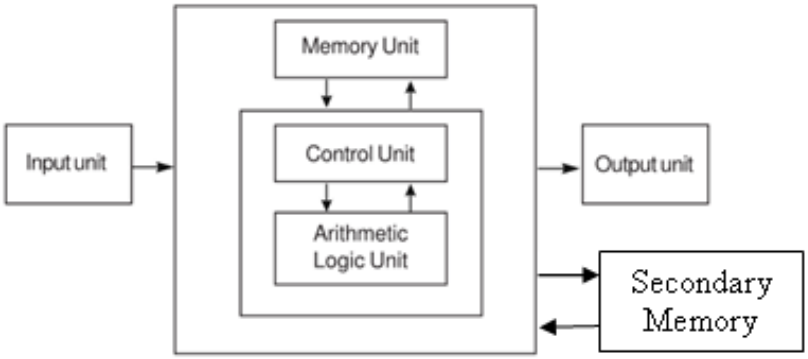
Computer Fundamentals

Computer - Computer is an advanced electronic device that takes raw data as input from the user and processes that data under the control set of instructions (called program) and gives the result (output) and saves the output for future use. It can process both numerical and non numerical (arithmetic and logical) calculations.

Block diagram of computer –

Que. Draw the block diagram of computer and explain the function of each block.



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

Input Devices - Following are few 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 (M. I. C. R.), Optical Character Reader(O. C. R.), Bar Code Reader, Optical Mark Reader (O. M. R.) etc.

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 computer.

CPU itself has following three components

1. A. L. U. (Arithmetic Logic Unit), **2.** Memory Unit, **3.** Control Unit

A. L. U. (Arithmetic Logic Unit) **-** This unit consists of two subsections namely: Arithmetic section and 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 above operations.

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

Control Unit **-** This unit controls the operations of all parts of computer but does not carry out any actual data processing operations. Functions of this unit are:

- It is responsible for controlling the transfer of data and instructions among other units of a computer.
- It manages and coordinates all the units of the computer.
- It obtains the instructions from the memory, interprets them, and directs the operation of the computer.
- It communicates with Input / Output devices for transfer of data or results from storage.
- It does not process or store data.

Memory or Storage Unit **-** This unit can store instructions, data and intermediate results. This unit supplies information to the other units of the computer when needed. It is also known as internal storage unit or main memory or primary storage or Random access memory (RAM). Its size affects speed, power and capability. Primary memory and secondary memory are two types of memories in the computer. Functions of memory unit are:

- ✓ It stores all the data and the instructions required for processing.
- ✓ It stores intermediate results of processing.
- ✓ It stores final results of processing before these results are released to an output device.
- ✓ All inputs and outputs are transmitted through main memory.

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

Following are few of the important output devices which are used in a computer: Monitors, Graphic Plotter, and Printer.

Address and data bus – The devices and CPU are connected with two groups of wire called address and data bus. The address bus is *unidirectional* and data bus is *bidirectional.* The width of address bus specifies the memory handling capacity.

Que. Explain different types of memories uses in computer

Memory - A memory is just like a human brain. It is used to store data and instructions. Computer memory is the storage space in computer where data is to be processed and instructions required for processing are stored. Memory is primarily of three types

1. Cache Memory
2. Primary Memory/Main Memory
3. Secondary Memory

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

Advantages - The advantages of cache memory are as follows:

- ✓ Cache memory is faster than main memory.
- ✓ It consumes less access time as compared to main memory.
- ✓ It stores the program that can be executed within a short period of time.
- ✓ It stores data for temporary use.

Disadvantages -

- ✓ Cache memory has limited capacity.
- ✓ It is very expensive.

Primary Memory (Main Memory) - Primary memory holds only those data and instructions on which computer is currently working. It has 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 reside in main memory. It is divided into two subcategories RAM and ROM.

Characteristics of Main Memory -

- ✓ These are semiconductor memories.
- ✓ It is known as main memory.
- ✓ Usually volatile memory.
- ✓ Data is lost in case power is switched off.
- ✓ It is working memory of the computer.
- ✓ Faster than secondary memories.

- ✓ A computer cannot run without primary memory.

Secondary Memory (Auxiliary memory) **-** This type of memory is also known as external memory or non-volatile. It is slower than 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. Contents of secondary memories are first transferred to main memory, and then CPU can access it. For example: disk, CD-ROM, DVD etc.

Characteristic of Secondary Memory:

- ✓ These are magnetic and optical memories.
- ✓ It is known as backup memory.
- ✓ It is non-volatile memory.
- ✓ Data is permanently stored even if power is switched off.
- ✓ It is used for storage of data in a computer.
- ✓ Computer may run without secondary memory.
- ✓ Slower than primary memories.

Que. Write a note on ROM. Explain different types of ROM.

Random Access Memory – RAM (Random Access Memory) is the internal memory of the CPU for storing data, program and program result. It is 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. RAM is small, both in terms of its physical size and in the amount of data it can hold.

RAM is of two types

1. Static RAM (SRAM)
2. Dynamic RAM (DRAM)

Static RAM (SRAM)

Static the word 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 have to be refreshed on a regular basis. Because of the extra space in the matrix, SRAM

uses more chips than DRAM for the same amount of storage space, thus making the manufacturing costs higher. So SRAM is used as cache memory and has very fast access. Characteristic of the Static RAM

- ✓ It has long life
- ✓ There is no need to refresh
- ✓ Faster
- ✓ Used as cache memory
- ✓ Large size
- ✓ Expensive
- ✓ High power consumption

Dynamic RAM (DRAM)

Refreshed DRAM, unlike SRAM, must be continually in order to maintain the data. This is done by placing the memory on a refresh circuit that rewrites the data several hundred times per second. DRAM is used for most system memory because it is cheap and small. All DRAMs are made up of memory cells which are composed of one capacitor and one transistor.

Characteristics of the Dynamic RAM

- ✓ It has short data lifetime
- ✓ Need to be refreshed continuously
- ✓ Slower as compared to SRAM
- ✓ Used as RAM
- ✓ Lesser in size
- ✓ Less expensive
- ✓ Less power consumption

Que. Write a note on ROM. Explain different types of 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.

Following are the various types of ROM

***MROM (Masked ROM)* -** The very first ROMs were hard-wired devices that contained a pre-programmed set of data or instructions. These kinds of ROMs are known as masked ROMs which are inexpensive.

***PROM (Programmable Read only Memory)* -** PROM is read-only memory that can be modified only once by a user. The user buys a blank PROM and enters the desired contents using a PROM program. Inside the PROM chip there are small fuses which are burnt open during programming. It can be programmed only once and is not erasable.

***EPROM (Erasable and Programmable Read Only Memory)* -** The EPROM can be erased by exposing it to ultra-violet light for a duration of up to 40 minutes. Usually, an EPROM eraser achieves this function. During programming, an electrical charge is trapped in an insulated gate region. The charge is retained for more than ten years because the charge has no leakage path. For erasing this charge, ultra-violet light is passed through a quartz crystal window (lid). This exposure to ultra-violet light dissipates the charge. During normal use the quartz lid is sealed with a sticker.

***EEPROM (Electrically Erasable and Programmable Read Only Memory)* -** The EEPROM is programmed and erased electrically. It can be erased and reprogrammed about ten thousand times. Both erasing and programming take about 4 to 10 ms (milli second). In EEPROM, any location can be selectively erased and programmed. EEPROMs can be erased one byte at a time, rather than erasing the entire chip. Hence, the process of re-programming is flexible but slow.

Advantages of ROM

1. Non-volatile in nature
2. These cannot be accidentally changed
3. Cheaper than RAMs
4. Easy to test
5. More reliable than RAMs
6. These are static and do not require refreshing
7. Its contents are always known and can be verified.

Que. State various input devices used with a computer. Explain any one of them.

Keyboard - Keyboard is the most common and very popular input device which helps in inputting data to the computer. The layout of the keyboard is like that of traditional typewriter, although there are some additional keys provided for performing additional functions.

Keyboards are of two sizes 84 keys or 101/102 keys, but now keyboards with 104 keys or 108 keys are also available for Windows and Internet.

Mouse - A mouse is an electro-mechanical, hand-held device. It is used as a pointer. It can perform functions like selecting menu commands, moving icons, and resizing windows, starting programs, and choosing options.

Light pen – Light pen is an input device that utilizes a light sensitive detector to select objects on a display screen. A light pen is similar to a mouse, except that with a light pen you can move the pointer and select objects on the display screen by directly pointing to the objects with the pen.

Optical Scanner - These devices are used for automatic data collection. The devices of this category completely eliminate manual input of data. For example, the bar-code reader is actually just a special type of image scanner. An image scanner translates printed images into an electronic format that can be stored in a computer's memory, and with the right kind of software, one can alter a stored image. Another example of scanner is optical character recognition (OCR) device, used by banks to convert the scanned image of a typed or printed page into text that can be Scanner edited on the computer.

Touch Screen - Touch panel displays and pads are now being offered as alternatives to keyboard. Here the input can be given through the computer screen, that accepts the input through monitor; users touch electronic buttons displayed on the screen or they may use light pen.

Microphone - Microphone is an input device, which takes voice as input. The voice communication is more error-prone than information through keyboard. There are two types of microphones available.

1. Desktop Microphone
2. Hand held Microphone

Que. State various output devices used with a computer. Explain any one of them.

Monitor - Out of all the output devices, monitor is perhaps the most important output device because people interact with this device most intensively than others. Information is displayed, visually with a video adapter card and monitor. Information processed within the CPU, that needs to be visually displayed, is sent to video adapter. The video adapter converts information

from the format used, in the same manner as a television displays information sent to it by a cable service.

Two basic types of monitors are used with microcomputers, which are as follows:

1. CRT
2. LCD

Cathode Ray Tube (CRT): CRT or Cathode Ray Tube Monitor is the typical monitor that you see on a desktop computer. It looks a lot like a television screen, and works the same way. This type Cathode Ray Tube (CRT) uses a large vacuum tube.

Liquid Crystal Displays (LCD): These types of monitors are also called liquid crystal known as flat panel monitor. Most of these employ displays (LCDs) to render images. These days LCD monitor are very popular.

Printer - After a document is created on the computer, it can be sent to a printer for a hard copy (printout). Some printers offer special features such as colored and large page formats. Some of the most commonly used printers are:

1. Laser Printer
2. Ink Jet Printer
3. Dot Matrix Printer
4. Line Printer

Que. State any three secondary memories. Explain any one of them.

Que. Write a note on floppy disc.

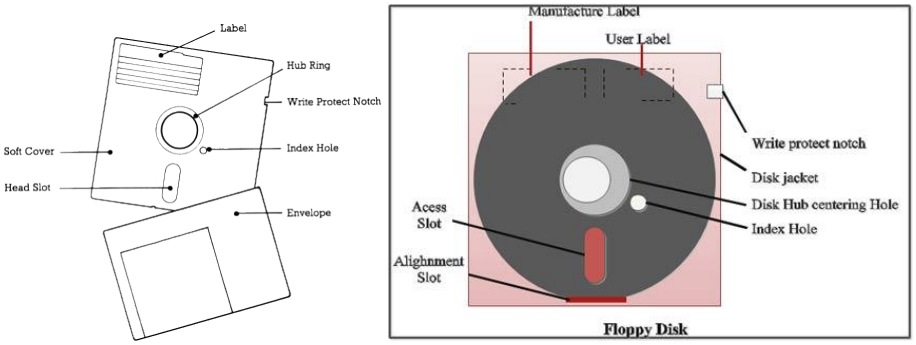
Secondary memories - Floppy disc, hard disc, magnetic tape

Floppy disc - A *floppy disk*, also called a ***diskette*** or just ***disk***, is a type of disk storage composed of a disk of thin and flexible magnetic storage medium, sealed in a rectangular plastic carrier lined with fabric that removes dust particles. Floppy disks are read and written by a **floppy disk drive** (FDD).

The disk has a large circular hole in the center for the drive's spindle and a small oval aperture in both sides of the plastic to allow the drive's heads to read and write data; the magnetic medium can be spun by rotating it from the middle hole. A small notch on the right of the disk identifies that it is writable, detected by a mechanical switch or phototransistor above it; if it is not present, the disk is read-only. Tape may be used over the notch to protect writable disks from unwanted writing. Another LED/photo-transistor pair located near the center of the disk detects

the *index hole* once per rotation in the magnetic disk; it is used to detect the angular start of each track and whether or not the disk is rotating at the correct speed.

Floppy disks are available in different sizes such as 8-inch (200 mm) media, 5¼-inch (133 mm) and 3½-inch (90 mm) sizes.

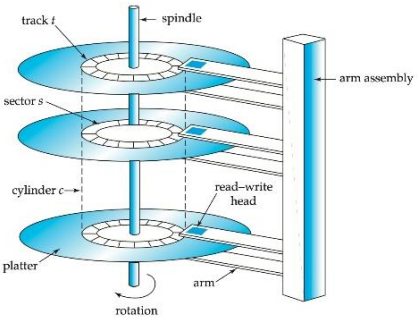


Que. Write a note on hard disc.

Hard disk drive - A hard disk drive (HDD), hard disk, hard drive or fixed disk is a data storage device used for storing and retrieving digital information using one or more rigid ("hard") rapidly rotating disks (platters) coated with magnetic material. The platters are paired with magnetic heads arranged on a moving actuator arm, which read and write data to the platter surfaces. Data is accessed in a random-access manner, meaning that individual blocks of data can be stored or retrieved in any order rather than sequentially. HDD retain stored data even when powered off.

An HDD records data by magnetizing a thin film of ferromagnetic material on a disk. Sequential changes in the direction of magnetization represent binary data bits. The data is read from the disk by detecting the transitions in magnetization. User data is encoded using an encoding scheme, which determines how the data is represented by the magnetic transitions.

A typical HDD design consists of a *spindle* that holds flat circular disks, also called platters, which hold the recorded data. The platters are made from a non-magnetic material, usually aluminum alloy, glass, or ceramic, and are coated with a shallow layer of magnetic material typically 10–20 nm in depth, with an outer layer of carbon for protection.



Que. Write a note on magnetic tape.

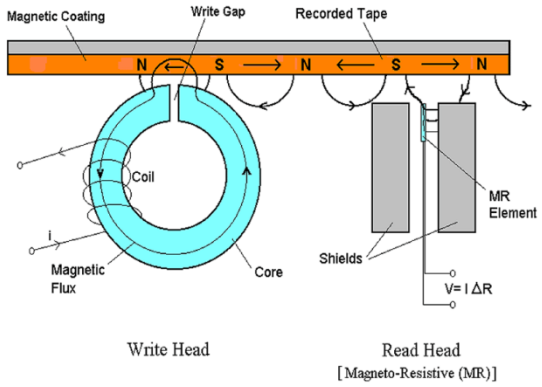
Magnetic tape is a sequential storage medium used for data collection, backup and archiving. Like videotape, computer tape is made of flexible plastic with one side coated with a

ferromagnetic material. Tapes were originally open reels, but were superseded by cartridges and cassettes of many sizes and shapes.

Magnetic tape is a medium for magnetic recording, made of a thin magnetizable coating on a long, narrow strip of plastic film. Devices that record and play back audio and video using magnetic tape are tape recorders and video tape recorders. A device that stores computer data on magnetic tape is a tape drive

In all tape formats, a tape drive (or "transport" or "deck") uses motors to wind the tape from one reel to another, passing tape heads to read, write or erase as it moves.

Tape has the benefit of a comparatively long duration during which the media can be guaranteed to retain the data stored on the media.



Que. Write the typical specifications of computer.

Specifications of computer –

1. Clock frequency (specify the speed of PC)
2. Type of microprocessor.
3. Hard disc capacity
4. Cache memory (RAM)
5. Extended memory size
6. Serial and parallel port to connect I / O devices like printer, scanner, MODEM, mouse, etc.
7. Other facilities like multimedia, TV tuner card, UPS, sound blaster card.