# IECS

## COMPUTER EDUCATION & SKILL DEVELOPMENT

Fully Recognised Institute of NIELIT

Since 1993

HARDWARE (ICT) CLASS – 7TH

रा.इ.सू.प्रौ.सं NIELIT

DOEACC QUALITY ASSURANCE IN COMPUTER EDUCATION

# LAST CLASS : OUTPUT DEVICE

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

Output Device : The output devices are the devices which are used to display the result generated by the computer system. The key distinction between an input device and an output device is that an input device sends data to the computer (CPU) , whereas an output device receives data from the computer (CPU). Monitor, printer, plotter, speaker are the example of output devices.


List of Most Common Output Device :

1. Monitor
2. Printer
3. Headphones
4. Speakers
5. Projector
6. Sound Card
7. Video Card
8. Braille Reader
9. Speech-Generating Device

# MEMORY DEVICE

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Memory Device :** 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 :**

1. Cache Memory
2. Primary Memory/Main Memory
   - RAM
   - ROM
3. Secondary Memory
   - Magnetic Disks
   - Optical Drive
   - Usb Drive
   - Magnetic Tape
   - Memory Card

IECS

COMPUTER EDUCATION & SKILL DEVELOPMENT

Fully Recognised Institute of NIELIT

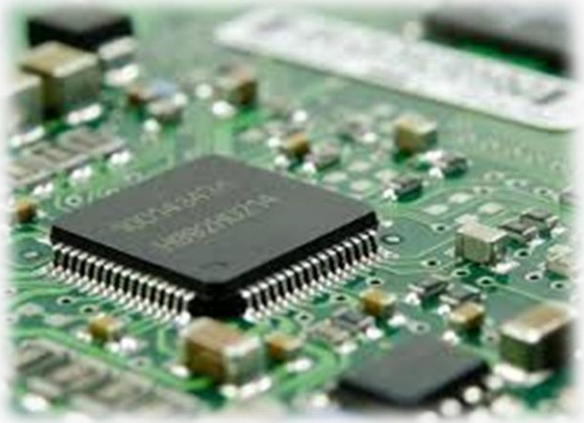
Since 1993

# CACHE MEMORY

# MEMORY DEVICE (CASH MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**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.



## Advantages

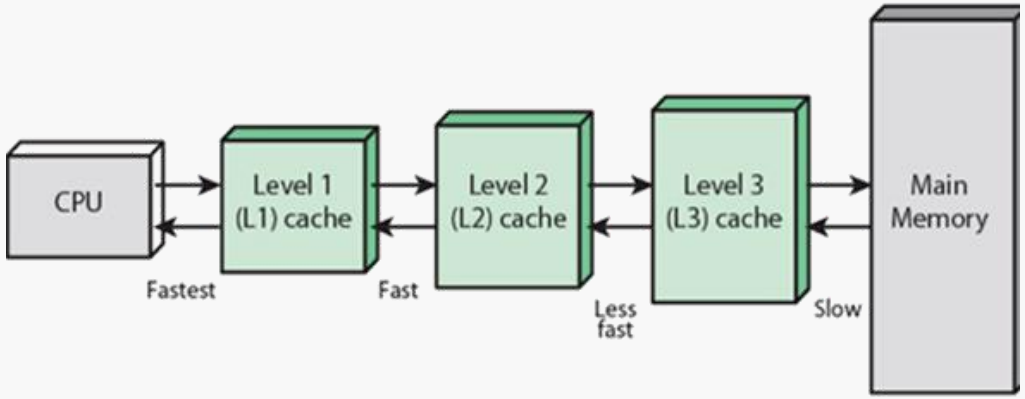
The advantages of cache memory are as follows :

- 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

The disadvantages of cache memory are as follows :

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



IECS

COMPUTER EDUCATION & SKILL DEVELOPMENT

Fully Recognised Institute of NIELIT

Since 1993

# PRIMARY MEMORY

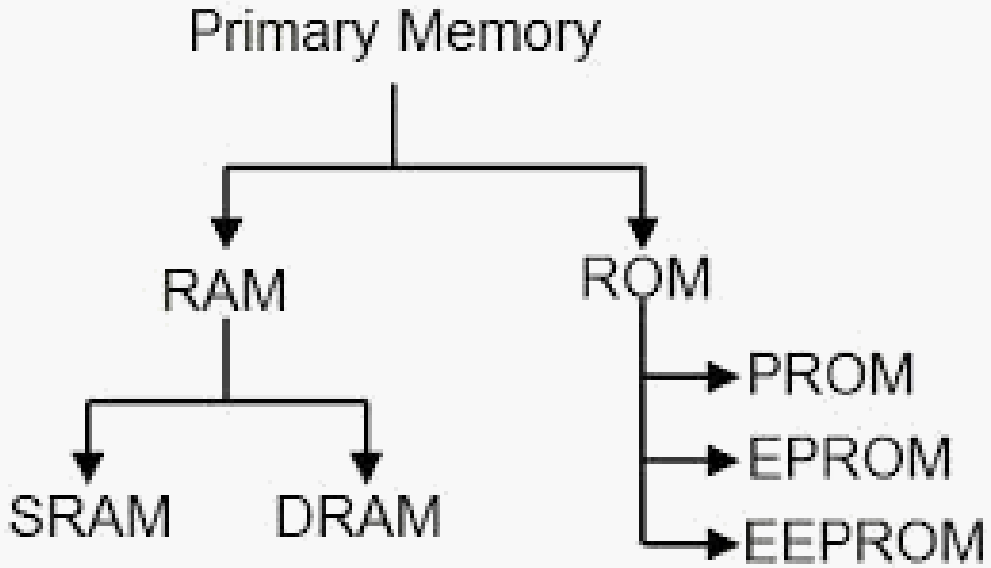
# MEMORY DEVICE (PRIMARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Primary 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. The data and instruction required to be processed resides in the main memory. The primary memory is a semiconductor memory. It is costlier compared with secondary memory. The capacity of primary memory is very much limited and is always smaller compares to secondary memory. It is divided into two subcategories RAM and ROM.

## Characteristics of Main Memory :

- These are semiconductor memories.
- It is known as the main memory.
- Usually volatile memory.
- Data is lost in case power is switched off.
- It is the working memory of the computer.
- Faster than secondary memories.
- A computer cannot run without the primary memory.



# MEMORY DEVICE (PRIMARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**RAM (Random Access Memory) :** Random access memory which is also known as RAM is generally known as a main memory of the computer system. It is called temporary memory. The information stored in this type of memory is lost when the power supply to the PC or laptop is switched off.

RAM is a hardware device that allows information to be stored and retrieved on a computer. Information is accessed randomly instead of sequentially like it is on a CD or hard drive, access times are much faster. However, unlike ROM, RAM is a volatile memory and requires power to keep the data accessible. If the computer is turned off, all data contained in RAM is lost.

**History of RAM :** The first form of RAM came about in 1947 with the use of the Williams tube. It utilized a CRT (cathode ray tube); the data was stored on the face as electrically charged spots.

**There are two main types of RAM:**

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

Note : DRAM (pronounced DEE-RAM), is widely used as a computer's main memory

# MEMORY DEVICE (PRIMARY MEMORY)

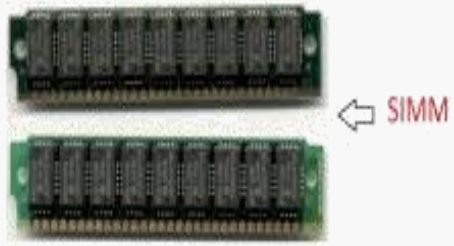
IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Static RAM (SRAM) :** Static random access memory, SRAM is computer memory that requires a constant power flow to hold information. Power consumption varies widely based on how frequently the memory is accessed. Although quicker than DRAM, SRAM is more expensive and holds less data per unit volume. Therefore, it is more commonly used in cache and video card memory only.

**Dynamic RAM (DRAM) :** Dynamic random access memory, DRAM is one of the most commonly found RAM modules in PC compatible personal computers and workstations. It stores its information in a cell containing a capacitor and transistor. Because of this design, these cells must be refreshed with new electricity every few milliseconds for the memory to keep holding its data. DRAM was first invented and patented by Robert Dennard in 1968. It was released by Intel in October 1970.

**These types of memory all fall into the general categories of SIMM or DIMM.**

**SIMM** : Single Inline Memory Module, SIMM is a memory module developed by Wang laboratories in 1983. The SIMM circuit board that holds six to nine memory chips per board, the ninth chip usually an error checking chip. The SIMM was used with computers using a 486, early Intel Pentium, and compatible processors. However, because the Pentium is 64-bit and a SIMM is only 32-bits wide, they must be installed two at a time when used with any 64-bit processor.




**DIMM** : Dual In-line Memory Module, DIMM is a module containing a circuit board and one more random access memory chips. DIMMs have a 168-pin connector and, from the advent of the Pentium processor, a 64-bit path. Because of the new bit path, DIMMs can be installed one at a time, unlike SIMMs that would require installation in pairs.

**SO-DIMM :** Which is short for Small Outline Dual In-line Memory Module, is available in both a 72-pin and 144-pin configuration. SO-DIMMs are commonly utilized in laptop computers.

# MEMORY DEVICE (PRIMARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

## THERE ARE SIX TYPES OF RAM

**EDO RAM :** EDO is short for Extended Data Out and is a type of memory developed in 1995 by Micron that was first used with Pentium computers.

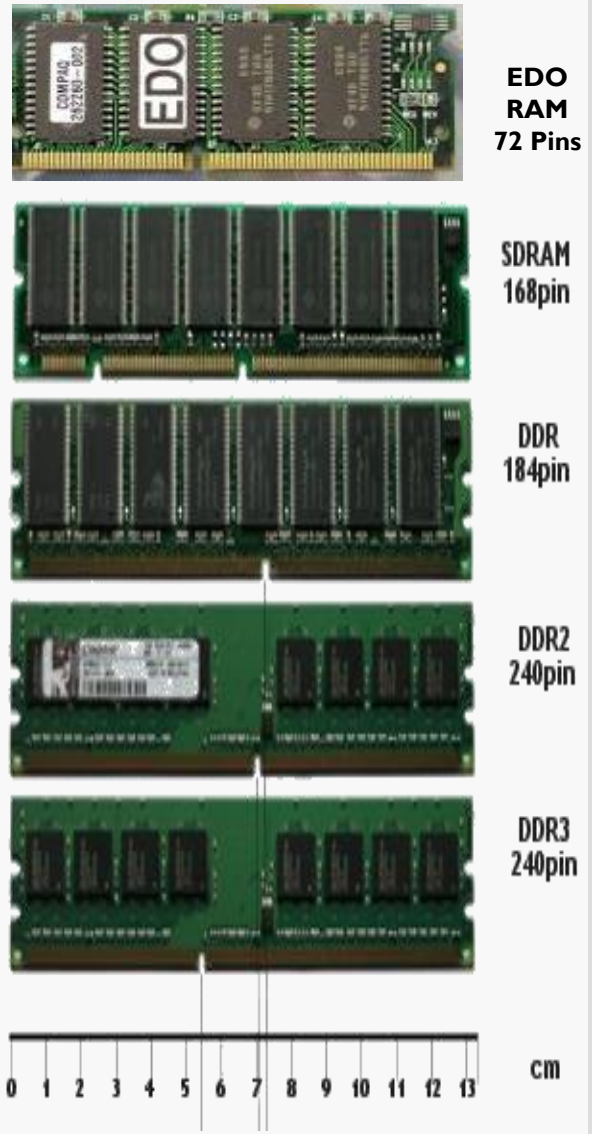
**SDRAM :** SDRAM, which is short for Synchronous DRAM, is a type of memory that synchronizes itself with the computer's system clock. Since 1993, this is the prevalent type of memory used in computers around the world.

**DDR RAM :** double data rate, DDR is memory that was first introduced in 1996 and has since been replaced by DDR2. DDR utilizes both the rising and falling edge of the system clock, potentially doubling the speed of the memory.

**DDR2 RAM :** double data rate two, DDR2 is the second generation of DDR memory that was released in September 2003. DDR2 is capable of operating at greater speeds than DDR, offers a greater bandwidth potential, operates on less power, and generates less heat. Due to architectural differences, DDR2 memory modules are incompatible with DDR slots.

**DDR3 RAM :** Short for double data rate three, DDR3 is a type of DRAM (dynamic random-access memory) released in June 2007 as the successor to DDR2. DDR3 chips have bus clock speed of 400 MHz up to 1066 MHz, range in size from 1 to 24 GB, and consume nearly 30% less power than their predecessors. DDR3 RAM sticks for a desktop computer have 240 pins. For a laptop computer, DDR3 RAM sticks have 204 pins.

**DDR4 RAM :** Short for double data rate four, DDR4 is a type of system memory known as SDRAM and was released in September 2014 as the successor to DDR3. DDR4 has bus clock speeds that range from 800 to 1600 MHz and range in storage capacity from 4 to 128 GB per DIMM. DDR4 is also more efficient at 1.2V when compared to DDR3's 1.5 to 1.65V range.



# MEMORY DEVICE (PRIMARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**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.

**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 kind 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) :** 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 10 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.

# MEMORY DEVICE (PRIMARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

- **EEPROM (Electrically Erasable and Programmable Read Only Memory) :** 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 (millisecond). 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 reprogramming is flexible but slow.
- **FLASH ROM:** It is an advanced version of EEPROM. It stores information in an arrangement or array of memory cells made from floating-gate transistors. The advantage of using this memory is that you can delete or write blocks of data around 512 bytes at a particular time. Whereas, in EEPROM, you can delete or write only 1 byte of data at a time. So, this memory is faster than EEPROM. It can be reprogrammed without removing it from the computer. Its access time is very high, around 45 to 90 nanoseconds. It is also highly durable as it can bear high temperature and intense pressure.

### Advantages of ROM

The advantages of ROM are as follows −

- Non-volatile in nature
- Cannot be accidentally changed
- Cheaper than RAMs
- Easy to test
- More reliable than RAMs
- Static and do not require refreshing
- Contents are always known and can be verified

IECS

COMPUTER EDUCATION & SKILL DEVELOPMENT

Fully Recognised Institute of NIELIT

Since 1993

# SECONDARY MEMORY

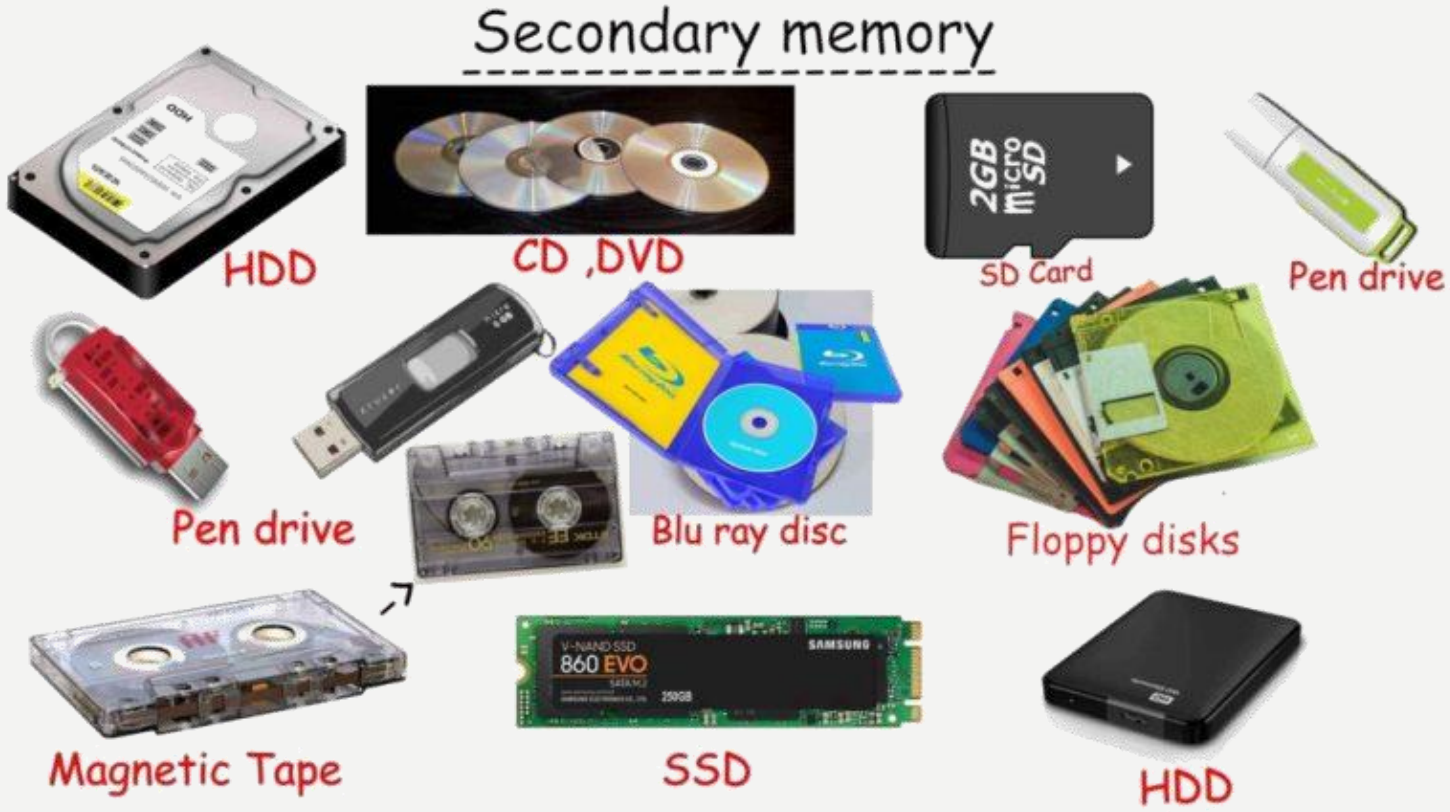
# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Secondary Memory :** Secondary memory (or secondary storage) is the slowest and cheapest form of memory. It cannot be processed directly by the CPU. It must first be copied into primary storage (also known as RAM). Secondary memory devices include magnetic disks like hard drives and floppy disks ; optical disks such as CDs and CDROMs ; and magnetic tapes, which were the first forms of secondary memory.

## Types of Secondary Memory -

- Magnetic Disks
  - Floppy Disks
  - Zip Disks
  - Hard Disks
- Optical Drive
  - CD
  - DVD
  - Blue Ray Disc
- Usb Drive
- Magnetic Tape
- Memory Card



# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Magnetic Disks :** A magnetic disk is a storage device that uses a magnetization process to write, rewrite and access data. It is covered with a magnetic coating and stores data in the form of tracks, spots and sectors. Hard disks, zip disks and floppy disks are common examples of magnetic disks.

**Floppy Disks :** Alternatively referred to as a floppy or floppy disk, a floppy diskette is a type of storage media, capable of storing electronic data, like a computer file. The floppy diskette was first created in 1967 by IBM as an alternative to buying hard drives, which were extremely expensive at the time. The picture shown on this page is an example of a 3.5" floppy diskette, which was one of the most commonly used floppy diskettes, capable of storing 1.44 MB of data.

**ZIP Disks :** Zip disks looked similar to floppy disks, but were slightly larger and thicker, and had stronger plastic casing, making them easier to store and handle. Like floppy disks, Zip disks were lightweight, portable and relied on magnetic storage techniques. The magnetic coating used in Zip disks was of higher quality than that used in floppy disks, and they could store more data than floppy disks. Zip disks were PC and Mac compatible. They were usually used as secondary storage devices. Zip disks had faster data transfer rates and faster seek times than floppy disks.

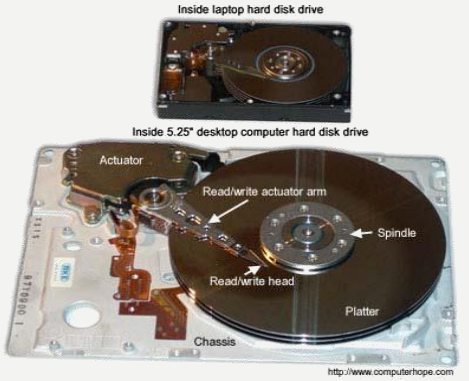

The Zip drive is a removable floppy disk storage system that was introduced by Iomega in late 1994. Considered medium-to-high-capacity at the time of its release, Zip disks were originally launched with capacities of 100 MB, then 250 MB, and then 750 MB.

# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Hard Disks :** A hard disk drive (sometimes abbreviated as a hard drive, HD, or HDD) is a non-volatile data storage device. It is usually installed internally in a computer, attached directly to the disk controller of the computer's motherboard. It contains one or more platters, housed inside of an air-sealed casing. Data is written to the platters using a magnetic head, which moves rapidly over them as they spin.

Internal hard disks reside in a drive bay, connected to the motherboard using an ATA, SCSI, or SATA cable. They are powered by a connection to the computer's PSU (power supply unit). Examples of data that may be stored on a computer's hard drive include the operating system, installed software, and the user's personal files. Hard driver can be of two type: PATA (Parallel Attachment Packet Interface) and SATA (Serial Attachment Packet Interface).




**Solid-State Drive (SSD) -** is a new generation of storage device used in computers. SSDs replace traditional mechanical hard disks by using flash-based memory, which is significantly faster. Older hard-disk storage technologies run slower, which often makes your computer run slower than it should. SSDs speed up computers significantly due to their low read-access times and fast throughputs.

# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**Optical Drive** : An optical drive is a type of computer disk drive that reads and writes data from optical disks through laser beaming technology. This type of drive allows a user to retrieve, edit and delete the content from optical disks such as CDs, DVDs and Blu-ray disks. Optical drives are among the most common computer components. An optical drive may also be known as an optical disk drive (ODD)

**CD Drive** : CD stands for Compact Disk. CDs are circular disks that use optical rays, usually lasers, to read and write data. They are very cheap as you can get 700 MB of storage space for less than a dollar. CDs are inserted in CD drives built into CPU cabinet.


They are portable as you can eject the drive, remove the CD and carry it with you. There are three types of CDs :

CD-ROM (Compact Disk – Read Only Memory) − The data on these CDs are recorded by the manufacturer. Proprietary Software, audio or video are released on CD-ROMs.


CD-R (Compact Disk – Recordable) − Data can be written by the user once on the CD-R. It cannot be deleted or modified later.

CD-RW (Compact Disk – Rewritable) − Data can be written and deleted on these optical disks again and again.

# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**DVD Drive** : DVD stands for Digital Video Display. DVD are optical devices that can store 15 times the data held by CDs. They are usually used to store rich multimedia files that need high storage capacity. In computing, an optical disc drive is a disc drive that uses laser light or electromagnetic waves within or near the visible light spectrum as part of the process of reading or writing data to or from optical discs.DVDs also come in three varieties – read only, recordable and rewritable.


**Blue Ray Disc** : Blue Ray Disk (BD) is an optical storage media used to store high definition (HD) video and other multimedia filed. BD uses shorter wavelength laser as compared to CD/DVD. This enables writing arm to focus more tightly on the disk and hence pack in more data. BDs can store up to 128 GB data.


CD Released: 1 October, 1982

DVD Released: 1 November ,1996

Blue Ray Released : June 20, 2006


# MEMORY DEVICE (SECONDARY MEMORY)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

**USB Drive (Flash Drive)** : Alternatively referred to as a USB flash drive, data stick, pen drive, memory unit, keychain drive, and thumb drive, a jump drive is a portable storage device. It is often the size of a human thumb (hence the name), and connects to a computer via a USB port. Flash drives are an easy way to store and transfer information between computers and range in sizes from 2 GB to 1 TB.

**Pen Drive :** Pen drive is a portable memory device that uses solid state memory rather than magnetic fields or lasers to record data. It uses a technology similar to RAM, except that it is nonvolatile. It is also called USB drive, key drive or flash memory.

**Magnetic Tape :** a thin ribbon (as of plastic) coated with a magnetic material on which information (such as sound or television images) may be stored. Originally, magnetic tape was designed to record sound. In computing, it holds binary data. In recent years, magnetic tape devices have become more scarce with the emergence of digital imaging and audiovisual media storage. Magnetic tape was used in many of the larger and less complex mainframe computers that predated today's personal computers (PC).


**Memory Card :** A memory card is known to be a small storage medium which is generally used to store information. The most common type of data that's being stored on a memory card include videos, pictures, audio and other types of file formats. It's also used for smaller, portable as well as remote computer devices. The majority of the current products are going to use flash memory, even though there are other technologies which are currently under development.

# MEMORY DEVICE (DIFFERENCE)

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

| Parameter | Primary memory | Secondary memory |
|---|---|---|
| Nature | The primary memory is categorized as volatile & nonvolatile memories. | The secondary memory is always a non-volatile memory. |
| Alias | These memories are also called internal memory. | Secondary memory is known as a Backup memory or Additional memory or Auxiliary memory. |
| Access | Data is directly accessed by the processing unit. | Data cannot be accessed directly by the processor. It is first copied from secondary memory to primary memory. Only then CPU can access it. |
| Formation | It's a volatile memory meaning data cannot be retained in case of power failure. | It's a non-volatile memory so that that data can be retained even after power failure. |
| Storage | It holds data or information that is currently being used by the processing unit. Capacity is usually in 16 to 32 GB | It stores a substantial amount of data and information. Capacity is generally from 200GB to terabytes. |
| Accesses | Primary memory can be accessed by the data bus. | Secondary memory is accessed by I/O channels. |
| Expense | Primary memory is costlier than secondary memory. | Secondary memory is cheaper than primary memory. |

IECS
COMPUTER EDUCATION & SKILL DEVELOPMENT
Fully Recognised Institute of NIELIT
Since 1993

रा.इ.सू.प्रौ.सं
NIELIT

DOEACC
QUALITY ASSURANCE in COMPUTER EDUCATION

# THANK'S

## NEXT CLASS (BIOS SETTING)