NEP NEW SYLLABUS

COMPUTER FUNDAMENTALS

[Generic Elective (GE) / Open Elective (OE)]

for

First Year : Semester-II

[Other than Science and Technology Faculty]

[Course Code OE-152-CS-T)

CBCS Pattern under NEP

w.e.f. Academic Year 2024

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Price ₹ 160.00

NIRALI PRAKASHAN
ADVANCEMENT OF KNOWLEDGE

N8321

COMPUTER FUNDAMENTALS **ISBN 978-93-6109-863-5**

First Edition : January 2025

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Published By :
NIRALI PRAKASHAN
Abhyudaya Pragati, 1312, Shivaji Nagar,
Off J.M. Road, Pune – 411005
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Polyplate

Printed By :
YOGIRAJ PRINTERS AND BINDERS
Survey No. 10/1A, Ghule Industrial Estate
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Preface ...

We take an opportunity to present this Text Book on **"Computer Fundamentals"** to the students of First Year other than Science and Technology faculty Semester-II as per the New CBCS Syllabus under NEP (National Education Policy), effective from June 2024.

The book has its own unique features. It brings out the subject in a very simple and lucid manner for easy and comprehensive understanding of the basic concepts. The book covers theory of Introduction to Computers, Introduction to Computer Peripherals, Number Systems, Operating Systems and Introduction to Computer Networking.

A special word of thank to Shri. Dineshbhai Furia, and Mr. Jignesh Furia for showing full faith in us to write this text book. We also thank to Mr. Amar Salunkhe and Mr. Akbar Shaikh of M/s Nirali Prakashan for their excellent co-operation.

We also thank Ms. Chaitali Takle, Mr. Ravindra Walodare, Mr. Sachin Shinde, Mr. Ashok Bodke, Mr. Moshin Sayyed and Mr. Nitin Thorat.

Although every care has been taken to check mistakes and misprints, any errors, omission and suggestions from teachers and students for the improvement of this text book shall be most welcome.

Authors

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1. Introduction to Computers (7 Hrs.)

1.1 Introduction, Characteristics of Computers

1.2 Block Diagram of Computer

1.3 Computer Generations

1.4 Types of Computers and Features - Mini Computers, Micro Computers, Mainframe Computers, Super Computers, Laptops and Tablets

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2.5 Pointing Devices - Mouse, Joystick, Touch Screen

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4.1 Definition of Operating System

4.2 Functions of Operating System

4.3 Role of Operating System

4.4 Types of Operating System

5. Introduction to Computer Networking (5 Hrs.)

5.1 Network – Definition, Common Terminologies - LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability

5.2 Network Administrator

5.3 Network Security

5.4 Network Components - Severs, Clients

5.5 Communication Media

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■■■

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5. Introduction to Computer Networking **5.1 – 5.26**

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CHAPTER 1

Introduction to Computers

Objectives...

- To learn Basic Concepts of Computers
- To study Generations and Types of Computers with Features
- To understand Programming Languages with Types

1.1 INTRODUCTION

- Nowadays, computers have become an integral part of modern life, used in diverse fields such as education, medicine, healthcare, banking, telecommunications governments, entertainment and so on.
- This pervading presence of computers has made it necessary for everyone to have a fundamental knowledge of computers. In short, computers are powerful tools that have revolutionized the way we live, work and communicate.
- A computer is basically a programmable computing machine. Computing is the process of utilizing computer technology to complete a task. Computing machine is a machine for performing particular tasks automatically.
- A computer is an electronic device that performs diverse operations using instructions to process the information in order to achieve the desired result.

1.2 BASIC CONCEPTS OF COMPUTER

- The term computer is derived from the Latin word “compute” means “to calculate”. A computer is a machine that is used to store, retrieve and manipulate data.
- A computer mainly works on the following principle, (See Fig. 1.1):
  1. **Input:** Taking the input in the form of instruction and data.
  2. **Process:** Processing the instruction and data and store the results.
  3. **Output:** Display the stored results or output it into the print format.



Fig. 1.1: Basic Operations of a Computer

- Fig. 1.2 shows work environment of computer.

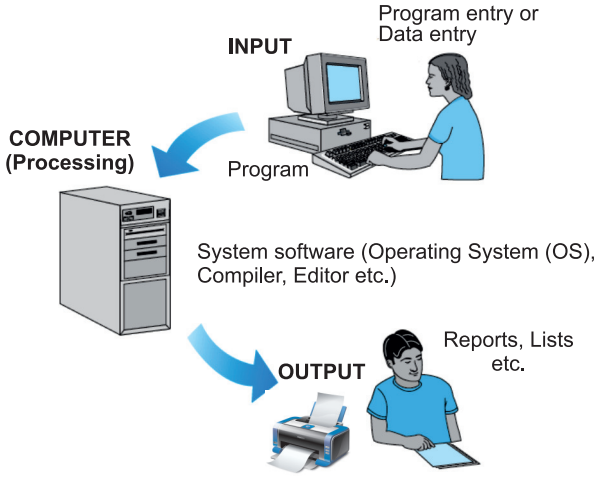

Fig. 1.2: Work Environment of Computer/Basic Working of Computer

- The basic parts of a desktop computer are the monitor, cabinet/case (CPU), keyboard and mouse as shown in Fig. 1.3.
- The computer case is the metal and plastic box that contains the main components of the computer, including the motherboard, processor, power supply hard disk processor, etc.
- The front of the case usually has an ON/OFF button and one or more optical drives. The monitor or VDU (Video Display Unit) works with a video card, located inside the computer case, to display images and text on the screen.
- Newer monitors usually have LCD (Liquid Crystal Display) or LED (Light-Emitting Diode) displays. These can be made very thin, and they are often called flat-panel displays. Older monitors use CRT (Cathode Ray Tube) displays.
- The keyboard is one of the main ways to communicate with a computer. It is an input device used for text entry to computer.
- A standard keyboard has 102 keys. The keys are divided into alphabetical (a-z), numerical (0-9) and special (Function, Ctrl, Alt etc. keys).
- The mouse is another important input device for communicating with computers. Commonly known as a pointing device, it lets us point to objects on the screen, click on them, and move them.
- There are two main mouse types i.e., optical and mechanical. The optical mouse uses an electronic eye (scroll) to detect movement while the mechanical mouse uses a rolling ball to detect movement.

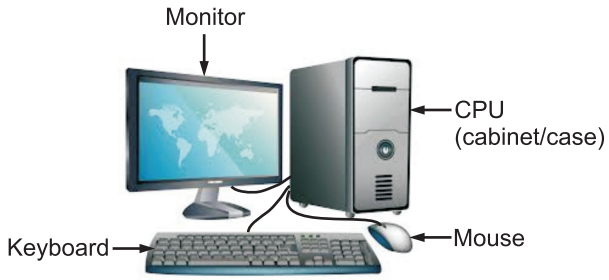

Fig. 1.3: Typical Desktop Computer

1.2.1 Definition of Computer

- A computer is defined as, "an electronic device that performs a given task on the basis of given instructions". **OR**
- A computer can be defined as "a programmable electronic device that can perform mathematical and logical calculations, data processing in accordance with a predefined program of instructions". **OR**
- A computer may be defined as "a machine that can solve problems by accepting data, performing certain operations and presenting the results of those operations under the direction of detailed step-by-step instructions i.e., programs".

1.2.2 Computer System

- A system is a group of element or components that work together to carry out some common tasks and to achieve a common goal or objective.
- A computer can be viewed as a system, which consists of a number of interrelated components or elements that work together with the aim/goal of converting data into information.
- A complete computer system consists of four parts components/elements i.e., Hardware, Software, Data and User as shown in Fig. 1.4.

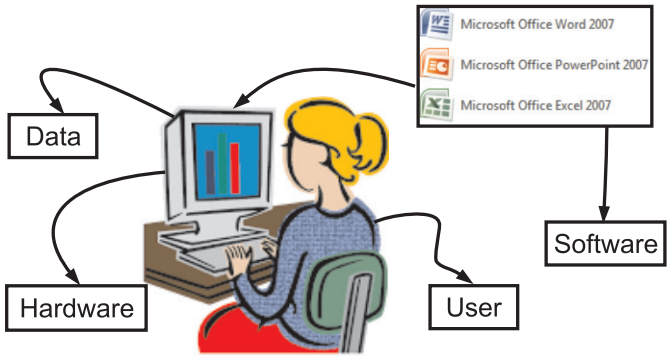

Fig. 1.4: Parts/Elements/Components of Computer System

- Fig. 1.4 shows following components/elements of computer system:

1. **Hardware:**

- The mechanical devices/parts/components that make up the computer are called hardware.
- A computer's hardware consists of interconnected electronic devices that you can use to control the computer's operation, input and output.

2. **Software:**

- It is a set of instructions that makes the computer perform tasks.
- In other words, software tells the computer what to do.

Difference between Hardware and Software:

Sr. No.	Hardware	Software
1.	These are the physical components of a computer system.	These are the logical components of a computer system.
2.	User can see, touch and feel the hardware.	User cannot touch the software.
3.	Hardware works based on the instructions of the software.	Software tell the hardware what to do.
4.	Hardware components are less expensive.	Software are generally costlier and expensive as compare to hardware.

3. **Data:**

- Data is the raw information or raw/basic facts that computer can process. Data by itself does not make much sense to the user.
- It will give a meaning only when it is processed by the computer. A processed data is called as information.
- Data can be text, numbers, audio or video that the computer manipulates.

4. **Users:**

- People who use computers are called users. Users are people who write computer programs or interact with the computer.
- They are also known as skinware, liveware, humanware or peopleware.
- Computer programmers, data entry operators, system analyst and computer hardware engineers fall into this category.

1.3 CHARACTERISTICS OF COMPUTERS

- The main characteristics of computer, which makes them powerful and useful are:
  1. **Automation:** An automatic machine works by itself without human intervention. Computers has automation (ability to perform the given task automatically) power that means computer can perform the task automatically by using programs.
  2. **Speed:** Computers are of high speed in its operation. The speed is measured in terms of Instructions Per Second (IPS). All modern computers can process information at a speed of a couple of Million Instructions Per Second (MIPS).

3. **Accuracy:** Computers are highly accurate in its operations. They either give correct answer or do not answer at all. Errors can occur in computers but these are mainly due to human rather than technological weakness.
4. **Reliability:** It is the ability of a computer to perform the same job exactly in the same way in any numbers of times.
5. **Versatility:** A computer is capable of performing almost any task provided that the task can be reduced to a series of logical steps.
6. **Integrity:** It is the ability of a computer to carry out a sequence of instructions.
7. **No Feelings:** Computers are devoid of emotions. They have no feeling because they are machines.
8. **Diligence Continuity:** A computer is free from monotony, tiredness, lack of concentration, etc. It can work for hours without creating any error.
9. **Power of Remembering:** Computers can store and recall any amount of information because of its storage capability.

1.4 BLOCK DIAGRAM OF COMPUTER

- The basic block diagram (structure) explains the way in which different units of computer are interconnected with each other.
- Computer is also a type of system because it is a group of integrated parts which are used to solve any general-purpose problem by executing the suitable program.
- The organization (block diagram) of computer system components are shown in Fig. 1.5.
- Every computer system has essential four important units i.e., Input Unit, Output Unit, CPU and Storage Unit.

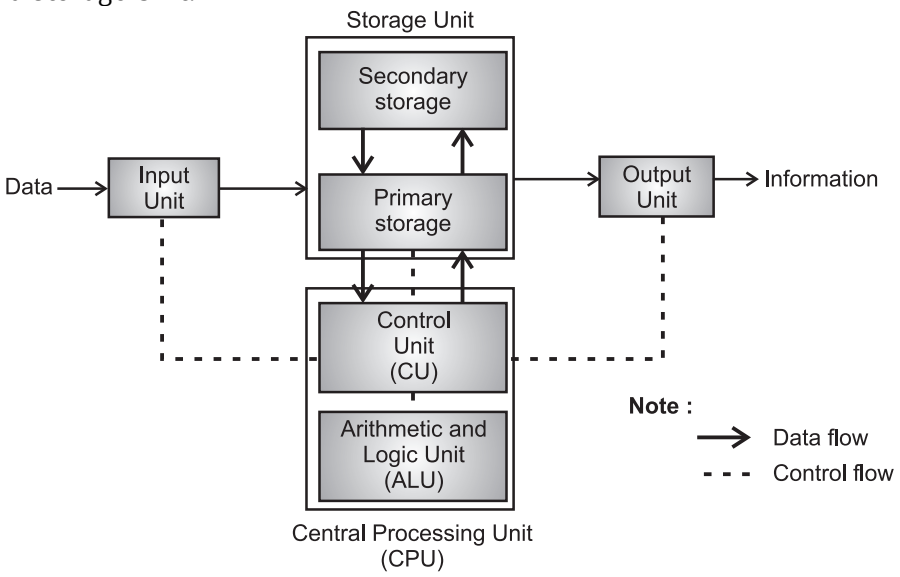

Fig. 1.5: Block Diagram of Computer

- Various parts/components of computer in Fig. 1.5 are described below:
  1. **Input Unit:** Input is the process of entering data and programs in to the computer system. Input is the raw information entered into a computer from the input device. The device that accepts data from the user and communicates the same to the CPU is called as an input device. Some common input devices are keyboard, mouse, joystick, light pen, track ball, scanner, graphic tablet, microphone, Magnetic Ink Card Reader (MICR), Optical Character Reader (OCR), Barcode reader, Optical Mark Reader (OMR) etc. Functions of Input Unit are listed below:
     (i) It accepts or reads data/instructions from outside world.
     (ii) Input unit converts these data/instructions in computer acceptable form.
     (iii) Input unit supplies the converted data/instructions to the storage unit for storage and further processing.
  2. **CPU:** The Central Processing Unit (CPU) is referred to as "brain" of a computer system. CPU converts data (input) into meaningful information (output). CPU controls all the internal and external devices, performs arithmetic and logic operations, and operates only on binary data, that is, data composed of 1's and 0's. In addition, it also controls the usage of main memory to store data and instructions and controls the sequence of operations. The central processing unit consists of three main subsystems, the Arithmetic Logic Unit (ALU), the Control Unit (CU), and the Registers. ALU performs the arithmetic and logic operations on the data that is made available to it. CU is responsible for organizing the processing of data and instructions. CU controls and co-ordinates the activity of the other units of computer. CPU uses the registers to store the data, instructions during processing.
  3. **Memory or Storage Unit:** The process of saving data and instructions permanently or temporary is known as storage. Memory unit can store instruction, data and intermediate results. This unit supplies information to the other units of the computer when needed. The memory unit consists of primary memory and secondary memory.

     Primary Memory (main memory) of the computer is used to store the data and instructions during execution of the instructions. The primary goal of computer memory is to store data.

     There are two types of memories i.e., **Volatile Memory** is a type of memory (storage) whose contents are erased when the system's power is turned off or interrupted, and **Non-volatile Memory** is any memory or storage that will be saved regardless if the power to the computer is on or off.

     Random Access Memory (RAM) and Read Only Memory (ROM) are the primary memories.

Secondary Memory is non-volatile and is used for permanent storage of data and programs. A program or data that has to be executed is brought into the RAM from the secondary memory. Magnetic tape, disks are the examples of secondary storage.

Types of Memory:

(a) RAM: RAM stands for Random Access Memory. RAM is read/write memory. RAM is of two types i.e. Static RAM (SRAM) and Dynamic RAM (DRAM).

(i) SRAM (Static Random Access Memory) is a type of semiconductor memory where the word static indicates that, it does not need to be periodically refreshed, as SRAM uses bi-stable latching circuitry to store each bit.

(ii) DRAM (Dynamic Random Access Memory) is a type of random access memory that stores each bit of data in a separate capacitor within an integrated circuit.

(b) ROM: ROM stands for Read Only Memory. ROM is the memory from which we can only read but cannot write on it. ROM is a non-volatile primary memory. It does not lose its content when the power is switched off. ROM has following types:

(i) MROM (Masked ROM) are the very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions.

(ii) PROM (Programmable Read Only Memory) is read-only memory that can be modified only once by a user.

(iii) EPROM (Erasable and Programmable Read Only Memory) is a type of memory chip that retains its data when its power supply is switched off.

(iv) EEPROM (Electrically Erasable and Programmable Read Only Memory) is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times.

4. **Output Unit:** The result of computer processing is called as output. This result is communicated to user through a device called output devices like Monitors, Plotter, Printer etc. Functions of Output Unit are listed below:
   (i) Output unit accepts the produced results, which are in the coded form.
   (ii) It converts these coded results to human acceptable form.
   (iii) Output unit supplies the converted results to outside world.

1.5 COMPUTER GENERATIONS

- In computer terminology, the word generation is described as a stage of technological development or innovation.
- A major technological development that fundamentally changed the way computers operate, resulting in increasingly smaller, cheaper, more powerful, more efficient and reliable devices, characterizes each generation of computer.