithm	0	3	2	0	0	5	x

N.B. : Two programs are to be performed by each student and marks given at Sl. No. 2 (Major Exercise) is to be distributed as 10 marks for one C++ program and 5 marks for 5 query questions from SQL commands.

** No fixed time is allotted for Viva-Voce. It is to be performed during the course of the examination.