
UNIT 1 INTRODUCTION TO COMPUTERS

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1.1 INTRODUCTION

This unit aims at introducing you to today's most commonly used electronic device – the **computer**. The study of this unit will highlight the characteristics and evolution of computers. It will also help you to understand the basic terminology associated with computers.

Objectives

After studying this unit, you should be able to

- understand the basic characteristics of computers,
- understand how the computers evolved,
- understand the components that make up a computer,
- differentiate between hardware and software,
- differentiate between system and application software,
- understand the difference between bits and bytes,
- classify devices as input and output devices,
- differentiate between ROM and RAM, and
- appreciate the use of various secondary storage devices.

1.2 WHY COMPUTER?

The word 'Computer' literally means to 'Compute' or to 'Calculate'. Stated simply, it is an electronic device, which processes information based on the instructions provided, to generate the desired output. It, therefore, requires two

types of input – raw data, and the set of instructions to process or act upon the data.

This can schematically be shown in Figure 1.1.

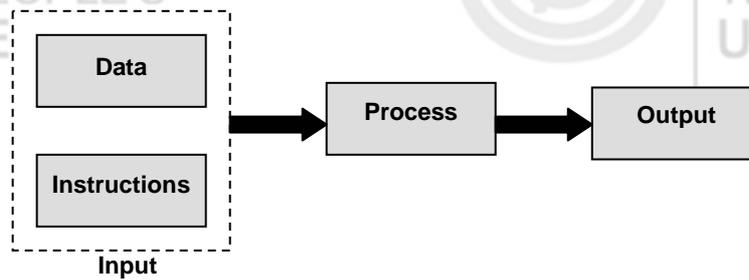


Figure 1.1 : Processing Information

Data can be of any type – text, numeric, alpha-numeric, image, picture, sound etc. The instructions that act upon this data are also called the *program* or *software* in computer terminology.

1.2.1 Characteristics of Computers

The characteristics of computers that have made them so powerful and universally useful are speed, accuracy, diligence, versatility and storage capacity :

Speed

Computers work at an incredible speed. The speed with which it performs is way beyond human capabilities. As a comparison, it can do in one minute what a human being would probably take a lifetime!

When we refer to the speed of computers, we have to talk in terms of milliseconds (hundredth of a second), microseconds (millionth of a second), nanoseconds (billionth of a second), and even picoseconds (trillionth of a second). A powerful computer is capable of performing about 3-4 million simple instructions per second.

Accuracy

In addition to being fast, computers are also accurate. Errors that may occur can almost always be attributed to human error (inaccurate data, poorly designed system or faulty instructions/programs written by the programmer) rather than technological weaknesses. In fact, a special term GIGO (Garbage in Garbage Out) has been coined to represent a scenario where faulty results are got due to inaccurate instructions or faulty data.

Diligence

Unlike human beings, computers are highly consistent. They do not suffer from human traits of boredom and tiredness resulting in lack of concentration. Computers, therefore, score high over human beings in performing voluminous and repetitive jobs.

Versatility

Computers are versatile machines and are capable of performing any task as long as it can be broken down into a series of logical steps. This means that their capability is, once again, limited only by human intelligence. As is evident, in today's fast developing technology-world, it is almost inconceivable to find an area where computers are not being used. The presence of computers can be seen in every sphere – Railway / Air reservation, Banks, Hotels, Weather forecasting, and many more.

Storage Capacity

Today's computers can store volumes of data. Unlike human memory where unimportant information is relegated to the back of the mind and forgotten as time progresses, a piece of information once recorded (or stored) in the computer, can never be forgotten and can be retrieved almost instantaneously! Information can, therefore, be retained as long as desired (using secondary storage – a type of detachable memory).

SAQ 1



Identify the characteristics of a computer that have contributed towards making it such a popular device.

1.3 EVOLUTION OF COMPUTERS

The history of computers can be traced back to almost 2000 years ago, with the advent of **abacus**, a wooden rack holding two horizontal wires with beads strung on them. Numbers are represented using the position of beads on the rack. Fast and simple calculations can be carried out by appropriately placing the beads.

In 1620, an English mathematician by the name *William Oughtred* invented the slide rule – a calculating device based on the principle of logarithms. It consisted of two graduated scales devised in such a manner that suitable alignment of one scale against the other, made it possible to perform additions, compute products etc. just by inspection.

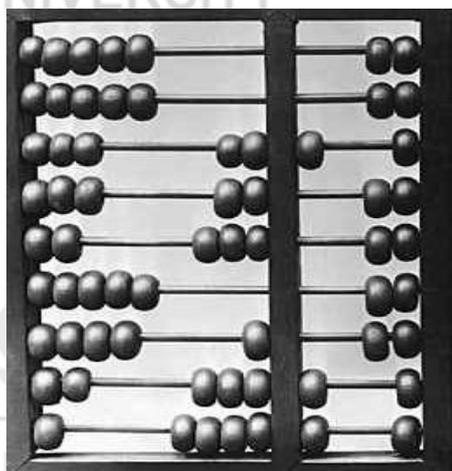


Figure 1.2 : The Abacus

Blaise Pascal, a French mathematician, is usually credited for building the first digital computer in 1642. He invented the mechanical calculating machine. Numbers were entered in this machine by dialing a series of numbered wheels. Another series of toothed wheels transferred the movements to a dial, which showed the results.

In 1671, *Gottfried von Leibnitz*, a German mathematician, invented a calculating machine which was able to add and perform multiplications. He invented a

special **stepped gear** mechanism for introducing the addend digits, which is still being used.

The prototypes made by Pascal and Leibnitz were not used in many places. It was only about a century later that **Thomas of Colmar** created the first successful mechanical calculator which could add, subtract, multiply, and divide. A lot of improved desktop calculators by various inventors, followed, such that by 1890 a range of improvements like accumulation of partial results, storage of past results, and printing of results, were not uncommon.

1.3.1 The First Computer

Charles Babbage, a professor of mathematics at Cambridge University, England, realized that many long calculations usually consisted of a series of actions that were constantly repeated and hence could possibly be automated. By 1822, he designed an automatic calculating machine that he called the '**Difference Engine**'. It was intended to be steam powered and fully automatic (including printing of result tables), commanded by a fixed instruction program. In short, he developed a prototype of a computer which was 100 years ahead of time and is, therefore, considered as the *father of modern day computers*.

A step towards automated computing was the development of punched cards which were first successfully used by **Herman Hollerith**, who worked in the US Census Bureau in 1890. He along with **James Powers** developed devices that could read information that had been punched into cards, without any human help. This resulted in reducing reading errors, increased workflow, and make availability of unlimited memory (punched cards could be used as easily accessible memory of unlimited size).

These advantages were seen by various commercial companies and soon led to the development of improved punch-card using computers by companies like International Business Machines (IBM), and Remington.

1.3.2 Some Well Known Early Computers

Mark I

After World War II there was a need felt for advanced calculations. By that time, many reliable mechanical desk calculators had been developed.

Howard A. Aiken of Harvard University, while working on his doctorate in physics, in the year 1937, designed a machine that could automatically perform a sequence of arithmetic operations. He completed this in 1944 and named it as **Mark I**. This machine performed a multiplication and division at an average of about four and eleven seconds respectively. The results were printed at a rate of one result per five seconds.

ENIAC

The World War II also produced a large need for computer capacity especially for the military. New weapons were made for which trajectory tables and other essential data were needed. In 1942, Professors **John P. Eckert** and **John W. Mauchly** at the Moore School of Engineering of the University of Pennsylvania, USA decided to build a high speed computer to do the job. This was called the ENIAC (Electronic Numeric Integrator and Calculator).

It used 18,000 vacuum tubes, about 1,800 square feet of floor space, and consumed about 180,000 watts of electrical power. It had punched cards I/O and its programs were wired on boards.

ENIAC is accepted as the first successful high-speed electronic digital computer which was used from 1946 to 1955.

EDIVAC

Fascinated by the success of ENIAC, *John Von Neumann*, a mathematician, undertook an abstract study of computation in 1945. In this he aimed to show that a computer should be able to execute any kind of computation by means of a proper programmed control. His ideas, referred to as '*stored program technique*', further became essential for future generations of high-speed digital computers and were universally accepted. The basic idea behind the stored program concept was that data as well as instructions can be stored in the computer's memory to enable automatic flow of operations.

Between 1947 and 1950, the More School personnel and the Ballistics Research Laboratory of the US army built a computer named EDVAC (Electronic Discrete Variable Automatic Computer), which was based on Von Neumann's concept of stored program.

UNIVAC

The Universal Automatic Computer (UNIVAC), developed in 1951, was the first digital computer to be produced and was installed in the Census Bureau.

The first-generation stored-program computers needed a lot of maintenance, reached 70% to 80% reliability of operations and were used for almost 10 years. EDVAC and UNIVAC fell into this group of computers and were the first commercially available computers.

1.3.3 Computer Generations

'Generation' in computer terminology is a 'step' ahead in technology. As you go through the history of evolution of computers, you will find that the earliest computers were big in size, consumed a lot of power, and heated up quickly, due to which it had to be shut down frequently – to be cooled. It were very cumbersome and expensive to build and maintain.

As technology improved, computers became compact, extra storage space, faster and more powerful. From a user's perspective, they become user friendly and more affordable. This has largely contributed towards the popularity that computers have gained today.

The term 'generation' was earlier used only to distinguish between varying hardware technologies but was later extended to include both hardware and software. A comparison of generations is made below:

First Generation Computers (1940 to 1956)

The first generation of computers were characterized as *vacuum tubes* in the circuitry and magnetic drums for memory.

These computers were enormous in size, used great deal of electricity and were expensive to operate. It also had limited storage capacity.

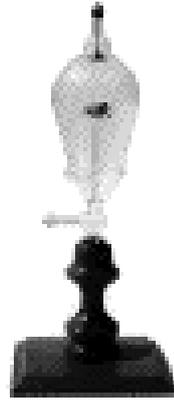


Figure 1.3 : Vacuum Tube

First generation computers relied on machine language (binary-coded program) to perform operations and could solve only one problem at a time. Punched cards and paper tapes were used to input data and instructions, and output was displayed on printouts.

Early computers like ENIAC, EDVAC, and UNIVAC can be classified as first generation computers.

Second Generation Computers (1956 to 1963)

In the early 1950s, the discoveries of *Transistor* and *Magnetic core memory* changed the image of computers – from unreliable to highly reliable machines with increased capability, and higher storage capacity.

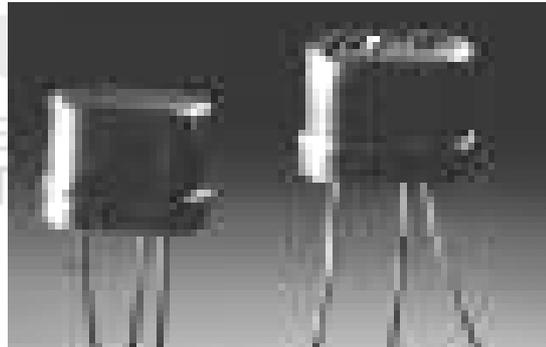


Figure 1.4 : First Silicon Transistor

The transistor was far superior to vacuum tube, allowing computers to become smaller in size, cheaper, reliable, and more energy efficient. Though transistor still generated a great deal of heat, it was a substantial improvement over the vacuum tube.

Second generation of computers were also characterized by allowing programmers to specify instructions in symbolic (or assembly) language rather than cryptic binary machine language. High level programming languages like COBOL (COMmon Business Oriented Language) and FORTRAN (FORMula TRANslation) were also being developed at this time.

Due to the increase in the cost of expanding programming, these machines were expensive to purchase and operate. Such computers were, therefore, mostly found in large computer centres or government/private laboratories with many programmers and support professionals.

Third Generation Computers (1964 to 1971)

The development of *Integrated Circuit* by Jack Kilby, an engineer with Texas Instruments, in 1958, was the hallmark of the third generation of computers. Punched cards and printouts gave way to devices like keyboards and monitors making it easier for the user to interact with the computer. Computer manufacturers could provide a range of accessories like the cathode ray tube display devices, page printers, consoles etc.

Existence of an *operating system* allowed the device to run various applications at one time with the central program monitoring the memory.

For the first time, computers were being widely used in business for areas like :

- Accounting
- Payroll
- Billing
- Tracking Inventory, etc.

This generation of computers were characterised by substantially smaller and cheaper than its predecessors.

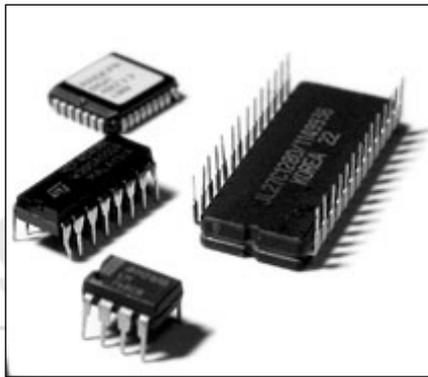


Figure 1.5 : IC Chips

Fourth Generation Computers (1971 to present)

The trend in 1970s was to move from single-purpose but powerful computers towards cheaper computer systems that could support a large range of applications.

A new revolution in computer hardware came into existence which could shrink the computer logic circuitry and its components using the Large Scale Integration (LSI) technology. Hundreds of components could now fit onto a single chip!

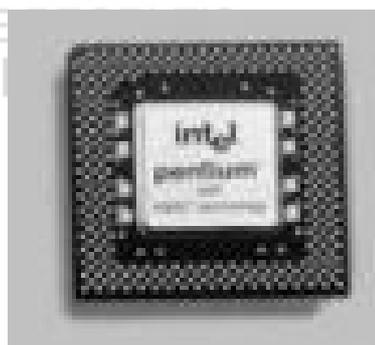


Figure 1.6 : Intel Pentium Microprocessor Chip

In the 1980s, very large scale integration (VLSI) squeezed hundreds of thousands of components onto a single chip. This shrinking trend continued and led to the introduction of personal computers (PCs) – programmable machines that are small enough and inexpensive so that these can be purchased and used by individuals. Companies like Apple Computers, and IBM introduced very successful PCs.

The IC technology was not only used to construct the processor, but also for the construction of memory. The first memory chip was constructed in 1970 and could hold 256 bits.

Fifth Generation Computers (the Road Ahead)

The fifth generation of computers characterized by artificial intelligence is in the process of development. The goal here is to develop a devices that are capable of learning and responding to natural language input. This generation of computers endow with new technologies in a very large scale integration, along with new programming languages and will be capable of having amazing whereabouts, in the area of artificial intelligence, such as voice recognition.

SAQ 2 

What unique features classify computers into different generations?

1.4 COMPONENTS OF A COMPUTER

The computer system essentially comprises into three important parts – input device, central processing unit (CPU), and the output device. The CPU itself is made of three components namely, the arithmetic logic unit (ALU), memory unit, and the control unit.

In addition to these, auxiliary storage/secondary storage devices are used to store data and instructions on a long-term basis.

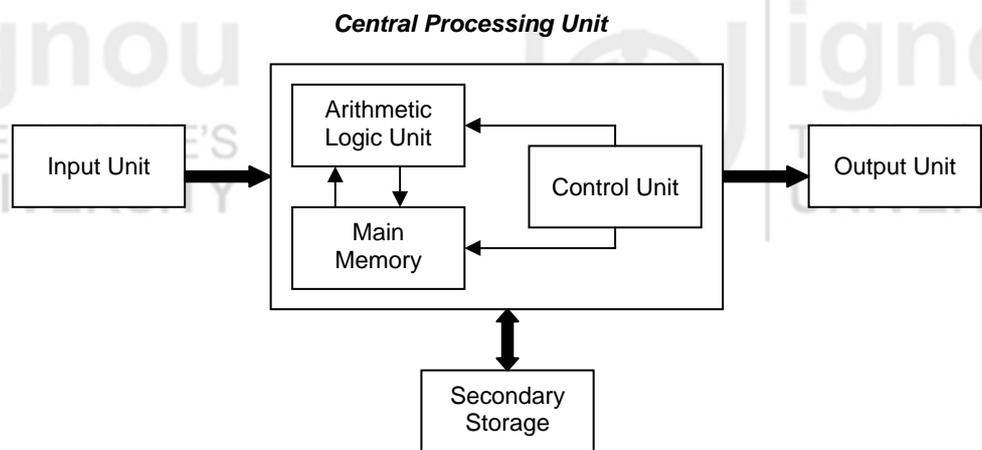


Figure 1.7 : Schematic Representation of a Computer

Data and instructions must be entered into the computer system for processing, and results obtained from computations must be displayed or recorded for the user. The input device serves the purpose of receiving data and instructions in a form that can be understood by the computer.

Central Processing Unit

Data and instructions (programs) are stored in the computer's memory after which all the major calculations and computations are carried out within the CPU. The CPU is also responsible for controlling the operations of various units of the computer system.

Arithmetic Logic Unit (ALU)

All calculations and comparisons, based on the instructions provided, are carried out within the ALU. It performs arithmetic functions like add, subtract, multiply, divide and logical operations like greater than, less than, and equal too.

Main Memory

The main memory holds data and instructions after input, till they are needed. It also holds the processed results that are awaiting output.

Control

The function of the control unit is to execute the instructions of a program, one by one, in the desired sequence. It interprets each instruction and then prompts its execution by one of the units like input, output, ALU, storage.

For example, a comparison of two numbers (a logical operation) to be performed by the ALU may require loading the two numbers into the main memory which is a function performed by the control unit. It then will pass on the execution of the 'compare' function to the ALU.

Output Unit

The processed data, stored in the memory of the computer is sent to the output unit, which then converts it into a form that can be understood by the user. The output is usually produced in one of the two ways – on the display device, or on paper (hard copy).

Secondary Storage

Also termed as 'auxiliary' or 'backup' storage, is typically used as a supplement to main storage. It is much cheaper than the main storage and stores large amount of data and instructions permanently. Hardware devices like magnetic tapes and disks fall under this category.

SAQ 3



What are the basic components of a computer system?

1.5 HARDWARE Vs SOFTWARE

The electrical, electronic, mechanical, and magnetic components that make up the computer system are together termed as '*hardware*'. These include components that are responsible for user input, display, and mathematical processing. The CPU, disk drives, internal chips and wiring, modem, peripheral devices like the monitor, keyboard, mouse, printer, speakers etc. are together termed as computer hardware.

Computer hardware cannot perform any manipulation or calculation without being instructed as to what to do and how to do it. Programs (or instructions) are required to tell the computer what to do. The generic term for computer programs is '*software*'. Software comes in two main types – system software and application software.

1.6 SYSTEM Vs APPLICATIONS SOFTWARE

System software consists of programs that control the operations of the computer system itself. It consists of a group of programs that control the operations of a computer equipment including functions like managing memory, managing peripherals, loading, storing, and is an interface between the application programs and the computer. MS DOS (Microsoft's Disk Operating System), UNIX are examples of system software.

Software that can perform a specific task for the user, such as word processing, accounting, budgeting or payroll, fall under the category of application software. Such programs run on top of an operating system (like Windows, UNIX, Linux, Macintosh) and are used to carry out specific functions. Word processors, spreadsheets, database management systems are all examples of general purpose application softwares.

1.7 BITS AND BYTES

All information in the computer is handled using electrical components like the integrated circuits, semiconductors, all of which can recognize only two states – presence or absence of an electrical signal. Two symbols used to represent these two states are **0** and **1**, and are known as BITS (an abbreviation for **BI**nary **Digi**TS). **0** represents the absence of a signal, **1** represents the presence of a signal. A BIT is, therefore, the smallest unit of data in a computer and can either store a **0** or **1**.

Since a single bit can store only one of the two values, there can possibly be only four unique combinations:

00 01 10 11

Bits are, therefore, combined together into larger units in order to hold greater range of values.

BYTES are typically a sequence of eight bits put together to create a single computer alphabetical or numerical character. More often referred to in larger multiples, bytes may appear as Kilobytes (1,024 bytes), Megabytes (1,048,576 bytes), GigaBytes (1,073,741,824), TeraBytes (approx. 1,099,511,000,000 bytes), or PetaBytes (approx. 1,125,899,900,000,000 bytes).

Bytes are used to quantify the amount of data digitally stored (on disks, tapes) or transmitted (over the internet), and are also used to measure the memory and document size.

SAQ 4



State TRUE or FALSE

- All code or data is stored and processed in computers using two symbols – 0 and 1.
- A 'Byte' is a group of four bits and is often used to store characters.

1.8 INPUT AND OUTPUT DEVICES

The computer will be of no use unless it is able to communicate with the outside world. Input/Output devices are required for users to communicate with the computer. In simple terms – input devices bring information INTO the computer and output devices bring information OUT of a computer system. These input/output devices are also known as *peripherals* since they surround the CPU and memory of a computer system.

Some commonly used Input/Output devices are listed in a table below.

Input Devices	Output Devices
Keyboard	Monitor
Mouse	LCD
Joystick	Printer
Scanner	Plotter
Light Pen	
Touch Screen	

Input Devices

Keyboard

It is a text base input device that allows the user to input alphabets, numbers and other characters. It consists of a set of keys mounted on a board.

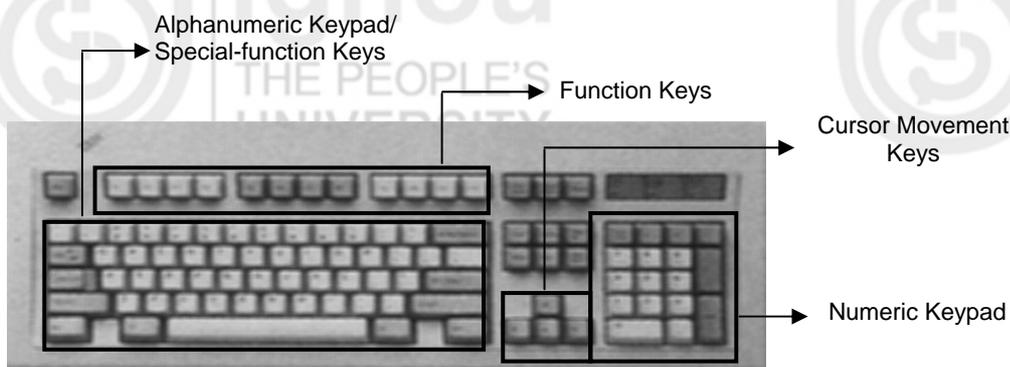


Figure 1.8 : Qwerty Keyboard Layout

- **Alphanumeric Keypad** : It consists of keys for English alphabets, 0 to 9 numbers, and special characters like + - / * () etc.
- **Function Keys** : There are twelve function keys labeled F1, F2, F3, ... , F12. The functions assigned to these keys differ from one software package to another. These keys are also user programmable keys.
- **Special-function Keys** : These keys have special functions assigned to them and can be used only for those specific purposes. Functions of some of the important keys are defined below.

Enter

Is used similar to the 'return' key of the typewriter and is used to execute a command or program.

Spacebar

Is used to enter a space at the current cursor location.

Backspace

Is used to move the cursor one position to the left and also delete the character in that position.

Delete

Is used to delete the character at the cursor position.

Insert

Is used to toggle between insert and overwrite mode during data entry.

Shift

Is used to type capital letters when pressed along with an alphabet key. Also used to type the special characters located on the upper-side of a key that has two characters defined on the same key.

Caps Lock

Is used to toggle between the capital lock feature. When 'on' locks the alphanumeric keypad for capital letters input only.

Tab

Is used to move the cursor to the next tab position defined in the document. Used to insert indentation into a document.

Ctrl

Or the control key is used in conjunction with other keys to provide additional functionality on the keyboard.

Alt

Also like the control key, is always used in combination with other keys to perform specific tasks.

Esc

Usually used to negate a command. Also used to cancel or abort executing programs.

Numeric Keypad

Is located on the right side of the keyboard and consists of keys having numbers (0 to 9) and mathematical operators (+ - * /) defined

on them. This keypad is provided to support quick entry for numeric data.

Cursor Movement Keys

Are have arrow keys used to move the cursor in the direction indicated by the arrow (up, down, left, right).

Mouse

The mouse is a small device used to point at a particular place on the screen and select in order to perform one or more actions. It can be used to select menu commands, size windows, start programs etc.

The most conventional kind of mouse has two buttons on top: the left one being used most frequently.

Mouse Actions

Left Click : used to select an item.

Double Click : used to start a program or open a file.

Right Click : usually used to display a set of commands.

Drag and Drop : allows you to select and move an item from one location to another. To achieve this place the cursor over an item on the screen, click the left mouse button and while holding the button down move the cursor to where you want to place the item, and then release it.



Figure 1.9 : Mouse

Joystick

The joystick is a vertical stick which moves the graphic cursor in a direction the stick is moved. It typically has a button on top that is used to select the option pointed by the cursor. Joystick is used as an input device primarily used with video games, training simulators, and controlling robots.



Figure 1.10 : Joystick

Scanner

Scanner is an input device used for direct data entry from the source document into the computer system. It converts the document image into digital form so that it can be fed into the computer. Capturing information like this reduces the possibility of errors typically experienced during large data entry.



Figure 1.11 : A Flat-bed Scanner

Hand-held scanners are commonly seen in big stores to scan codes and price information for each of the items.

Light Pen

It is a pen shaped device used to select objects on a display screen. It is quite like the mouse (in its functionality) but uses a light pen to move the pointer and select any object on the screen by pointing to the object.

Users of CAD (Computer Aided Design) applications commonly use the light pens to directly draw on screen.

Touch Screen

Allows the user to operate/make selections by simply touching the display screen. Common examples of touch screen include information kiosks, and bank ATMs.

Output Devices

Monitor

Monitor is an output device that resembles the television screen and uses a Cathode Ray Tube (CRT) to display information. The monitor is associated with a keyboard for manual input of characters and displays the information as it is keyed in. It also displays the program or application output. Like the television, monitors are also available in different sizes.



Figure 1.12 : Monitor

LCD (*Liquid Crystal Display*)

LCD was introduced in the 1970s and is now applied to display terminals also. Its advantages like low energy consumption, smaller and lighter have paved its way for usage in portable computers (laptops).

Printer

Printers are used to produce paper (commonly known as hardcopy) output. Based on the technology used, they can be classified as **Impact** or **Non-impact** printers.



Figure 1.13 : An Inkjet Printer

Impact printers use the typewriting printing mechanism wherein a hammer strikes the paper through a ribbon in order to produce output. Dot-matrix and Character printers fall under this categories.

Non-impact printers do not touch the paper while printing. They use chemical, heat or electrical signals to etch the symbols on paper. Inkjet, Deskjet, Laser, Thermal printers fall under this category of printers.

When we talk about printers we refer to two basic qualities associated with printers: resolution, and speed. Print resolution is measured in terms of number of dots per inch (dpi). Print speed is measured in terms of number of characters printed in a unit of time and is represented as characters-per-second (cps), lines-per-minute (lpm), or pages-per-minute (ppm).

Plotter

Plotters are used to print graphical output on paper. It interprets computer commands and makes line drawings on paper using multicoloured automated pens. It is capable of producing graphs, drawings, charts, maps etc.

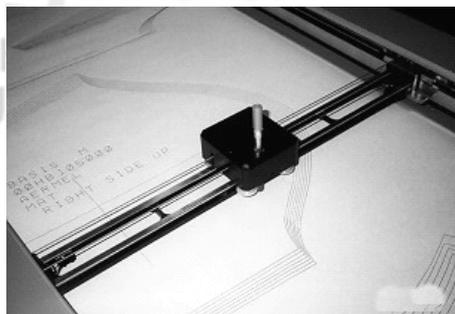


Figure 1.14 : A Flatbed Plotter

Computer Aided Engineering (CAE) applications like CAD (Computer Aided Design) and CAM (Computer Aided Manufacturing) are typical usage areas for plotters.

1.9 RAM/ROM

Computer's memory can be classified into two types – RAM, and ROM.

RAM or Random Access Memory is the central storage unit in a computer system. It is the place in a computer where the operating system, application programs, and the data in current use are kept temporarily so that they can be accessed by the computer's processor. The more RAM a computer has, the more data a computer can manipulate.

Random access memory, also called the Read/Write memory, is the temporary memory of a computer. It is said to be 'volatile' since its contents are accessible only as long as the computer is on. The contents of RAM are cleared once the computer is turned off.

ROM or Read Only Memory is a special type of memory which can only be read and contents of which are not lost even when the computer is switched off. It typically contains manufacturer's instructions. Among other things, ROM also stores an initial program called the 'bootstrap loader' whose function is to start the computer software operating, once the power is turned on.

Read-only memories can be *manufacturer-programmed* or *user-programmed*. While manufacturer-programmed ROMs have data burnt into the circuitry, user-programmed ROMs can have the user load and then store read-only programs. PROM or Programmable ROM is the name given to such ROMs.

Information once stored on the ROM or PROM chip cannot be altered. However, another type of memory called EPROM (Erasable PROM) allows a user to erase the information stored on the chip and reprogram it with new information. EEPROM (Electrically EPROM) and UVEPROM (Ultra Violet EPROM) are two types of EPROMs.

SAQ 5



Differentiate between RAM and ROM.

1.10 SECONDARY STORAGE DEVICES

RAM is volatile memory having a limited storage capacity. Secondary/auxiliary storage is storage other than the RAM. These include devices that are peripheral and are connected and controlled by the computer to enable permanent storage of programs and data.

Magnetic medium was found to be fairly inexpensive and long lasting medium and, therefore, became the preferred choice for auxiliary storage. Floppy disks and hard disks fall under this category. The newer forms of storage devices are optical storage devices like CDs, DVDs, Pen drive, Zip drive, etc.

Floppy Disk

These are small removable disks and are plastic coated with magnetic recording material. Floppy disks are typically 3.5" in size (diameter) and can hold 1.44 MB of data. This portable storage device is a rewritable media and can be reused a number of times.

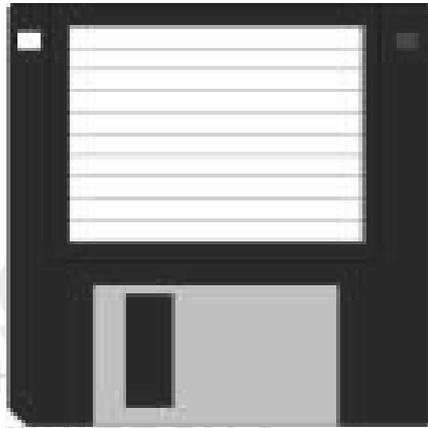


Figure 1.15 : A Floppy Disk

Floppy disks are commonly used to move files between different computers. The main disadvantage of floppy disks is that they can be damaged easily and, therefore, are not very reliable.

Hard Disk

Hard disks are made up of rigid material and are usually a stack of metal disks sealed in a box. The hard disk and the hard disk drive exist together as a unit and are a permanent part of the computer where data and programs are saved. These disks have storage capacities ranging from 1GB to 80 GB and more. Hard disks are also rewritable and are more reliable when compared with floppies.



Figure 1.16 : A Winchester Disk

Depending on the way they are packaged, hard disks can be classified as *Disk packs* or *Winchester disks*. Disk packs are removable, in the sense that they can be removed and kept offline when not in use. They must be mounted on the disk drive before use. Winchester disks on the other hand, consist of disk platters sealed in a contamination-free container and form a permanent component of the computer.

CD

Compact Disk (CD) is portable disk having data storage capacity between 650-700 MB. It can hold large amount of information such as music, full-motion videos, and text etc. It contains digital information that can be read, but cannot be rewritten. Separate drives exist for reading and writing CDs.

Since it is a very reliable storage media, it is very often used as a medium for distributing large amount of information to large number of users. In fact today most of the software is distributed through CDs.

DVD

Digital Versatile Disk (DVD) is similar to a CD but has larger storage capacity and enormous clarity. Depending upon the disk type it can store several Gigabytes of data (as opposed to around 650MB of a CD). DVDs are primarily used to store music or movies and can be played back on your television or the computer too. They are not rewritable media.

1.11 SUMMARY

In this unit, you have studied the evolution of a computer from a simple device like the abacus to the more sophisticated ones as seen today, and its characteristics (speed, accuracy, diligence, versatility, and storage capacity) that have contributed towards making it such a popular device. The differences between concepts like hardware/software, system/application software, bits/bytes, ROM/RAM was also explained. Various types of input, output and secondary storage devices along with their usages, were also studied.

1.12 ANSWERS TO SAQs

SAQ 1

Computer Characteristics :

- (a) Speed
- (b) Accuracy
- (c) Diligence
- (d) Versatility
- (e) Storage capacity

SAQ 2

Computers can be classified into various generations based on the following features :

- (a) Technology used
- (b) Speed
- (c) Storage capacity
- (d) Programming language

Computer Generation	Technology Used	Speed	Storage Capacity	Programming Language
First	Vacuum tubes	Slow	Limited	Symbolic language
Second	Transistors	Relatively faster	Increased storage capacity	High Level Languages (e.g. COBOL, FORTRAN)
Third	Integrated Circuits (ICs)	Better performance, Remote processing and time sharing	Increased storage	Extensive use of High Level Languages
Fourth	Large scale and very large scale integrated circuits (LSI, VLSI)	Considerably faster	Increased storage	Sophisticated programs and languages for special applications
Fifth	Use of ICs with ultra large scale integration technology (ULSI)	Extremely fast	Larger capacity storage (RAID, optical disks)	Based on Artificial Intelligence

SAQ 3

The basic components of the computer system include :

Input Unit

Input unit receives data and instructions in a form that can be understood by the computer.

Output Unit

Output unit presents processed information in a form that can be understood by the user.

Main Memory

Main memory holds data and instructs after input, till needed. Also holds information awaiting output.

Arithmetic Logic Unit

Arithmetic logic unit performs calculations and comparisons based on the instructions.

Control Unit

Control unit interprets each instruction and prompts the execution by one of the units – input, output, ALU, storage.

Secondary Storage

Secondary storage supplements main storage, and stores data and instructions permanently.

SAQ 4

- (a) True
- (b) False

SAQ 5

The main memory in the computer system is referred to as RAM (Random Access Memory). It is fast access memory and is used to store data and instructions during computer operations. The main feature of RAM is that it can be read from and written onto any location and thus can be accessed randomly hence the name RAM commenced. The contents of RAM are available only as long as the computer is on and are lost once it is switched off. It is, therefore, also called 'volatile' memory. Secondary storage can be used to store data and instructions permanently.

ROM or Read Only Memory holds data or instructions permanently and as the name suggest, can only be read from but cannot be changed by the users. It is non-volatile in nature, which means that contents of ROM are not lost even if the power is switched off. It, therefore, usually contains instructions that are required to get the computer started once it is powered on. The contents of ROM are built into it at the time of manufacturing itself.