S. Chand's

COMPUTER SCIENCE

FOR CLASS XI

As Per New CBSE/NCERT Syllabus

DHEERAJ MEHROTRA

S. CHAND School

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COMPUTER SCIENCE

FOR CLASS–XI

[AS Per New CBSE / NCERT Syllabus]

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TO

SHRUTI and ***SHASHANK***

With

LOVE

DEDICATED TO HONOURABLE PRESIDENT SHRI APJ ABDUL KALAM FOR BESTOWING ME THE GREAT BLESSINGS TOWARDS QUALITY OF MY WORKLIFE

On this day, September 5, 2006

PREFACE

Quality Literacy is a subordinate of QUALITY IT Literacy Today. If you are not an IT Literate, sorry to say, you are in illiterate. Kudos to Quality initiative by the Central Board of Education and other boards which have introduced this part of learning as the MODE of learning other subjects in the CURRICULA. Over the years the Computer Science or the IT paper as such has been quite a supporting phase for scoring HIGH marks in the total as it is very easy to achieve 100% in the subject with a little expertise of Programming and logic as such.

I remain indebted to my Teacher Colleagues by taking an innovative step towards Quality IT Literacy today by being updated day by day with this vast field of IT learning and at the same time allows preferences over others towards QUALITY IT learning in totality. The present book titled "S. Chand's Computer Science for CBSE'' is featured with updated syllabus guidelines and tends to provide Quality IT Literacy in the most easy way through Logic Formation and Explanations, best possible.

My hearty regards and thanks to the Founder Manager of City Montessori School, Mr. Jagdish Gandhi, my Mentor, and motherly figure, Dr. (Mrs) Vineeta Kamran towards their heartful support and inspiration as a regular feature towards my achievement in life.

My special thanks to Mr. Navin Joshi, Vice President (Publishing), S. Chand & Co. Ltd., and all the Marketing and Sales staff at various branches of the S. Chand for making me believe that HARD WORK IS THE KEY TO SUCCESS by their wonderful Quality of Service.

Looking forward to the touch in the same.

With best wishes

DHEERAJ MEHROTRA

National Awardee

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COMPUTER SCIENCE

Class XI (Theory)

Duration: 3 hours *Total Marks: 70*

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
		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*

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

2. Project Work 10

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

3. Practical File 05

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

4. Viva Voce 05

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

CONTENTS

CHAPTER

1 Computer Fundamentals

INTRODUCTION

The term Information Technology encompasses all forms of technology used to create, store, exchange and use information in its various forms like business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms including those not yet conceived. A convenient term for including both telephony and computer technology in the same word. IT is the technology that is driving what has often been called "the information revolution." IT includes matters concerned with furthering computer science and technology, design development, installation, and implementation of information systems and applications.

Also often termed as ICT (Information and Communications Technology) and C & IT (Communication and Information Technologies). The broad subject concerned with all aspects of managing and processing information, on databases or in libraries, especially within large organisations.

Broadly estimating its importance today, the term IT includes all matters concerned with the furtherance of computer science and technology and with the design, development, installation, and implementation of information systems and applications. Because computers are central to information management, computer departments within companies and universities are often called IT departments. Some companies refer to this department as IS (Information Services) or MIS (Management Information Services).

The term IT is often used for encompassing both telephony and computer technology together. Information Technology is driving what has often been called "the information revolution."

WHAT IS A COMPUTER?

A computer is a device that accepts information and manipulates it for some result. Computers can be confusing, and it takes a little time before you gain confidence in using and understanding them. Just like a new TV or VCR, computers can be a bit cumbersome to figure out, but once you achieve a certain level of knowledge, these machines can become powerful allies.

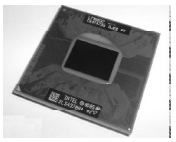
A computer collects processes, stores and outputs information as per the following order:

Input

An input device lets you communicate with a computer. You can use input devices to enter information and issue commands. A keyboard, mouse and joystick are input devices.

Process

The Central Processing Unit (CPU) is the main chip in a computer. The CPU processes instructions, performs calculations and manages the flow of information through a computer system. The CPU communicates with input, output and storage devices to perform tasks.



Output

An output device lets a computer communicate with you. These devices display information on a screen, create printed copies or generate sound. Monitor, printers and speakers are output devices.

Store

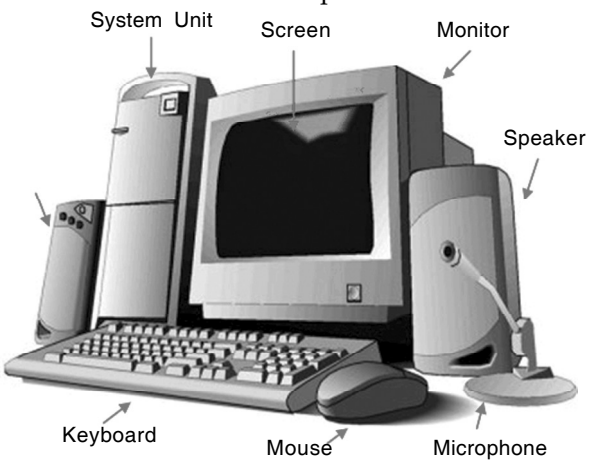
A storage device that holds information. The computer uses information stored on these devices to perform tasks. The hard drive, the tape drive, the floppy disk and the CD Rom drive are storage devices.

Characteristics of a Digital Computer

$$\text{Computer System} = \text{Hardware} + \text{Software}$$

$$\text{Hardware} = \text{Internal Devices} + \text{Peripheral Devices}$$

Hardware is the term associated with Computer Architecture.



All the parts of the computer are hence referred to as computer hardware.

The chip level circuitry is well designed inside the processing box with the two input/output units of the computer.

According to the block diagram of the computer, the computer is divided into four main parts as

Input ⟶ Processing ⟶ Output ⟶ Storage

The Input Unit fetches the data to be processed.

The processing unit converts the data into meaningful information.

The Output unit displays the processed information to the user which may be in the form of the display unit or the storage unit of the computer.

The Storage Unit stores the data for further reference.

CPU or the Central Processing Unit

The main component to make a computer operate is the **computer chip** or **microprocessor.** This is referred to as the **Central Processing Unit** (CPU) and is housed in the computer case. Together, they are also called the CPU.

The CPU acts like a traffic cop in a busy intersection. It instructs the computer programs to process the data.

Power Switch

The power switch is located somewhere on the CPU, usually in the front or on the side. You press this to start your computer. But **do not press the power switch to turn off your computer** unless nothing else works.

Motherboard

All of the computer's components are hooked up to a motherboard, which is the main base for the computer's circuitry and components.

RAM

Memory is called RAM, which stands for **Random Access Memory**. RAM is the actual grouping of computer microchips on your motherboard.

Megahertz

Your computer speed is called megahertz, after Heinrich Hertz, a German physicist. It is defined as the millions of cycles that the electric circuitry goes through while operating your computer.

TYPES OF COMPUTERS

There are several types of computer systems.

PC (Personal Computer)

A PC is a computer designed to meet the needs of a single person and usually refers to IBM-compatible computers. PCs are found in many businesses and are popular for home use.

Mainframe

A mainframe is a computer that can process and store large amounts of information and support many users at the same time. A terminal consisting of a keyboard and monitor, is used to input and output information on a mainframe.

Macintosh

Macintosh computers are found in many homes and are very popular in the graphics, publishing and multimedia industries. The Macintosh was the first widely used computer that offered a graphical display.

Notebook Computer

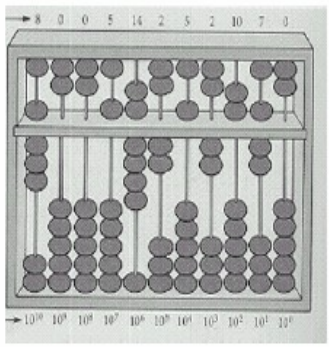
A notebook computer is a small, lightweight computer that you can easily transport. It also called a laptop or notebook. And a notebook computer has a built-in keyboard, pointing device and screen. This eliminates the need for cables to connect these devices to the notebook. And you can buy a notebook computer with the same capabilities as a desktop computer, although notebook computers are more expensive.

EVOLUTION OF COMPUTERS

The greatest milestone of the achievements made by mankind has been the discovery of the numbers. In early days man used stones and pebbles for counting. With the invention of zero by the Indians, the number system developed with a new pace.

The later growth of trade and commerce gave way to further advancements on the field of calculation. The following important developments enroute the modern day computer which is no more an instrument but a household name.

The following are some of the important developments which took place contributing to the present day world of desk top machines.



ABACUS

It is a mechanized pebble counter having beads strung on wires or strings held in a frame. The beads are slid along the wires when counting. It is divided into two parts. The upper part is known as Heaven and the lower part is known as Earth. It was first developed in China and with the march of time its use spread in nearly all parts of the world.

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