UNIT 1: BASICS OF COMPUTERS

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1.1 LEARNING OBJECTIVES

After going through this unit you will be able to

- Define a computer;
- Learn about the evolution of computer system;
- Identify the different components of a computer;
- Discuss the different types of computers;
- Check out the advantages and disadvantages of a computer.

1.2 INTRODUCTION

The industrial machine eliminates muscular effort from production; just like that the computing machine eliminates clerical and computational

effort from administration, research, etc. The word “computer” is derived from the word “compute”, which means to calculate. It is an electronic device that can perform a variety of operations according to a set of instructions called program. It is “a device that receives, processes and presents information” (McGraw Hill, 1997, p. 270). A computer is a device that solves problems by applying prescribed operation on data entered into it. (Encyclopaedia Britannica, 1991, p. 638). A computer can also be defined as a set of interacting elements, responding to input so as to produce desire output.

1.3 HISTORY OF A COMPUTER

It is difficult to identify any one device as the earliest computer, partly because the term "computer" has been subject to varying interpretations over time. It was the fusion of automatic calculation with programmability that produced the first recognizable computers.

1.3.1 The Beginning

Examples of early mechanical calculating devices included the abacus, the slide rule and arguably the astrolabe and the Antikythera mechanism (which dates from about 150-100 BC). The end of the middle ages saw a re-invigoration of European mathematics and engineering. Wilhelm Schickard's 1623 device was the first of a number of mechanical calculators constructed by European engineers. However, none of those devices fit the modern definition of a computer because they could not be programmed.

a) Abacus: The concepts of number and counting are believed to have been developed first by the herdsmen of ancient times, who sought to avoid animal losses. It can be traced back to 3000 BC. The herdsmen (or the Stone Age men) used small round stones (pebbles) for counting cattle. After counting with pebbles, the successor was a tool known as ABACUS, which is treated as the first mechanical computing device. The word “Abacus” is

derived from the Greek word 'abakos' which means a board or calculating tables. Beads are strung on wires or strings held in a frame and they are slid along the wires counting, adding, etc. It was invented by the Chinese in 3000 BC, which was later improved by the Egyptians and the Greeks.

b) Mechanical Theater: Hero of Alexandria (c. 10 – 70 AD) built a mechanical theater which performed a play lasting 10 minutes and was operated by a complex system of ropes and drums that might be considered to be a means of deciding which parts of the mechanism performed which actions and when.

c) Joseph Marie Jacquard: In 1801, Joseph Marie Jacquard made an improvement to the textile loom that used a series of punched paper cards as a template to allow his loom to weave intricate patterns automatically. The resulting "Jacquard loom" was an important step in the development of computers because the use of punched cards to define woven patterns can be viewed as an early form of programmability.

d) Napier's Bones: John Napier was the inventor of logarithms. He used his data tables and with the help of a mechanical device could do the necessary computing.

e) Pascal's Machine Arithmetique: In 1642 Blaise Pascal, a French mathematician invented a mechanical adding machine, a prototype of the digital calculating machine. This device was able to add and subtract directly, whereas multiplication and division were performed through repeated addition and subtraction respectively.

f) Leibnitz's Stepped Reckoner: Gottfried Withelm Von Leibnitz, a German mathematician invented a more advanced calculating machine in 1671, which could not only add but also multiply, divide and extract square root. As the machine could make a series of repeated additions, it was called the Stepped Reckoner. The merit of Leibnitz's contribution is that he showed the advantage of binary system over decimal system in the operation of mechanical computer.

g) **Punched Card:** A French weaver's son named Joseph Marie-Jacquard made the next significant contribution in 1804. After observing how his father could make different weaving patterns on the loom, he thought of storing these patterns for future use. So, he developed a plate with multiple holes to control the weaving patters, not knowing that only day his idea of storing the weaving patterns would be used to store data and would be called the Punched Card. A Punched card is a thin rectangular card divided into 80 columns and 12 rows in which the various characters could be represented by punching holes in different rows and columns. On one card it is possible to punch 80 characters – one character per column, thus it is possible to store 80 characters of data.

h) **Babbage's Difference and Analytical Engines:** Charles Babbage, a professor of Mathematics, designed a computing machine in 1822 for the purpose of producing ballistic tables called the "Difference Engine". Then he conceived the idea of a new computing machine in 1833 and designed the machine in 1835 called Analytical Engine, which is the forerunner of the modern computer. It could be called as the first digital computer having the memory and the calculating units as well as sequential control with provision for automatic printout. Thus, Charles Babbage is widely regarded as the father of the computer. Due to limited finances, and an inability to resist thinking with the design, Babbage never actually built his Analytical Engine. (The Analytical Engine should not be confused with Babbage's Difference Engine which was a non-programmable mechanical calculator).

i) **Lady Ada Lovelace:** Lady Ada Lovelace, an amateur mathematician, and a friend of Babbage produced supporting material for the "Analytical Engine" in the form of programs, and explanatory documentation. As such, she is considered the first lady computer programmer. ADA is one of the programming languages named after her.

j) **Boole's Symbolic Logic:** George Boole, the famous logician, discussed symbolic logic in 1859 in his work 'Treatise of differential equation'. The development of symbolic logic and the application of binary logic operation AND, OR, NOT are his main contribution to modern computer technology.

k) **Hollerith's Punched Card Machinery:** Dr. Herman Hollerith, an American statistician invented the punched card machinery in 1886. Large-scale automated data processing of punched cards was performed for the U.S. Census in 1890 by tabulating machines designed by Herman Hollerith and manufactured by the Computing Tabulating Recording Corporation, which later became International Business Machine (IBM) Corporation. The punched card invented by Hollerith is still used as the basic input medium to computers.

l) **Aiken and MARK I:** This computer is also known as automatic sequence controlled calculator, which was designed by Howard A. Aiken of Harvard University. It is also known as Harvard MARK I. It is the first fully electro-mechanical computer.

m) **Stibitz's Machine, MARK II and SSEC:** George R. Stibitz developed a large relay computer at Bell Telephone Laboratories in 1946. Aiken built the MARK II, the large relay computer in 1947. Another machine was also constructed by the people of IBM Corporation. It was known as the Selective Sequence Electronic Calculator (SSEC).

n) **The Atanasoff-Berry Computer:** This electronic machine was also known as ABC (Atanasoff-Berry Computer) as it was named after its founder Dr. John Atanasoff and his assistant Clifford Berry. The non-programmable Atanasoff–Berry Computer (1941) used vacuum tube based computation, binary numbers, and regenerative capacitor memory.

o) **Colossus Computers:** The secret British Colossus computers (1943) (Copeland, 2006), had limited programmability but demonstrated that a device using thousands of tubes could be rea-

sonably reliable and electronically reprogrammable. It was used for breaking German wartime codes.

p) Z Machines: In 1941, Konrad Zuse's electromechanical "Z machines" (Z3) was the first working machine featuring binary arithmetic, including floating point arithmetic and a measure of programmability. In 1998, the Z3 was proved to be the world's first operational computer.

q) Bush and Memex: Memex is a device in which an individual stores all his books, records and communications, which is mechanized so that it may be consulted with exceeding speed and flexibility. Dr. Vannevar Bush visualized the library of the future with mechanized services from housekeeping to operation.

1.3.2 Early Electronic Computer

a) ENIAC: (Electronic Numerical Integrator And Calculator): This computer was built by a team at the University of Pennsylvania, designed by a team of members from the USA headed by Professor J. Presper Eckert and John Mauchly. The U.S. Army's Ballistics Research Laboratory ENIAC (1946), which used decimal arithmetic, is sometimes called the first general purpose electronic computer (since Konrad Zuse's Z3 of 1941 used electromagnets instead of electronics). Initially, however, ENIAC had an inflexible architecture which essentially required rewiring to change its programming.

Several developers of ENIAC, recognizing its flaws, came up with a far more flexible and elegant design, which came to be known as the stored program architecture or Von Neumann architecture. This design was first formally described by John Von Neumann in the paper "First Draft of a Report on the EDVAC", published in 1945. A number of projects to develop computers based on the stored program architecture commenced around this time, the first of these being completed in Great Britain. The

first to be demonstrated working was the Manchester Small-Scale Experimental Machine (SSEM) or "Baby".

b) BINAC (Binary Automated Computer): Mauchly and Eckert established their own company and design the BINAC in 1950, which was the first machine to use self checking devices.

c) EDVAC (Electronic Discrete Variable Automatic Computer): Dr. John Von Neumann and the ENIAC group designed this computer. The device could store both the instruction and the data in the binary form, instead of human readable words or decimal numbers.

d) EDSAC (Electronic Delay Storage Automatic Calculator): It was developed by the Britishers, headed by Professor Maurice V. Wilkes at the Cambridge University Mathematical Laboratory. It was much faster than EDVAC. EDSAC was one of the first computers to implement the stored program (Von Neumann) architecture.

The EDSAC which completed a year after SSEM, was perhaps the first practical implementation of the stored program design. Shortly thereafter, the machine originally described by von Neumann's paper EDVAC was completed but did not see full-time use for an additional two years.

e) SEAC (Standard Eastern Automatic Computer): The US National Bureau of Standards constructed this computer following the design of EDVAC and was completed in 1950. It was the first stored-program American Computer.

f) Manchester Mark I (1948): This machine was designed by a group of scientists headed by Professor M. N. A. Newman.

g) UNIVAC I (Universal Automatic Computer): Mauchly and Eckert designed and built UNIVAC I. It was the first computer to handle both numerical and alphabetical information.

h) MARK III and IV: Aiken built MARK III with magnetic drum storage at Harvard in 1950 and MARK IV, an improved version of MARK III, in 1952.

1.3.3 Modern Electronic Computer

Modern electronic computers have a faster speed. A major breakthrough in the computer technology was made by introducing transistor in place of vacuum tubes during the early sixties. With the development of transistor it was possible to design printed circuit, integrated circuit and other miniaturization techniques in the structure of computer.

The first devices that resemble modern computers date to the mid-20th century (around 1940 - 1945), although the computer concept and various machines similar to computers existed earlier. Early electronic computers were the size of a large room, consuming as much power as several hundred modern personal computers. Modern computers are based on tiny integrated circuits and are millions to billions of times more capable while occupying a fraction of the space. Today, simple computers may be made small enough to fit into a wristwatch and be powered from a watch battery.

In 1946, ENIAC consumed an estimated 174 kW. By comparison, a typical personal computer may use around 400 W; over four hundred times less (Kempf, 1961). Early computers such as Colossus and ENIAC were able to process between 5 and 100 operations per second. A modern "commodity" microprocessor (as of 2007) can process billions of operations per second, and many of these operations are more complicated and useful than early computer operations.

1.4 GENERATIONS OF COMPUTERS

Computer generation means step by step changes and each major change or progress after a period of time. Since inception there are totally five generation of computers.

a) First Generation Computer (Up to 1950): ENIAC was the first valve based computer and taken as first computer of first generation of electronic digital computer. It was made by J. P. Eckert and John W. Mauchly

in 1946. EDVAC, EDSAC, UNIVAC are some other examples of computer of this generation. This generation computer possessed the following characteristics:

i) Used thermionic valves or vacuum tube or electronic valve;
ii) Used Mercury line for storage and paper tapes and punched cards were also used;
iii) Computer programming was mainly done in machine language;
iv) All the computers were of very big size and so required very large space;
v) The computers were very costly;
vi) Limited programming capabilities, memory;
vii) Slow operating speed and restricted computing capacity;
viii) High power consumption (each vacuum tubes consumed about half a watt power);
ix) Vacuum tubes used filament as a source of electron; they have a limited life.
x) Large amount of heat generated from the vacuum tubes and so they needed air-conditioning.

b) Second Generation Computer: The invention of transistor (short names for transfer resistor) in 1948 led to the development of second generation of computer. Their main disadvantages were that the commercial productions of transistors were difficult and expensive; again, the manual assembly of individual components into a functioning unit was required. Examples of second generation of computer include UNIVAC-1108, IBM 700, 1401, CDC 1604, 3600.

The second generation computers are characterized by the following:

i) Transistors replaced the vacuum tubes completely;
ii) Use of magnetic cores for memory storage. Magnetic drum, magnetic disc, punched card were also used for storage purpose;
iii) Use of high level language like FORTRAN, COBOL, Algol, SNOBOL etc.;
iv) Due to the use of transistors the sizes turned to be smaller;
v) Less costly in comparison to the first generation of computer;

vi) Memory capacities were about 100 Kilobyte;
v) Reduction in computation time from millisecond to microsecond;
vi) Transistors consume only a tenth of power as required by vacuum tubes;
vii) Transistors have no filament to burn as against the first generation of computer so they were more reliable;
ix) Less heat was generated due to the use of transistor but still needed air conditioning and frequent maintenance.

c) Third Generation Computer: The third generation began in 1965 with germanium transistors being replaced by silicon transistors (=integrated circuit). Integrated circuit is a circuit consisting of transistors, resistors and capacitors grown on a single chip of silicon eliminating wired inter-connections between components. Highly sophisticated technology was required for the manufacture of the chips, but still commercial production become easier and not so expensive. Remote processing and time sharing is also an added advantage of this generation of computer. Example: IBM 360 Series, ICL 1900 series, IBM 370/168, ICL 2900, Honeywell 6000 series. This generation computer has the following characteristics

i) Use of integrated circuit;
ii) Use of semiconductor memories in addition to, and later instead of, ferrite core memory. The two main types of semiconductor memory are Read-Only Memory (ROM) and read-and-write memories called Random Access Memory (RAM);
iii) Extensive use of high level programming languages;
iv) Smaller size and better performance, more flexibility with input/output;
v) Less costly in comparison to the second generation of computer and become popular as mini computer and are quite portable;
vi) Memories improved to 4 Megabytes;
vii) Reduction in computational time from microseconds to nanoseconds;
viii) Lower heat generation and quite less power requirement;
ix) More reliable in comparison to the second generation of computer;
x) Air conditioning required in many cases;

d) Fourth Generation Computer: The fourth generation of computer may be identified by the advent of the microprocessor chip. The whole computer CPU except primary memory is placed on a single chip. This chip is known as microprocessor. Examples: Intel 4004, Apple series I and II, spectrum 7 etc.

This generation computer has the following characteristics:

i) Use of large scale and very large scale integrated circuits (VLSI) packing about 50,000 transistors in a chip;
ii) Magnetic core memories were replaced by semiconductor memories;
iii) Sophisticated programs and languages for special application. In the area of language "C" language became popular.
iv) Increasing use of microcomputer;
v) Low cost;
vi) Increased storage;
vii) Considerably faster and smaller;
viii) Heat generated is negligible and even air conditioner is not always required;
ix) Network of computers and distributed computer systems were developed;
x) Modular design, versatility and compatibility.

e) Fifth Generation Computer: The fifth generation of computer is in the process of full development. This computer is expected to be a new and unique of its kind having the artificial intelligence i.e. the ability to reason logically and with the real knowledge of the world, behaving almost like a human being in the sense of talking, seeing, hearing and utilizing human language.

1.5 COMPONENTS OF A COMPUTER

The computer unit is frequently called as the computer system because of its numerous parts, machinery units and complicated sequential operation. A computer system has three main parts i.e Hardware, Software and Humanware. A general purpose computer has two main parts Hardware and Software.

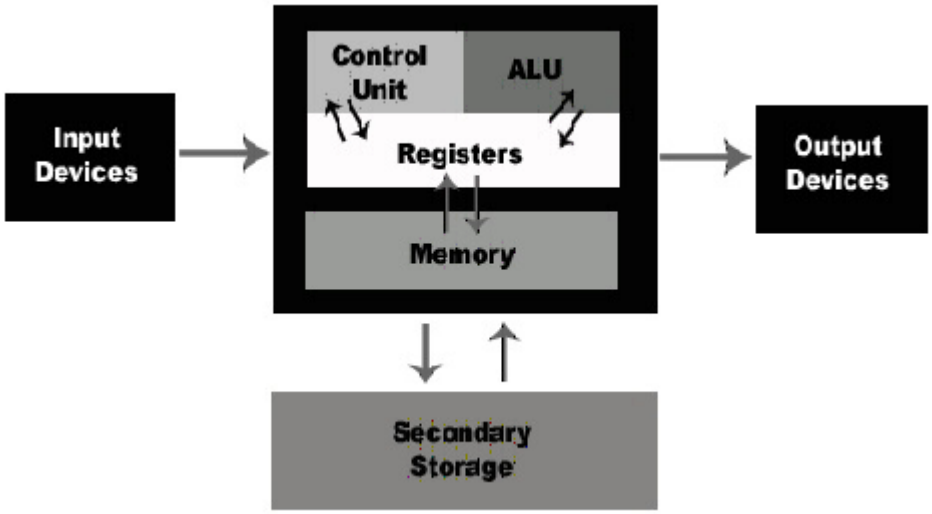


Fig. 1: Block Diagram of a Computer

1.5.1 Hardware

The physical or mechanical parts of the computer system that can be seen and touched are known as hardware. It consists of a combination and collection of electro-mechanical and electronic components and devices, electronic circuits and microelectronic equipment assembled in metal boxes in the form of modules and cabinet. All these equipment and elements are interconnected by wiring and switching communication components like transistors, capacitors, resistors, diodes, printed circuits, integrated circuits, main and auxiliary storage systems, various types of magnetic media, communication media for carrying and transformation of data, coded instruction, etc. The different hardware parts are interconnected by busses, often made of groups of wires.

Any computer system has three important hardware parts. They are input device, central processing unit and the output device. The central processing unit itself has three parts, namely memory unit, control unit and arithmetic and logic unit. These three units along with the input and output devices form the five important components of any computer system. In addition to the above five parts mentioned, computers also have secondary storage devices,

which are used for storing data or instruction on a long term basis.

A) Input Unit: The input devices are used to transfer the information into the memory unit of a computer. In simplest term, they bring information into the computer from the user's hand, i.e. input unit feeds data into the computer. It is thus a communication medium between the user and the machine. The input devices are of the following types.

i) Keyboard: Keyboards are the most commonly used input devices usually having 83-84 keys and enhanced with 101 keys or even more. The enhanced keyboards are more popular.

ii) Mouse: It is a hand-held pointing device that allows controlling the computer without having to type the instruction through keyboard. The Scrolling mouse is a small unit with a round ball at the bottom and with two depression switches at the upper top portion having again a scroll button. Nowadays cord less as well as without scroll ball-type of mouse is also used.

iii) Scanners: Scanners are used to store or feed an entire image / data or page of other information into the computer system. Image scanner is a general-purpose device which digitizes a two-dimensional image.

iv) Track Ball: A trackball is just like a mouse lying on its back. It is stationary and does not need to move on any surface. To move the pointer only the ball should be rotated with the thumb / finger or with the palm. The buttons next to the ball are used just like mouse button.

v) Joystick: A joystick is an input device consisting of a stick that pivots on a base and reports its angle or direction to the device it is controlling. Joysticks are often used to control video games and they usually have one or more push-buttons whose state can also be read by the computer.

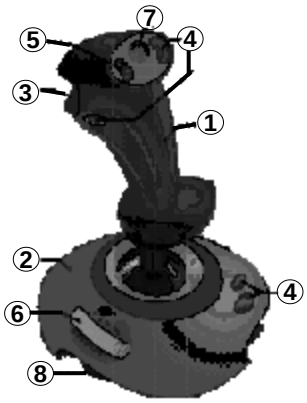


Fig. 2: Elements of a joy-stick elements: 1. Stick 2. Base 3. trigger 4. Extra buttons 5. Autofire switch 6. Throttle 7. Hat Switch (POV Hat) 8. Suction Cup

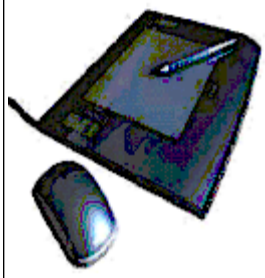


Fig. 3: A 6×8 Wacom Intuos3 graphics tablet with DuoSwitch erasing Grip Pen stylus and 5-button scrollwheel puck.



Fig. 4: Front and back of a Canon PowerShot A95.

vi) Digitizing Tablet: A graphics tablet (or digitizing tablet, graphics pad, drawing tablet, pen pad or digitizer) is a computer input device that allows one to hand-draw images and graphics, similar to the way one draws images with a pencil and paper. These tablets may also be used to capture data or handwritten signatures.

vii) Digital Camera: A digital camera (or digicam) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor.

viii) Magnetic Ink Character Recognition (MICR): It allows the computer to recognize character printed using magnetic ink. MICR is widely used in banks to read the cheque number written on the bottom of the cheque. It is also used in the back of credit cards and bank debit cards and ID cards.

ix) Optical Character Recognition (OCR): An optical character reader is used to read character of special type fonts printed on conventional paper with conventional ink i.e. it involves reading text from paper, book or from a magazine articles but they still have difficulty with handwritten text.

x) Bar Code Reader: Bar code readers are photoelectric scanner that reads the bar codes or vertical zebra striped marks printed on the product container and the computer automatically tells the prices of the product at the terminals.

xi) Speech Recognition and Voice Response Devices: In this type of device the user speaks into a microphone which is attached to a digitizer. The dizitizer convert the analog sounds waves to “0” and “1”s which can be easily understood by the computer. Speech recognition devices are necessary because spoken commands are much quicker than typing. It helps to give command to a remote computer over telephone. It helps the computer usable to the blind people. In computer assisted learning environment it helps in the interaction between the man and machine.

xii) Touchscreen: A touchscreen is a display that can detect the presence and location of a touch within the display area. The touchscreen has two main attributes. Firstly, it enables one to interact with what is displayed directly on the screen, where it is displayed, rather than indirectly with a mouse or touchpad. Secondly, it lets one do so without requiring any intermediate device such as a stylus that needs to be held in the hand. Such displays can be attached to computers or, as terminals, to networks.

xiii) Touchpad: A touchpad (also trackpad) is a pointing device consisting of specialized surface that can translate the motion and position of a user's fingers to a relative position on screen. They are a common feature of laptop computers and are also used as a substitute for a computer mouse where desk space is scarce.

xiv) 14 Light Pen: A light pen is similar to a mouse except that with a light pen one can move the pointer and select objects on the display screen by directly pointing to the object with the help of the pen.

xv) Optical Mark Recognition (OMR): Optical Mark Recognitionis also called mark sensing. It is a technology where an OMR device senses the presence or absence of a mark such as pencil mark. OMR is used in test such as aptitude test.

B) Central Processing Unit (CPU): The CPU is the brain of any computer system; all major calculations and comparisons are made inside the CPU and it is also responsible for activating and controlling the operations of other units of a computer system. It guides, directs and controls a computer performance. It also executes the instruction given to it. The CPU consists of the ALU, control unit, registers, and basic I/O (and often other hardware closely linked with these). Early CPUs were composed of many separate components but since the mid-1970s CPUs have typically been constructed on a single integrated circuit called a microprocessor.

a) Arithematic and Logic Unit (ALU): The input devices are used to transfer the information into the memory unit of a computer. Information from the memory can be transferred to the ALU where comparison and calculation are done and the results are sent back to the memory unit. The set of arithmetic operations that a particular ALU supports may be limited to adding and subtracting or might include multiplying or dividing, trigonometry functions (sine, cosine, etc) and square roots. Some can only operate on whole numbers (integers) whilst others use floating point to represent real numbers with limited precision. An ALU may also compare numbers and return boolean truth values (true or false) depending on whether one is equal to, greater than or less than the

other. Logic operations involve Boolean logic: AND, OR, and NOT. These can be useful both for creating complicated conditional statements and processing Boolean logic.

b) Control Unit: It acts as a manager which controls all activities being carried out within the computer. The control unit strictly obeys the instruction given by us, follows the instruction in the same sequence and executes them one after another until the entire set of instruction is exhausted. CU brings one instruction at a time from the memory, interprets it and obeys it by coordinating the working of all other units. The CU tells the input unit what is to be read and addresses the memory as to where it is to be stored. The CU ensures that according to the stored instruction the right operation is done on the right data at the right time. It manages and coordinates the entire computer system. The simplified descriptions of the steps that are performed by the Control unit are given below. Some of these steps may be performed concurrently or in a different order depending on the type of CPU

- Read the code for the next instruction from the cell indicated by the program counter (program counter is conceptually just an other set of memory cells, it can be changed by calculations done in the ALU);
- Decode the numerical code for the instruction into a set of commands or signals for each of the other systems;
- Increment the program counter so it points to the next instruction;
- Read whatever data the instruction requires from cells in memory (or perhaps from an input device). The location of this required data is typically stored within the instruction code;
- Provide the necessary data to an ALU or register;
- If the instruction requires an ALU or specialized hardware to complete, instruct the hardware to perform the

requested operation;

- Write the result from the ALU back to a memory location or to a register or perhaps an output device
- Jump back to step one.

c) Memory Unit: It is the workspace area within the computer where the data and instructions are stored. It holds all data, instruction and results temporarily. It stores the data to be processed, the intermediate results and the final results until they are displayed. It contains the programs that are currently being run and the data the programs are operating on. In modern computers, the main memory is the electronic solid-state Random Access Memory (RAM). It is directly connected to the CPU via a "memory bus" and a "data bus". The arithmetic and logic unit can very quickly transfer information between a processor register and locations in main storage, also known as a "memory addresses". The memory bus is also called an address bus or front side bus and both buses are high-speed digital "superhighways". Access methods and speed are two of the fundamental technical differences between memory and mass storage devices. Main memories are of the following types

i) Random Access Memory (RAM): It is the key working area of the memory. It is possible to select randomly and use any location of this memory. It is also called the read/ write memory because information can be read from RAM chip and can also be written into it. It is a volatile storage medium i.e. the contents of the memory are lost when power is switched off/cut, as it requires a steady flow of electricity to maintain its content. RAM is also quite expensive. RAM may be of VRAM, WRAM, NVRAM.

ii) Read Only Memory (ROM): It holds permanent data or instruction that can only be read. That information is permanently recorded and cannot be changed by the pro-

grammer. It is non volatile in nature i.e. the contents of ROM are not lost when the computer is switched off. It contains instruction to get the computer started when the switch is on, holds instruction and data that control the various peripheral units of the computer such as graphic display, disk drives, etc. Most personal computers contain a small amount of ROM that stores critical programmes, as it is expensive to produce. Typically, ROM must also be completely erased before it can be rewritten, making large scale use impractical, if not impossible. ROM may be of the following types-

- **Programmable Read Only Memory (PROM):** A PROM is a memory chip on which set of instructions or information can be stored, but it cannot be modified or wiped out later on. Like ROM its memory is also non volatile. To write data on a PROM one will need a special device called a PROM programmer or PROM burner. The difference between a PROM and ROM is that PROM is manufactured as blank memory where ROM is programmed during the manufacturing process.

- **Erasable Programmable Read Only Memory (EPROM) :** EPROM is used widely in personal computers to enable the manufacturer to change the contents of PROM before the com puter is actually skipped so that the bugs can be removed and new versions can be installed shortly before delivery. The EPROM is of two types - Electrically Erasable PROM (EEPROM), where high voltage electric pulses are used to erase the previous data or instruction and after that the disk can be reused and Ultra Violet Erasable PROM (UVEPROM), which retains its data or instruction until it is exposed to Ultra Violet light. The UV light clears its contents making it possible to reprogramme the memory. The difference

between an EPROM and PROM is that while in PROM the data or instruction can be written only once and cannot be erased, in EPROM the content can be erased and reprogramming can be done

iii) Flash Memory: Many modern PCs have their Basic Input Output System (BIOS) stored on flash memory chip so that it can easily be updated if necessary. Such type of BIOS is sometimes called flash BIOS. Flash memory is also important for modem as it enables the modem manufacturer to support new protocols as they become standardized. EEPROM is similar to flash memory (sometimes called flash EEPROM). The principal difference between the two is that EEPROM requires data to be written or erased in byte at a time whereas flash memory allows data to be written or erased in blocks. This makes flash memory faster.

iv) Cache Memory: It is a special type of internal memory used by many central processing units to increase their performance or "throughput". Some of the information in the main memory is duplicated in the cache memory, which is slightly slower but of much greater capacity than the processor registers, and faster but much smaller than main memory. Multi-level cache memory is also commonly used—"primary cache" being smallest, fastest and closest to the processing device; "secondary cache" being larger and slower, but still faster and much smaller than main memory.

C) Output Unit: An output device is any product or machine that is capable of bringing information for user view. It presents the processed data or information to the user. It can be a printed page, a picture in monitor, and so on. Anything which comes out of a computer system is the output of it. The common output devices are-

i) **Monitor [Video Display Unit (VDU) / Cathode Ray Tube (CRT)]:** It looks like a television. The advantage of having a video display unit is that as we write we can see what is being fed into the computer and by this way we can spot the mistakes and make the necessary correction. It also helps to display the stored information inside the computer system.

ii) **Liquid Crystal Display (LCD):** CRT screens are relatively heavy and bulky, therefore unsuitable for small portable computer like note book. Considering this the screen of a portable computer is effectively replaced by a flat panel LCD screen which is smaller in size and lighter in weight.

iii) **Printer:** A computer printer, or more commonly called the printer, is a device that produces a hard copy (permanent human-readable text and/or graphics) of documents stored in electronic form, usually on physical print media such as paper or transparencies. Many printers are primarily used as computer peripherals, and are permanently attached by a printer cable to a computer which serves as a document source. The latest technology is combining printers with a scanner and/or fax machine in a single unit. The world's first computer printer was a 19th-century mechanically driven apparatus invented by Charles Babbage for his Difference Engine.

iv) **Plotter:** A plotter is a vector graphics printing device which operates by moving a pen over the surface of paper. Plotters are used in applications such as computer-aided design, though they are being replaced with wide-format conventional printers.

v) **Speaker:** Speaker output the music or speech from the programme. A speaker or loudspeaker converts an electrical signal to sound. The speaker pushes a medium in accord with the pulsations of an electrical signal, thus causing

sound waves to propagate to where they can then be received by the ear.

vi) Computer Output on Microfilm and Microfiche (COM): The output from the computer, instead of being printed is displayed on a high resolution cathode ray tube, and the output is obtained in microfilm or microfiche from which it is often used to store massive data in compact form. Then, when needed, with the help of a special microfilm reader it is used to read the output.

vii) Speech Output Unit: A speech output unit is one which reads string of character stored in a computer memory and converts it into spoken sentence. This type of speech output is very useful in many areas. Examples: A telephone where a message is given to the caller when the number dialed does not exist, railway and airlines enquires.

D) Auxiliary Storage Devices: Auxiliary memory / storage devices or secondary storage supplements the main memory and it requires the computer to use its input/output channels to access the information. Secondary storage is also known as “mass storage devices”. It functions as back up device even if by some accident the computer is crashed and the data in it is unrecoverable. One can restore it from the backups. It acts both as input and output devices. The secondary storage devices are also used as a transport medium to transfer data or information from one computer system to another computer system. If we use keyboard as an input device we will waste a lot of valuable computer times because manual input is always slow. Secondary storage is also used for long-term storage of persistent information. Secondary storage device includes Magnetic tapes, Floppy disc, CD / DVD, Pen drive, External Hard Disc etc. The Floppy and Magnetic Tapes are now obsolete as secondary storage devices.

i) **CD-ROM:** CD-ROM is an abbreviation for Compact Disc Read-only memory. The standard CD-ROM holds 650 or 700 MiB of data. A "700 MB" CD has a nominal capacity of about 700 MiB. The CD-ROM is popular for distribution of software, especially multimedia applications, and large databases.

ii) **DVD:** It typically may contain at least 4.4 GiB of data, nearly 7 times the amount of a CD-ROM. DVD capacities are given in decimal units: A "4.7 GB" DVD has a nominal capacity of about 4.38 GiB.

iii) **Pen Drive:** A USB flash drive consists of a NAND-type flash memory data storage device integrated with a USB (Universal Serial Bus) interface. USB flash drives are typically removable and rewritable, much smaller than a floppy disk, and most weigh less than an ounce (30 g). Storage capacities can range from 64 MB to 256 GB with steady improvements in size and price per capacity. Some allow 1 million write or erase cycles and have 10-year data retention, connected by USB 1.1 or USB 2.0.

1.5.2 Software

A computer cannot perform on its own. It needs to be exclusively instructed on what it has to do, the programmes written for a computer to perform different operation are called software and it can be defined as 'the set of computer programme, procedures and associated documentation or complete set of instruction which enable the computer to obtain solution of a problem that resides in the memory or storage device of a computer'. (The programme is a set of instructions written in computer language). Software is a general term that is used to describe only single programme or group of programme and makes the hardware run. It acts as an interface between the user and the computer. Computer softwares are generally classified into two broad categories:

A) System Software: It is a set of one or more programs, designed to control the operation of a computer system. Generally, the system software supports the running of the other software, communicates with other peripherals devices, supports the development of other types of software and supervises the user of various hardware resources. System software is of the following types-

a) Operating System: An operating system (OS) is an integrated set of computer programmes that manage the hardware and software resources and the overall operation of a computer system. The operating system is designed to support the activities of computer installation. It acts as an interface between a user and the hardware i.e. all computer resources. It forms a platform for other system software and for application software. Its prime objectives are to improve the performance and efficiency of a computer system, increase the facility and the ease with which a system can be used. Most operating systems have a command line interpreter as a basic user interface, but they may also provide a Graphical User Interface (GUI) for ease of operation. Operating systems are mainly of two types-

i) Command / Character User Interface (CUI): In this type of OS the user has to type the commands at the command prompt mode, which will act as an input to execute and program. E.g. UNIX, MS DOS.

ii) Graphic User Interface (GUI): In this type the user is able to select files, programmes or commands by pointing to graphical representations on the screen and thereby it avoids the typing of lengthy complex commands. E.g. Windows XP.

b) Language Processor: Men use their own language (High Level Language) to write their programmes because it is much easier to code in such languages. However, the com-

puter is unable to understand such a High Level Language; it only understands its own language i.e. Machine Language (Binary Language). Therefore, it becomes necessary to process a HLL to LLL. The computer programme that performs this job is the language processor. The language processors are of the following types-

i) **Assembler:** In the 1950s to reduce programming complexity in Machine Language and to provide some standardization, assembly languages were developed. Assembly language is also known as Symbolic Language. Assembly language uses abbreviation or mnemonic code to replace the earlier 0s and 1s of machine language. i.e. it substitutes letters and symbols for the numbers in the machine language program. The function of an assembler is to translate an assembly code into the computer machine code / language.

ii) **Interpreter:** This language processor converts a HLL program into machine language by converting and executing it line by line. If there is any error in any line, it reports it at the same time and the programme execution cannot resume until the error is rectified. For error debugging the interpreter is very useful as it reports the errors at the same time, but, once errors are removed then also interpreter is present in the memory. So, unnecessary usage of memory takes place in this case.

iii) **Compiler:** It converts the entire HLL program at one go and reports all the errors of the programme along with the line numbers. After all the errors are removed, the programme is recompiled and after that the compiler is not needed in the memory as the object programme is available.

B) Application Software: These are the programmes written by the programmers to enable the computer to perform a specific

task such as processing words, inventory control, handling calculation and figures, medical accounting, financial accounting, result preparation, railway reservation, billing, etc. It can be defined as "a set of programmes necessary to carry out operation for a specified application". Application software can further be subdivided into three categories-

a) Packages: The application softwares that are designed for the individual user, so that they can be used in a manner that suits their needs and requirements are known as packages. Actually it is a bundle of essential features for carrying out a particular task. There are different packages available in the market. Some of the most common categories are given bellow-

i) Word Processing Software: It is the software that processes textual matter and creates organized and flawless documents. It provides a general set of tools for entering, editing and formatting text. A word processor has everything that a conventional type writer has; in addition, it also removes various barriers of the conventional type writers. eg. M.S. Word, Wordstar, WordPerfect, Softword, etc.

ii) Spreadsheet: An electronic spreadsheet is a programme that accepts data values in tabular form and allows the users to manipulate / calculate / analyze data in the desired manner. It can also generate graphs and charts to show the relationship among numbers. Eg. MS Excel, Quattropro, etc.

iii) Database Management System: A DBMS is a software that can effectively store, manipulate and handle bulk of data. Eg. Foxpro, MS Access, Oracle, etc.

iv) Desktop Publishing Software: Desktop publishing packages handle page layout by combining the function of a traditional typesetter and a layout artist.

v) **Graphics:** The application software that manipulates images is known as graphics software.

vi) **Multimedia:** The software that incorporates images, text, sounds, animation, video sequences is known as multimedia software.

vii) **Presentation Software:** The application software that concentrates on professional looking visual aids is called presentation graphics software. Eg. Corel Draw, Macro Media, Director, MS. Power Point, etc.

b) **Utilities Software:** Utility software (also known as service program, service routine, tool, or utility routine) is a computer software designed to help, manage and tune the computer hardware, operating system or application software by performing a single task or a small range of tasks. Some utility softwares have been integrated into most major operating systems.

i) **Text Editors:** Text and Hex / Editors directly modify the text or data of a file. These files could be data or an actual programme.

ii) **Backup Utility:** Backup utilities can make a copy of all the information stored on a disk, and restore either the entire disk (e.g. in the event of disk failure) or selected files (e.g. in the event of accidental deletion).

iii) **Compression Utility:** Disk compression utilities can transparently compress / uncompress the contents of a disk, increasing the capacity of the disk.

iv) **Disk Defragmenter:** Disk defragmenters can detect computer files whose contents are stored on the hard disk in dis jointed fragments, and move the fragments together to increase efficiency.

v) **Antivirus Software:** Anti-virus utilities scan for computer viruses.

c) Customized Software: Customized software (also known as Bespoke software) is a type of software that is developed either for a specific organization or function that differs from or is opposite of other already available softwares (also called off-the-shelf or COTSsoftware). It is generally not targeted to the mass market, but is usually created for companies, business entities, and organizations.

The trained computer professionals who, by their knowledge are able to run the computer and can perform different operations are known as Humanware. They are the persons who programme, design and operate a computer installation such as System Analyst, Programmer and computer operator.

1.6 TYPES OF COMPUTERS

Computers can be classified in many different ways; some of them are discussed bellow

A) Based On Purpose and Use: Depending upon the purpose for which computers are used, it can be classified as follows

i) General Purpose Computer: This type of computer is so designed that it can be used to solve many kinds of problem or which permits the development of different stimulated models as needed. Eg. Model EA1-2000 (Electronic Association Inc).

ii) Special Purpose Computer: It has a fixed programme with a few or no permitted adjustment. It is generally built into or appended to the physical system it serves. Examples: Special Purpose Pneumatic Analog Computer, Model Foxboro 516 (Foxboro Co.).

B) Based On Interconnection: Based on interconnection computer can be Distributed and Parallel computer.

i) Distributed Computer: A configuration in which several workstation / PC are interconnected by a communication network is called a distributed computer system. A common use of distributed com-

puter is the so called client server computing.

ii) **Parallel Computer:** A set of computers connected together by a high speed communication network and programmed in such a way that they corporate to solve a single large problem is called a parallel computer. It can again be classified into two categories i.e Shared Memory Parallel Computer and Distributed Memory Parallel Computer.

C) Based on Programme: Based on programme computer can be-

i) **Embedded Computer:** Embedded computers are small, simple devices that are used to control other devices. These are embedded within the circuitry of appliances such as fighter aircraft, industrial robots, digital cameras, children's toys, washing machines, wrist watches, etc. These computers are typically preprogrammed for a specific task.

ii) **Programmable Computer :** The user can create a new program for his/her specific purpose in these types of computers. It can be used as notepads, scheduling system and address books. If equipped with a cellular phone it can also be connected to World Wide computer networks for exchanging information regardless of location.

D) Based On Technology / Design

a) **Analog Computer:** An analog computer receives inputs that are instantaneous representation of variable quantities and produce output results dynamically to a graphical display device, a virtual display device or, in case of a control system, a device which causes mechanical motion.

b) **Digital Computer:** The digital computer works with numbers, words, and symbols expressed as digits which it manipulates and counts discretely.

c) **Hybrid Computer:** The flexibility of the electronic analog computer has allowed it to be augmented with interface channels to the electronic digital computer, so that during 1960s a third type of general computer i.e. the hybrid computer came into being. The hybrid com-

puters combine the features of the other two types and utilize both analog and discrete representation of data.

A few more computers are being made all over the world, which are in their developmental stages. They include

d) Optical Computer: Today's computers use the movement of electrons in-and-out of transistors to do logic. Photonic computing is intended to use photons or light particles, produced by lasers, in place of electrons. Compared to electrons, photons are much faster – light travels about 30 cm, or one foot, in a nanosecond – and have a higher bandwidth.

A completely optical computer (or photonic computer) requires that one light beam can turn another on and off. This was first achieved with the photonic transistor, invented in 1989 at the Rocky Mountain Research Center. This demonstration eventually created a growing interest in making photonic logic componentry utilizing light interference.

e) Atomic Computer or Molecular Computer: Molecular computers, also called DNA computer, are massively parallel computers taking advantage of the computational power of molecules (specifically biological). Molectronics specifically refers to the sub-field of physics which addresses the computational potential of atomic arrangements.

f) Biological Computer: DNA computing is a form of computing which uses DNA, biochemistry and molecular biology, instead of the traditional silicon-based computer technologies. DNA computing, or, more generally, molecular computing, is a fast developing interdisciplinary area.

g) Chemical Computer: A chemical computer, also called reaction-diffusion computer, BZ computer or gooware computer, is an unconventional computer based on a semi-solid chemical "soup" where the data is represented by varying concentrations of chemicals. The computations are performed by naturally occurring chemical reactions. So far it is still in a very early experimental stage, but may have great potential for the computer industry.

h) Quantum Computer: A quantum computer is a device for computation that makes direct use of quantum mechanical phenomena, such as superposition and entanglement, to perform operations on data. The basic principle behind quantum computation is that quantum properties can be used to represent data and perform operations on these data.

E) Based On Memory (Physical Size): Modern computer system varies in physical size from those that used to fill a room to those with CPUs that can rest on the nail of a person's little finger. Generally the larger the systems the greater are its processing speed, storage capacity, cost and ability to handle large number of powerful input and output devices.

a) Micro Computer: Micro computers are popularly known as Desktop computer. Microcomputers are the smallest unit. They may be tiny, special purpose devices dedicated to carrying out a single task or they may be the more visible and familiar personal computer ranging from note book size to desktop size that we can use in countless ways. The performance of some newer micros surpasses the capabilities of some older minis. Memory capacity upto 4 MB, now upto 64 MB. Eg. Acer's, Aspire, Compaq, etc.

b) Mini Computer: They are generally more powerful and more expensive than Micros. Memory Capacity ranges from 4-24MB, but now obsolete. In physical size mini computers vary from desktop models to unit that has the size of a small cabinet. Eg. IBM-6000 model 580, CDC 4360, etc.

c) Mainframe Computer: Mainframe computers are the system that offers faster processing speeds and greater storage capacity than a typical mini. A whole series of mainframe models ranging from small to very large are usually lumped together under a family designation by mainframe vendors. Memory capacity 10 MB – 128 MB. Eg. CDC 2000, IBM ES-2, etc.

d) Super Computer: These are the largest, fastest and more expensive system in the world. Super computer is designed to process complex scientific jobs, to analyze large commercial databases, pro-

duce animated movies and play games such as Chess. Memory capacity is 256 MB onwards. A super computer is very expensive, prices range from about $ 4 million to over $ 17 million. Eg. Cray -1, Cray-2, Cray-3, ETA-10, X-MP, etc.

The above classifications are arbitrary. The fact is that the size, cost, and performance capabilities of machines in different classifications are likely to overlap.

F) Based On Nature Of Use: All the above classifications are no longer relevant. Computers can only be classified as based on its use.

a) Home Computer / Personal Computer: Home computer was a class of personal computer entering the market in 1977 and becoming common during the 1980s. They were marketed to consumers as accessible personal computers, more capable than video game consoles. These computers typically cost much less than business, scientific or engineering-oriented desktop personal computers of the time, and were generally less powerful in terms of memory and expandability. Personal computers, in various forms, are icons of the Information Age and are what most people think of as "a computer"; however, the most common form of computer in use today is the embedded computer.

A personal computer (PC) is any general-purpose computer whose size, capabilities, and original sales price make it useful for individuals, and which is intended to be operated directly by an end user, with no intervening computer operator. A personal computer may be a desktop computer, a laptop computer or a tablet computer.

i) Desktop Computer: A desktop computer is a personal computer (PC) in a form intended for regular use at a single location, as opposed to a mobile laptop or portable computer. It can indicate a horizontally-oriented computer case usually intended to have the display screen placed on top to save space on the desk top. Most modern desktop computers have separate screens and keyboards

ii) **Laptop Computer:** Also known as Notebook Computer or Portable computer. A laptop is a personal computer designed for mobile use and is small enough to sit on one's lap. A laptop integrates most of the typical components of a desktop computer, including a display, a keyboard, a pointing device (a touchpad, also known as a trackpad, and/or a pointing stick), speakers, and often including a battery, into a single small and light unit.

iii) **Handheld Computer:** A handheld computer is a pocket-sized computing device, typically having a display screen with touch input or a miniature keyboard.

iv) **Personal Digital Assistance (PDA):** A personal digital assistant (PDA) is a handheld computer, also known as a palmtop computer. Newer PDAs commonly have color screens and audio capabilities, enabling them to be used as mobile phones (smartphones), web browsers, or portable media players.

b) **Work Station:** The distinction between PC and Work station in the recent day concept is blurring. The principal reason is that microprocessor used in PCs are nowadays as powerful as many of those used in work stations.

1.7 ADVANTAGES AND DISADVANTAGES OF COMPUTERS

Computers have some strength, which makes them immensely useful and popular and also adorable for all. Some of its main characteristics are given below.

a) **Accuracy:** Computers can perform all the calculation and comparison accurately provided the hardware does not malfunction.

b) **Automaticity:** Computers are capable of doing certain level of automation provided they are programmed in that order. In the computer, once a task is initiated, it can perform on its own till its completion. It will execute the program in the correct sequence i.e. it will switch on/off the machine at the appropriate time, monitor the operational parameter, send warning signals or take corrective actions if the parameters exceed the control level and so on.

c) **Diligence / Reliability:** The human being suffers from weaknesses like tiredness, lack of concentration etc. being constant and earnest in efforts and application. Humans also have feelings, so they become sad, depressed, bored and negligent and virtually it is reflected in the work they do. But the computers can perform the task repetitively for n numbers of times without any degradation in quality. So computers are more reliable than human beings.

d) **Speed:** Computers can calculate at a very high speed. A modern computer can execute millions of instructions in one second.

e) **Storage:** Computers can store a large amount of information in a very small space. The storage capacity of a computer is virtually unlimited.

f) **Versatility:** The computer can perform activities ranging from simple calculation to performing complex tasks in any field of knowledge and in different environment conditions, i.e. they can do hazardous jobs even in hospital environment.

Being an electronic device the computers have certain limitations also, which can be summarized as follows.

i) **Lack of Decision Making Power:** Computers cannot decide on their own; they are dependent on human instruction. Computers can only do what they are told to do.

ii) **Zero IQ:** Computers are dumb machines with zero IQ. They need to be told in each and every step, however minute it may be.

iii) **No Heuristic:** Heuristic refers broadly to learning from past experiences. If a computer commits an error once and the similar situation / event occurs again, the computer will commit the same error again. i.e. it can not learn from the past experiences.

1.8 APPLICATIONS OF COMPUTERS

Computer is used everywhere in the world in every field of life. It has a very big impact on our day to day life and increasingly it is becoming an integral part of our life. It is enhancing our efficiency and productivity in all activities. It is used for a number of applications like education, research

and development, entertainment, medical treatment, business, military services, space, etc. The application of computers in human life is virtually endless. A cursory account of it is given below:

i) **Education:** There are many uses of computer in schools, colleges and universities. For example, student details are stored into the computer system for subsequent operation on them. Multimedia, animations, graphics and charts could be used to teach the students and many boring topics can be made interesting by using multimedia. Students again could access internet for online help and courses for more information.

ii) **Health and Medicine:** Computers are helping immensely to monitor the extremely ill in the intensive care unit and provide cross-sectional views of the body. This eliminates the need for hired nurses to watch the patient twenty-four hours a day, which is greatly tiring and error prone. Doctors use computers in diagnosing certain diseases. Computers are now able to map, in exquisite details, the structure of the human cold virus - the first step towards the common cold. Furthermore, computers are used greatly in managing patients, doctors, wards and medicine records, as well as for making appointments, scheduling surgeries, etc.

iii) **Agriculture:** Farmers use small computers to help themselves with billing, crop information, and cost per acre, feed combinations, and market price checks. Cattle ranchers can also use computers for information about livestock breeding and performance.

iv) **Banking:** Every bank is now using a computerized system because it is very fast and user friendly. ATM cards are used everywhere now which let us bank any time we want. PC banking (Personal Computer banking) allows us to see our bank balance, request transfers between accounts and pay bills electronically etc.

v) **Entertainment:** It is used to make cartoon movies, animated and special effects in movies, games, and so on.

vi) **Sports:** In sports computers are used widely in conjunction with video cameras. These are used to record the motion of all the sports men. 3D

programs are used later on to help the trainers see their movements and to improve their style of playing.

vii) Communication: Internet is becoming an information superhighway with lots of facilities to communicate.

viii) Traffic Light Control: In traffic light control the computer is being employed to drive the traffic signals. There are some programmed codes like "turn off the red light" or "turn on the red light" to control the traffic signal and to carry out the instructions that follows.

ix) Day to Day Life: It is used in Railway ticket booking, air ticket booking, and son on.



CHECK YOUR PROGRESS

Q 1: Match the Following

a) First generation computer.	a) Transistors are used.
b) Second generation of computer.	b) Use of Microprocessor.
c) Third generation computer.	c) Thermionic valves or vac -uum tube or electronic valves \were used.
d) Fourth generation computer.	d) Integrated circuits are used.

.....

Q 2: Find out True and False Sentences

a) A computer is a machine that manipulates data according to a set of instructions.

b) A general purpose computer has two main parts Hardware and Software

c) The physical or mechanical parts of the computer system that can be seen and touched are known as hardware.

d) The CPU is the main brain of a computer system.

Q 3: Fill in the Blanks

a) ..... is the father of the computer.

b) ..... discussed symbolic logic in “Treatise of differential equation”.



1.9 LET US SUM UP

A computer is a machine that manipulates data according to a set of instructions. The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued to be used in that sense until the middle of the 20th century. From the end of the 19th century onwards though, the word began to take on its more familiar meaning, describing a machine that carries out computations.

Nearly all modern computers implement some form of the stored program architecture, making it the single trait by which the word "computer" is now defined. By this standard, many earlier devices would no longer be called computers by today's definition, but are usually referred to as such in their historical context. The technologies used in computers have changed dramatically since the first electronic, general-purpose computers of the 1940s, but most still use the Von Neumann architecture. The design made the universal computer a practical reality.

Vacuum tube-based computers were in use throughout the 1950s. Vacuum tubes were largely replaced in the 1960s by transistor-based computers. When compared with tubes, transistors are smaller, faster, cheaper, use less power, and are more reliable. In the 1970s, integrated circuit technology and the subsequent creation of microprocessors, such as the Intel 4004, caused another generation of decreased size and cost, and another generation of increased speed and reliability. By the 1980s, computers became sufficiently small and cheap to replace simple mechanical controls in domestic appliances such as washing machines. The 1980s also witnessed home computers and the now ubiquitous personal computer. With the evolution of the Internet, personal computers are becoming as common as the television and the telephone in the household.

Experts don’t agree on computer classification because computer

technology is changing so fast that within the span of a month, when a new system comes out, it is faced with two potential factors- one costs the same and has a much higher performance and the other has the same performance but costs much less. Thus, a recently introduced smaller system can outcome (outperform) the large model of a few years ago and a new PC can do the work of an earlier mini at a much lower cost.

This is the Computer Age and these machines are beginning to affect our lives in many ways. There are so many applications of computers. The computer era appears before us with the promise of new and improved ways of thinking, living and working. Computers are all around us and avoiding them is virtually impossible. We have been exposed to the world of computer hype, computer advertisements and computer headlines. We interact with computers in our daily lives - whether we are at the cinemas, the school, or the public library.



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1.11 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1:

a) First generation computer. a) Thermionic valves or vacuum tube or electronic valves were used.

b) Second generation of computer. b) Transistors are used.

c) Third generation computer. c) Integrated circuits are used.

d) Fourth generation computer. d) Use of Microprocessor.

Ans to Q No 2:

a) True b) True c) True d) True

Ans to Q No 3:

a) Charles Babbage.

b) George Boole.



1.12 PROBABLE QUESTIONS

A) Short Answer Type Questions

a) Define a computer.

b) Who is treated as the father of a computer?

c) What is the control unit of a computer? What are its functions

d) What functions are performed by ALU.

e) What are the input units of a computer system?

B) Essay Type Questions

a) Write a short note on the evolution of a computer system.

b) Give a sketch of the different generations of computers.

c) What are the different components of a computer? Describe each one of them with block diagram.

d) Write a short note on the types of computers.

f) Write a short note on the advantages and disadvantages of computers.

g) Describe the applications of computers.

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