Basics of Computer:

Definition of Computer:

Computer is an electronic device, which process the data with the help of programs.

Computer is an electronic device, which accepts the data and instructions (input) from the user, process the data according to the instructions and gives the result (output).

The name computer is derived from the Latin word "Compute", which means calculation. Hence, computer is a machine used for the purpose of calculation. Computer is a calculating device.

"**Abacus**" the first computer used for calculation purpose.

Chinese people found the computer.

Characteristics (Features) of Computer

The main characteristics or features of computer are listed as under. They are:

- ❖ Speed
- ❖ Accuracy (Perfect ness)
- ❖ Diligence
- ❖ Versatility
- ❖ Power of Remembering
- ❖ No I Q
- ❖ No feelings
- ❖ Storage

Speed

The computer is a fast device; it can perform a task in a few seconds that a human being does in an entire year. Powerful computers can capable of performing about 3 to 4 billion simple arithmetic operations per second.

Accuracy

The accuracy is one of the most important features in computer. Accuracy means the computer is always perfect in his work and he never makes mistakes.

Diligence

Unlike human beings, the computer is free from monotony tiredness like lack of concentration. Hence, the computer can work for many hours without creating any error and without grumbling.

Versatility

Versatility is one of the most wonderful things in computer. It can do multiple jobs at a time. One moment it helps the user to take hard copy the same time it supports the same user to browse the internet and the same user can play the game for entertainment.

Power of Remembering

In computer, we can store any type and any amount of information and we can retrieve the same information after the several years because of its storage capability. Therefore, the remembrance capacity of computer is so high.

No I Q (Intelligence Quotient)

The computer I Q is a big zero because it cannot think like human beings and it cannot take decision. It cannot find any error in a data and it cannot correct such errors.

No Feelings

The computer is not having any feelings like human beings because it is a machine. It will do the task, what the user commands to it.

Storage

By default, the user data in a computer stores in secondary storage device (hard disk). We can store any amount of data based on the storage device capacity.

Parts of Computer

In computer, there are mainly three parts. They are:

1. Input Unit
2. C P U
3. Output Unit

Input Unit

Input units are the devices, from which the user the user provides the input to the computer.

Ex: - Keyboard, Mouse, Joystick, Light pen, Web cam, Scanner and Mic.

C P U (Central Processing Unit)

The C P U is a data processing device, where the user data will be processed. The C P U is also called as the brain cum heart of a computer.

In C P U, there are mainly three parts. They are:

1. Storage or Memory Unit
2. A L U (Arithmetic Logic Unit)
3. Control Unit

Storage or Memory Unit

This unit stores both the input as well as the output of a computer.

A L U (Arithmetic Logic Unit)

This unit performs all the arithmetical and logical calculations in a computer.

Control Unit

This unit is responsible for all the operations held in a computer. It controls both the flow of input as well as output in a computer and it controls all the operations taking place in a computer. It works like traffic police and it is called as the nervous system of computer.
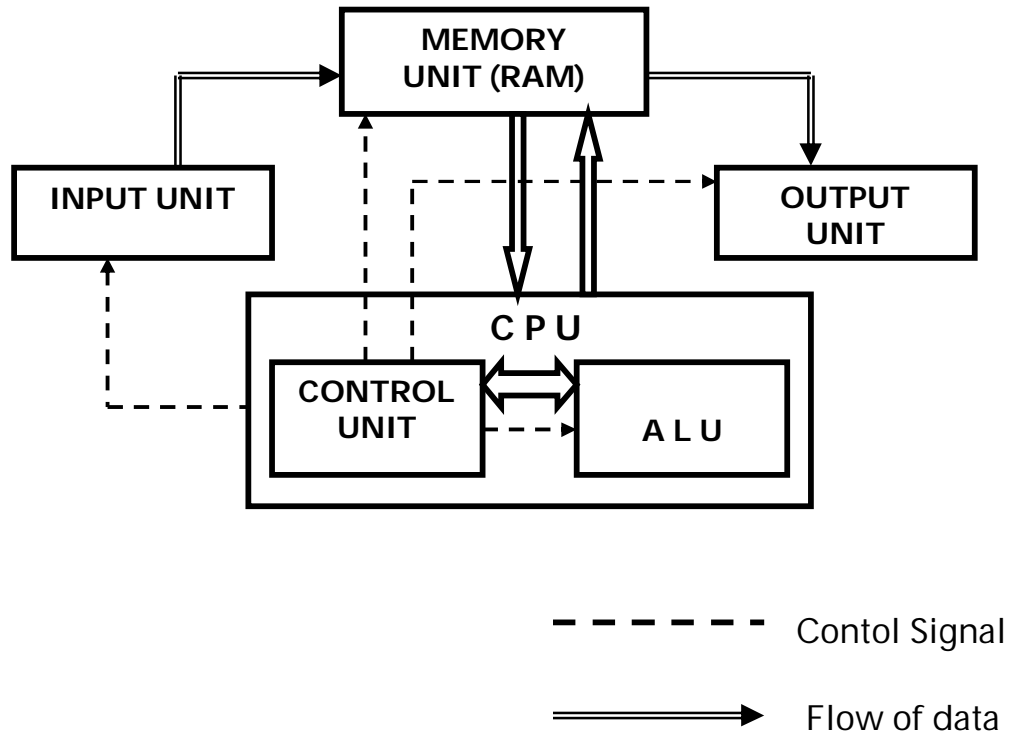
Output Unit

Output units are the devices, from which the user gets the result in a computer.

Ex: Monitor (V D U), Printer, Speaker, Plotter.

BLOCK DIAGRAM OF COMPUTER

CENTRAL PROCESSING UNIT

```
            ┌─────────────────┐
            │   MEMORY        │
   ┌───────▶│   UNIT (RAM)    │───────┐
   │        └─────────────────┘       ▼
┌──────────┐                    ┌──────────┐
│INPUT UNIT│                    │ OUTPUT   │
└──────────┘                    │  UNIT    │
                                └──────────┘
      ┌──────────────────────────────┐
      │          C P U               │
      │  ┌──────────┐   ┌─────────┐  │
      │  │ CONTROL  │◀─▶│         │  │
      │  │  UNIT    │   │  A L U  │  │
      │  └──────────┘   └─────────┘  │
      └──────────────────────────────┘
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- - - - - - - Contol Signal

⟹ Flow of data

Usually the input given by the user will flow and store into Memory unit (RAM), then the given input will be checked by Control Unit then it transfers the input to the Arithmetic Logic Unit (ALU).   The ALU processes such data according to the instructions given by the user and it again resends the output (result) to the Memory Unit (RAM). Then the output will be taken by the user the user through output devices such as Monitor and Printer.

Memory

Memory is a storage device. It stores both the input as well as output in a computer.

In memory, there are mainly two types. They are:

1. Primary Memory or Main Memory or Internal Memory
2. Secondary Memory or Auxiliary Memory or External Memory

Differences between Main Memory and Secondary Memory

<u>Main Memory</u>	<u>Secondary Memory</u>
1. It works very fast	it is comparatively slow
2. It is costly	it is cheap
3. Storage capacity is less	storage capacity is high
4. Ex: RAM and ROM	Ex: Disks, Tapes and Drums

Volatile Memory

Volatile is memory is that which stores the information based on power supply. If the power supply is stopped, all the information on this memory will be lost. This memory is also known as Temporary Memory.

Ex: RAM (Random Access Memory)

Non-volatile Memory

Non –volatile memory is that which stores the information even there is no power supply. This memory is also known as permanent memory.

Ex: ROM (Read Only Memory)

RAM (Random Access Memory)

It is also known as Read and Write memory, where the user can read as well as modify the contents stored on this memory.

In RAM, there are two types. They are:

1. S RAM
2. D RAM

ROM (Read Only Memory)

As the name suggests, the user can read the information stored on this memory but he cannot modify such information. This memory contains all the information relating to a system.

Types of ROM

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

Actions of Computer

The main three actions of computer are as listed as under:

1. Receives the input
2. Process the input or manipulation
3. Sends the output

Receives the input

The C P U receives the input given by the user through the input devices. Such as keyboard, mouse etc.

Process the input or manipulation

The C P U processes the data according to the instructions given by the user and sends the result to the memory.

Sends the output

Finally, the user takes the result from the computer through the output devices such as monitor and printer.

Advantages of Computer

The main advantages of computer are:

1. It works very fast.
2. It is very efficient. Its efficiency never decreases with its age.

Limitations of Computer

The main limitations of computer are as under:

1. The computer cannot think itself like human beings.
2. It cannot find the error (mistakes) in a given data and it cannot correct such mistakes.
3. It requires the lengthy of instructions to process the simple data.

Data measurement in computer

Generally, the data and instructions given by the user in the high-level language but the high-level language cannot directly understand by the C P U. Instead of that, all the data and instructions are understood by the computer in Machine Level or Binary language (in the form of 0's and 1's). The data and instructions in high-level language that are given by the user to the C P U will be converted into Machine Level Language. Later the output that is given by the C P U, which is in the machine level language, is converted into high-level language.

The data in computer is measured as under:

0 or 1 = 1 Bit (Binary Digit)

4 Bits= 1 Nibble

8 Bits/2 Nibbles= 1 Byte

1024 Bytes= 1 Kilo Byte (KB) (2^{10})

1024 Kilo Byte= 1 Mega Byte (MB) (2^{20}) (10, 48,576 Bytes)

1024 Mega Byte= 1 Giga Byte (GB)

1024 Giga Byte = 1 Tera Byte (TB)

1024 Terra Byte = 1 Peta Byte (PB)

1024 Peta Byte = 1 Exa Byte (EB)

Applications of Computer

The main applications of computer are as follows:

Schools and Colleges: Administration and Management

Hospitals: Administration and Management

Ex: Medical machines

Means of transport: Bus stand, Railways, Airports: for getting and reservation purpose.

Banks and other offices: keeping records and maintaining accounts.

Police station, court and defense departments

Computer Networks: LAN, WAN, MAN, CAN and SAN.

LAN: Local Area Network

WAN: Wide Area Network

MAN: Metropolitan Area Network

CAN: Campus Area Network

SAN: Storage Area Network

Computer Education institutions: Education purpose etc.

Components of Computer

The components of computer are mainly classified into two types. They are:

1. Hardware
2. Software

Hardware

The physical components relating to a computer are called hardware.

In the hardware session, we learn about introduction to hardware components, functions of hardware components and troubleshooting of hardware components.

Software

The collections of computer programs are called software.

In software, there are mainly three types. They are:

1. Application Software
2. System Software
3. Utility Software

Application Software

Application software is that which is used by the user in his daily life. This type of software supports only the user but not the system (computer).

Ex: MS-Office, D T P, Tally, Nudi, Baraha, Games etc.

System Software

System software is that which is used by the system to run. Without this, the computer does not work. The application software needs the system software to run.

In system software, there are mainly two types. They are:

1. Operating System
2. Translator programs

Utility Software

Utility software is system software, which helps the all types of computer hardware devices to work. It also manages the operating system.

Ex: Device drivers, Antivirus software, Disk Utilities.

Operating System

The operating system is an interface between a computer and a user. It is also called as the main bridge between the user and the computer. Without this, the user cannot communicate with the computer.

Some of the operating systems are:

MS-DOS (Microsoft Disk Operating System)

OS/2

MS-Windows work group

MS-Windows-95, Windows-95–OSR-2, Windows-98, Windows-98 Second Edition, Windows-2000, Windows-2003, Windows Vista, Windows-XP (Extended Program), Windows-7, Windows-8, Windows-NT (New Technology/Networking Technology), UNIX, LINUX, Sun Solaris, MAC (Apple computers).

Translator Programs

Translator programs are system software; they convert high level to machine level language and vice-versa. The translator programs can be classified into three types. They are:

1. Compiler
2. Assembler
3. Interpreter

Compiler

It is a system software. It compiles all the information given by the user at once in the form of 0's and 1's.

Assembler

Assembler is system software; it translates the assembly language into machine level language and machine level language to high-level language vice-versa.

Interpreter

Interpreter is system software; it translates the information given by the user line by line.

Languages of Computer

The languages relating to a computer can be classified into three types. They are:

1. High Level Language
2. Machine Level Language
3. Assembly Level Language

High Level Language

High-level language is one, in which the input given to the computer by the user by this language.

The commonly used high-level languages are C(Compiler , FORTRAN, and PASCAL.

Assembly Level Language

Assembly level language is one, which uses the names instead of numbers. It needs a translator called assembler to translate the machine level language. To high-level language, high-level language to machine level language vice-versa. Assembly level language is also called as **MNEMONICS.**

Machine Level Language or Binary Language

The computer easily understands the data given by the user in machine level language. The machine level language is a set of 0's and 1's.

GENERATIONS OF COMPUTER

First Generation - 1940-1956: Vacuum Tubes

The first computers used vacuum tubes for circuitry and magnetic drums for memory, and were often enormous, taking up entire rooms. A magnetic drum, also referred to as drum, is a metal cylinder coated with magnetic iron-oxide material on which data and programs can be stored.

They were very expensive to operate and in addition to using a great deal of electricity, generated a lot of heat, which was often the cause of malfunctions. First generation computers relied on machine language to perform operations, and they could only solve one problem at a time. Machine languages are the only languages understood by computers. While easily understood by computers, machine languages are almost impossible for humans to use because they consist entirely of numbers. Programmers, therefore, use either a high-level programming language or an assembly language. An assembly language contains the same instructions as a machine language, but the instructions and variables have names instead of being just numbers.

Programs written in high-level languages retranslated into assembly language or machine language by a compiler. Assembly language programs retranslated into machine language by a program called an assembler.

The UNIVAC and ENIAC computers are examples of first-generation computing devices. The UNIVAC was the first commercial computer delivered to a business client, the U.S. Census Bureau in 1951.

Second Generation - 1956-1963: Transistors

Transistors replaced vacuum tubes and ushered in the second generation of computers. Transistor is a device composed of semiconductor material that amplifies signal, opens, or closes a circuit. Invented in 1947at Bell Labs, transistors have become the key ingredient of all digital circuits, including computers. Today's microprocessors contain tens of millions of microscopic transistors.

Prior to the invention of transistors, digital circuits were composed of vacuum tubes, which had many disadvantages. They were much larger, required more energy, dissipated more heat, and were more prone to failures. It is safe to say that without the invention of transistors, computing, as we know it today would not be possible.

The transistor was invented in 1947 but did not see widespread use in computers until the late 50s. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than their first-generation predecessors. Though the transistor still generated a great deal of heat that subjected the computer to damage, it was a vast improvement over the vacuum tube.

Second-generation computers moved from cryptic binary machine language to symbolic, or assembly languages, which allowed programmers to specify instructions in words. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN.

Third Generation - 1964-1971: Integrated Circuits

The development of the integrated circuit was the hallmark of the third generation of computers. Transistors were miniaturized and placed on silicon chips, called semiconductors, which drastically increased the speed and efficiency of computers.

Computer chips, both for CPU and memory, are composed of semiconductor materials. Semiconductors make impossible to miniaturize electronic components, such as transistors. Not only does miniaturization mean that the components take up less space, it also means that they are faster and require less energy.

Fourth Generation - 1971-Present: Microprocessors

The microprocessor brought the fourth generation of computers, as thousands of integrated circuits were built onto a single silicon chip. A silicon chip that contains a CPU. In the world of personal computers, the terms microprocessor and CPU are used interchangeably. At the heart of all personal computers and most workstations sits a microprocessor. Microprocessors also control the logic of almost all digital devices, from clock radios to fuel-injection systems for automobiles.

Fifth Generation - Present and Beyond: Artificial Intelligence

Fifth generation computing devices, based inartificial intelligence, are still in development, though there are some applications, such as voice recognition, that are being used today.

Artificial Intelligence is the branch of computer science concerned with making computers behave like humans. Artificial intelligence includes:

- **Games Playing**: programming computers to play games such as chess and checkers

- **Expert Systems:** programming computers to make decisions in real-life situations (for example, some expert systems help doctors diagnose diseases based on symptoms)

- **Natural Language:** programming computers to understand natural human languages

CLASSIFICATION OF COMPUTERS

The computers can be classified under the following basis. They are:

Classification according to their size

- ❖ Mainframe Computer
- ❖ Mini Computer
- ❖ Micro Computer
- ❖ Super Computer

Classification according to their Work

- ❖ Analog Computer
- ❖ Digital Computer
- ❖ Hybrid Computer

Mainframe computer

Another giant in computers after the super computer is Mainframe, which can also process millions of instruction per second and capable of accessing billions of data.

This computer is commonly used in big hospitals, airline reservations companies, and many other huge companies prefer mainframe because of its capability of retrieving data on a huge basis.

Minicomputer

This computer is next in his line but less offers less than mainframe in work and performance. These are the computers, which are mostly preferred by the small type of business personals, colleges, etc.

Personal Computer

Almost all the computer users are familiar with the personal computers. They normally know what the personal computer is and what its functions are.

This is the computer mostly preferred by the home users. These computers are lesser in cost than the computers given above and also, small in size; they are also called PCs in short for Personal computers.

This computer is small and you can easily arrange it to fit in your single bedroom with its all accommodation. Today this is thought to be the most popular computer in all.

Notebook computers

Having a small size and low weight the notebook is easy to carry to anywhere. A student can take it with him/her to his/her school in his/her bag with his/her book.

This is easy to carry around and preferred by students and business people to meet their assignments and other necessary tasks.

The approach of this computer is also the same as the Personal computer. It can store the same amount of data and having a memory of the same size as that of a personal computer. One can say that it is the replacement of personal desktop computer.

Super computer

The biggest in size, the most expensive in price than any other is classified and known as super computer. It can process trillions of instructions in seconds. This computer is not used as a PC in a home neither by a student in a college.

Governments specially use this type of computer for their different calculations and heavy jobs. Different industries also use this huge computer for designing their products.

In most of the Hollywood's movies, it is used for animation purposes. This kind of computer is also helpful for forecasting weather reports worldwide.

According to work:

- ❖ **Analog Computers**
- ❖ **Digital Computers**
- ❖ **Hybrid Computers**

Analog Computers

These computers recognize data as a continuous measurement of a physical property (voltage, pressure, speed and temperature).

Example: Automobile speedometer, Analog multimeter, Analog clock etc.

Digital Computers

These are high-speed programmable electronic devices that perform mathematical calculations, compare values and store results. They recognize data by counting discrete signal representing either a high or low voltage state of electricity.

Hybrid Computers

A computer that has the combined characteristics of both analog as well as digital is called Hybrid computer.

Windows Operating System

Windows

Windows is a G U I (Graphical User Interface) based Operating System, which allows the user to operate multiple programs at a time. As the Windows is G U I based operating system, the user can easily intract between with this operating system. This Operating System is a multitasking operating system.

Booting

Booting is a process of loading (copying) the operating system from permanent memory (Hard Disk) to temprory memory (RAM).

In booting there are two types. They are:

1. Warm booting
2. Cold booting

My Computer: It represents all the physical components attached to a computer.

Ex: Hard Disk Drives, Floppy Disk Drives, CD-ROM Drives, Removable Disk etc.

My Documents: It is a system folder, where the saved files are stored by default in the computer.

Recycle Bin: It is a system folder, where the deleted files and floder are stored by default.

Folder: Folder is a collection of items. The items may be files or documents.

Icon: It a graphical or pictorial representation of programs. In icons there are mainly three types. They are:

1. Folder icon
2. Program icon or Application icon
3. Group icon

Taskbar: It is a main desktop component, which is used to navigate the programs.

Web Browser

Web browser is software, which is used for internet browsing and to open web page format files.

Some of the web browser softwares are:
1. Internet Exploer
2. Mozilla Firefox
3. Netscape Navigator
4. Google Chrome etc.

Some of the extension names for programs:

Notepad - .txt   Microsoft Excel - .xlsx
MS-Paint - .bmp   Microsoft PowerPoint - .pptx
Microsoft Word - .docx   Adobe Pagemaker - .pmd
Adobe Photoshop - .psd   Corel Draw - .cdr
C-Programming - .c   C++ - .cpp
Html - .html   Wordpad - .rtf

Notepad

Notepad is a basic text editor. It is used to create and edit simple documents. We cannot apply the standard formats in Notepad like Wordpad and Microsoft Word.

Paint

Paint is a drawing application. We use paint to create and edit drawings. We can easily create drawing by using Tool box and Color box, which are available in this application.

Control Panel

Control panel is a program; it is used to make both hardware and software configurations in a computer.