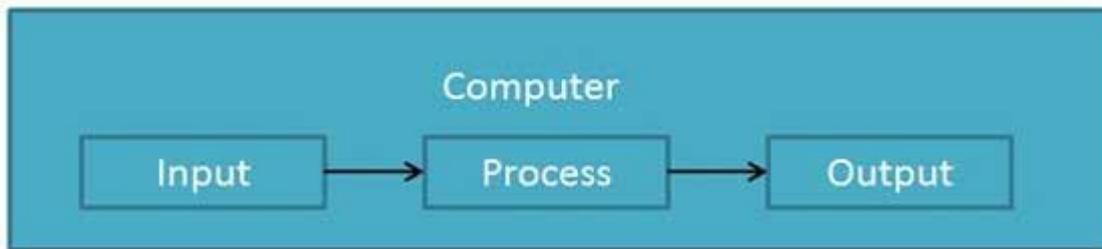# Introduction of Computer Fundamentals

Definition of Computer:-

A computer is an electronic data processing device, which accepts and stores data input, processes the data input, and generates the output in a required format.

Advantages of Computers

1. High Speed
2. Accuracy
3. Storage Capability
4. Diligence
5. Versatility
6. Reliability
7. Automation
8. Reduction in Paper Work and Cost

Disadvantages of Computers

1. No I.Q.
2. Dependency
3. Environment
4. No Feeling

What is DATA:-

Data can be defined as a representation of facts, concepts, or instructions in a formalized manner, which should be suitable for communication, interpretation, or processing by human or electronic machine.

Data is represented with the help of characters such as alphabets (A-Z, a-z), digits (0-9) or special characters (+,-,/,*,<,>,= etc.)

What is Information?

Information is organized or classified data, which has some meaningful values for the receiver. Information is the processed data on which decisions and actions are based.

Program :- set of Instruction that enables a computer to perform a given task.

Computer Generation :-

Following are the main five generations of computers.

S.No	Generation & Description
1	**First Generation** The period of first generation: 1946-1959. Vacuum tube based.
2	**Second Generation** The period of second generation: 1959-1965. Transistor based.
3	**Third Generation** The period of third generation: 1965-1971. Integrated Circuit based.
4	**Fourth Generation** The period of fourth generation: 1971-1980. VLSI microprocessor based.
5	**Fifth Generation** The period of fifth generation: 1980-onwards. ULSI microprocessor based.

Components/Anatomy of computers:-
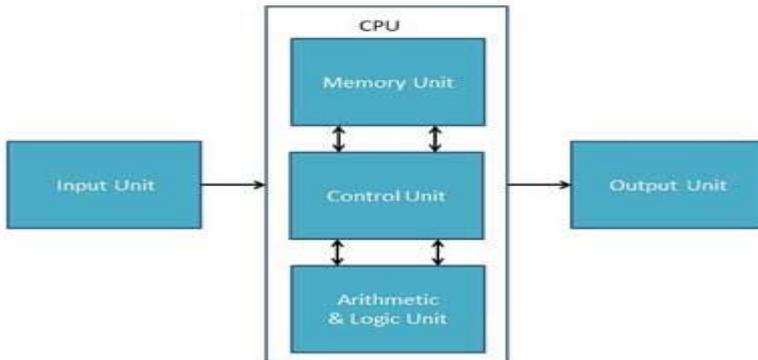
Input Unit

This unit contains devices with the help of which we enter data into the computer. This unit creates a link between the user and the computer. The input devices translate the information into a form understandable by the computer.

CPU (Central Processing Unit)

CPU is considered as the brain of the computer. CPU performs all types of data processing operations. It stores data, intermediate results, and instructions (program). It controls the operation of all parts of the computer.

CPU itself has the following three components −

- ALU (Arithmetic Logic Unit)
- Memory Unit
- Control Unit

Output Unit

The output unit consists of devices with the help of which we get the information from the computer. This unit is a link between the computer and the users. Output devices translate the computer's output into a form understandable by the users.

CPU(Central Processing Unit)

Central Processing Unit (CPU) consists of the following features −

- CPU is considered as the brain of the computer.
- CPU performs all types of data processing operations.
- It stores data, intermediate results, and instructions (program).
- It controls the operation of all parts of the computer.

Memory or Storage Unit

This unit can store instructions, data, and intermediate results. This unit supplies information to other units of the computer when needed. It is also known as internal storage unit or the main memory or the primary storage or Random Access Memory (RAM).

Control Unit

This unit controls the operations of all parts of the computer but does not carry out any actual data processing operations.

ALU (Arithmetic Logic Unit)

This unit consists of two subsections namely,

- Arithmetic Section
- Logic Section

Arithmetic Section

Function of arithmetic section is to perform arithmetic operations like addition, subtraction, multiplication, and division. All complex operations are done by making repetitive use of the above operations.

Logic Section

Function of logic section is to perform logic operations such as comparing, selecting, matching, and merging of data.

Input Devices:-

Following are some of the important input devices which are used in a computer –

- Keyboard

- Mouse

- Joy Stick

- Light pen

- Track Ball

- Scanner

- Graphic Tablet

- Microphone

- Magnetic Ink Card Reader(MICR)

- Optical Character Reader(OCR)

- Bar Code Reader

- Optical Mark Reader(OMR)

Monitors

Monitors, commonly called as **Visual Display Unit** (VDU), are the main output device of a computer. It forms images from tiny dots, called pixels that are arranged in a rectangular form. The sharpness of the image depends upon the number of pixels.

There are two kinds of viewing screen used for monitors.

- Cathode-Ray Tube (CRT)

- Flat-Panel Display

There are some disadvantages of CRT –

- Large in Size

- High power consumption

Printers

Printer is an output device, which is used to print information on paper.

There are two types of printers –

- Impact Printers
- Non-Impact Printers

Impact Printers

Impact printers print the characters by striking them on the ribbon, which is then pressed on the paper.

These printers are of two types –

- Character printers
- Line printers

Character Printers

Character printers are the printers which print one character at a time.

These are further divided into two types:

- Dot Matrix Printer(DMP)
- Daisy Wheel

Dot Matrix Printer

In the market, one of the most popular printers is Dot Matrix Printer. These printers are popular because of their ease of printing and economical price. Each character printed is in the form of pattern of dots and head consists of a Matrix of Pins of size (5*7, 7*9, 9*7 or 9*9) which come out to form a character which is why it is called Dot Matrix Printer.

Daisy Wheel

Head is lying on a wheel and pins corresponding to characters are like petals of Daisy (flower) which is why it is called Daisy Wheel Printer. These printers are generally used for word-processing in offices that require a few letters to be sent here and there with very nice quality.

Line Printers

Line printers are the printers which print one line at a time.

These are of two types −

- Drum Printer
- Chain Printer

Drum Printer

This printer is like a drum in shape hence it is called drum printer. The surface of the drum is divided into a number of tracks. Total tracks are equal to the size of the paper, i.e. for a paper width of 132 characters, drum will have 132 tracks. A character set is embossed on the track. Different character sets available in the market are 48 character set, 64 and 96 characters set. One rotation of drum prints one line. Drum printers are fast in speed and can print 300 to 2000 lines per minute.

Chain Printer

In this printer, a chain of character sets is used, hence it is called Chain Printer. A standard character set may have 48, 64, or 96 characters.

Non-impact Printers

Non-impact printers print the characters without using the ribbon. These printers print a complete page at a time, thus they are also called as Page Printers.

These printers are of two types −

- Laser Printers
- Inkjet Printers

Laser Printers

These are non-impact page printers. They use laser lights to produce the dots needed to form the characters to be printed on a page.

Inkjet Printers

Inkjet printers are non-impact character printers based on a relatively new technology. They print characters by spraying small drops of ink onto paper. Inkjet printers produce high quality output with presentable features.

Memory

A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in the computer, where data is to be processed and instructions required for processing are stored. The memory is divided into large number of small parts called cells. Each location or cell has a unique address, which varies from zero to memory size minus one. For example, if the computer has 64k words, then this memory unit has 64 * 1024 = 65536 memory locations. The address of these locations varies from 0 to 65535.

Memory is primarily of three types –

- Cache Memory
- Primary Memory/Main Memory
- Secondary Memory

Cache Memory

Cache memory is a very high speed semiconductor memory which can speed up the CPU. It acts as a buffer between the CPU and the main memory. It is used to hold those parts of data and program which are most frequently used by the CPU. The parts of data and programs are transferred from the disk to cache memory by the operating system, from where the CPU can access them.

Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which the computer is currently working. It has a limited capacity and data is lost when power is switched off. It is generally made up of semiconductor device. These memories are not as fast as registers. The data and instruction required to be processed resides in the main memory. It is divided into two subcategories RAM and ROM.

Secondary Memory

This type of memory is also known as external memory or non-volatile. It is slower than the main memory. These are used for storing data/information permanently. CPU directly does not access these memories, instead they are accessed via input-output routines. The contents of secondary memories are first transferred to the main memory, and then the CPU can access it. For example, disk, CD-ROM, DVD, etc.

RAM

RAM (Random Access Memory) is the internal memory of the CPU for storing data, program, and program result. It is a read/write memory which stores data until the machine is working. As soon as the machine is switched off, data is erased.

Access time in RAM is independent of the address, that is, each storage location inside the memory is as easy to reach as other locations and takes the same amount of time. Data in the RAM can be accessed randomly but it is very expensive.

RAM is volatile, i.e. data stored in it is lost when we switch off the computer or if there is a power failure. Hence, a backup Uninterruptible Power System (UPS) is often used with computers. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types –

- Static RAM (SRAM)
- Dynamic RAM (DRAM)

Static RAM (SRAM)

The word **static** indicates that the memory retains its contents as long as power is being supplied. However, data is lost when the power gets down due to volatile nature. SRAM chips use a matrix of 6-transistors and no capacitors. Transistors do not require power to prevent leakage, so SRAM need not be refreshed on a regular basis.

There is extra space in the matrix, hence SRAM uses more chips than DRAM for the same amount of storage space, making the manufacturing costs higher. SRAM is thus used as cache memory and has very fast access.

The following table explains the main memory storage units −

S.No.	Unit & Description
1	**Bit (Binary Digit)** A binary digit is logical 0 and 1 representing a passive or an active state of a component in an electric circuit.
2	**Nibble** A group of 4 bits is called nibble.
3	**Byte** A group of 8 bits is called byte. A byte is the smallest unit, which can represent a data item or a character.
4	**Word** A computer word, like a byte, is a group of fixed number of bits processed as a unit, which varies from computer to computer but is fixed for each computer. The length of a computer word is called word-size or word length. It may be as small as 8 bits or may be as long as 96 bits. A computer stores the information in the form of computer words.

The following table lists some higher storage units −

S.No.	Unit & Description
1	**Kilobyte (KB)** 1 KB = 1024 Bytes

2	**Megabyte (MB)** 1 MB = 1024 KB
3	**GigaByte (GB)** 1 GB = 1024 MB
4	**TeraByte (TB)** 1 TB = 1024 GB
5	**PetaByte (PB)** 1 PB = 1024 TB

ROM (Read only Memory)

ROM stands for **Read Only Memory**. The memory from which we can only read but cannot write on it. This type of memory is non-volatile. The information is stored permanently in such memories during manufacture. A ROM stores such instructions that are required to start a computer. This operation is referred to as **bootstrap**. ROM chips are not only used in the computer but also in other electronic items like washing machine and microwave oven.

Let us now discuss the various types of ROMs and their characteristics.

1. MROM (Masked ROM)
2. PROM (Programmable Read Only Memory)
3. EPROM (Erasable and Programmable Read Only Memory)
4. EEPROM (Electrically Erasable and Programmable Read Only Memory)

Types of computers:-

Computers can be broadly classified by their speed and computing power.

S.No.	Type	Specifications
1	PC (Personal Computer)	It is a single user computer system having moderately powerful microprocessor
2	Workstation	It is also a single user computer system, similar to personal computer however has a more powerful microprocessor.
3	Mini Computer	It is a multi-user computer system, capable of supporting hundreds of users simultaneously.
4	Main Frame	It is a multi-user computer system, capable of supporting hundreds of users simultaneously. Software technology is different from minicomputer.
5	Supercomputer	It is an extremely fast computer, which can execute hundreds of millions of instructions per second.

Analog Computers

Analog computers are used to process analog data. Analog data is of continuous nature and which is not discrete or separate. Such type of data includes temperature, pressure, speed weight, voltage, depth etc. These quantities are continuous and having an infinite variety of values.

Digital Computers

A Digital Computer, as its name implies, works with digits to represent numerals, letters or other special symbols. Digital Computers operate on inputs which are ON-OFF type and its output is also in the form of ON-OFF signal. Normally, an ON is represented by a 1 and an OFF is represented by a 0. So we can say that digital computers process information which is based on the presence or the absence of an electrical charge or we prefer to say a binary 1 or 0.

Hybrid Computers

A hybrid is a combination of digital and analog computers. It combines the best features of both types of computers, i-e. It has the speed of analog computer and the memory and accuracy of digital computer. Hybrid computers are used mainly in specialized applications where both kinds of data need to be processed. Therefore, they help the user, to process both continuous indiscreet data.

Practice Question :-

1.The main electronic component used in first generation computers was
A)Transistors
B)Vacuum Tubes and Valves
C) Integrated Circuits
D) None of above

2. The basic operations performed by a computer are
A) Arithmetic operation
B) Logical operation
C) Storage and relative
D) All the above

3. The two major types of computer chips are
A) External memory chip
B) Primary memory chip
C) Microprocessor chip
D) Both b and c

4. Microprocessors as switching devices are for which generation computers
A) First Generation
B) Second Generation
C) Third Generation
D) Fourth Generation

5. What is the main difference between a mainframe and a super computer?
A) Super computer is much larger than mainframe computers
B) Super computers are much smaller than mainframe computers
C) Supercomputers are focused to execute few programs as fast as possible while mainframe uses its power to execute as many programs concurrently
D) Supercomputers are focused to execute as many programs as possible while mainframe uses its power to execute few programs as fast as possible.

6. ASCII and EBCDIC are the popular character coding systems. What does EBCDIC stand for?
A) Extended Binary Coded Decimal Interchange Code
B) Extended Bit Code Decimal Interchange Code
C) Extended Bit Case Decimal Interchange Code
D) Extended Binary Case Decimal Interchange Code

7. The brain of any computer system is
A) ALU
B) Memory
C) CPU
D) Control unit

8. Storage capacity of magnetic disk depends on
A) tracks per inch of surface
B) bits per inch of tracks
C) disk pack in disk surface
D) All of above

9. The two kinds of main memory are:
A) Primary and secondary
B) Random and sequential
C) ROM and RAM
D) All of above

10. A storage area used to store data to a compensate for the difference in speed at which the different units can handle data is
A) Memory
B) Buffer
C) Accumulator
D) Address

11. Computer is free from tiresome and boardoom. We call it
A) Accuracy
B) Reliability
C) Diligence
D) Versatility

12. Integrated Circuits (Ics) are related to which generation of computers?
A) First generation
B) Second generation
C) Third generation
D) Fourth generation

13. CD-ROM is a
A) Semiconductor memory
B) Memory register
C) Magnetic memory
D) None of above

14. A hybrid computer
A) Resembles digital computer
B) Resembles analogue computer
C) Resembles both a digital and analogue computer
D) None of the above

15. Which type of computers uses the 8-bit code called EBCDIC?
A) Minicomputers
B) Microcomputers
C) Mainframe computers
D) Super computer

16. The ALU of a computer responds to the commands coming from
A) Primary memory
B) Control section
C) External memory
D) Cache memory

17. Chief component of first generation computer was
A) Transistors
B) Vacuum Tubes and Valves

C) Integrated Circuits
D) None of above

18. To produce high quality graphics (hardcopy) in color, you would want to use a/n
A) RGB monitor
B) Plotter
C) Ink-jet printer
D) Laser printer

19. What are the stages in the compilation process?
A) Feasibility study, system design and testing
B) Implementation and documentation
C) Lexical Analysis, syntax analysis, and code generation
D) None of the above

20. Which of the following IC was used in third generation of computers?
A) SSI
B) MSI
C) LSI
D) Both a and b

Answer Key

1-B	2-D	3-D	4-D	5-C	6-A	7-C	8-D	9-C	10-B
11-C	12-C	13-D	14-C	15-C	16-B	17-B	18-B	19-C	20-D