

## Digital Versatile Disk (DVD)

It has much more storage capacity than that of CD. It uses Laser beam of shorter wavelength as compared to that used in CDs. The capacity of different types of large capacity optical disks is as follows:

DVD-ROM: 4.7, 8.5 and 17 GB, for single sided single layer, single sided double layer and double sided double layer respectively.

DVD-R: 4.7 GB and 8.5 GB, for single layer and double layer respectively.

DVD-RW: 4.7 GB and 9.4 GB, for single layer and double layer respectively.

Blu-ray disk: 25 GB and 50 GB, for single layer and double layer respectively.

### Blu-Ray DISKS :-

The capacity of this type of disks is 25 GB and 50 GB for single layer and double layer disks respectively.

Blu-ray disks are available in two sizes: Standard (12 cm) and Mini (8 cm). Each disk can have either a single layer or dual layers depending upon which the data storage capacity of the disk differs.

It's data transfer rate is 72 MBPS. In future much higher data transfer speed is expected.



## Advantages of Optical Disks

The main advantages of optical disks are as follows

- (i) They possess large capacity to store data/information in the form of multimedia, graphics and video files.
- (ii) The life span for data storage in optical disks is considered to be more, about 10-20 years as compared to magnetic disks.
- (iii) They hold more data recording density as compared to other storage media; ~~that~~ therefore, they have low cost per bit of storage.
- (iv) Due to their small size and lightweight, these disks are easily portable and stored.

## Disadvantages of Optical Disks.

- (i) They possess slow data access speed as compared to the magnetic disks.
- (ii) The drive mechanism of optical disk is more complicated than the magnetic and floppy disks.

## CCD Memory

CCD stands for charge coupled device. It is a semi-conductor device. It stores the information in the form of charge. It is fabricated in the form of long shift register to act as a memory. There is a p-type substrate. On the p-type substrate, there is an oxide layer which acts as an insulating layer. On the oxide layer, there is an isolated



gates. When positive potential is applied to a gate w.r. to the substrate, a potential well is developed under the gate. In this condition, if a charge of electron is injected into the region under the gate, the charge is retained there. If a sequence of clock pulses is applied to the gates, the stored charge shifts along the region under the next gate.

For the use of CCDs for computer's version, several hundred CCD shift registers are fabricated in parallel on a single IC. A Photodiode is fabricated under the alternate gate. To create potential well, all the gates having photodiodes under them are made positive. When light falls on photodiode, a charge proportional to the intensity of light is produced. The charge is held in each well. These charges can be shifted.

### Cache Memory:-

It is a semi-conductor memory and is placed b/w the CPU and the main memory. It consists of static RAMs. Its access time is about 10 ns which is much less than that of main memory. Its capacity is 2 to 3 percent of that of main memory. It stores instruction codes and data which are to be immediately used by the CPU.

The modern 32-bit and 64 bit microprocessors operate at very high speed. Their clock rates are in the range of 400 MHz to 3.8 GHz. The memory matching with high speed microprocessor must be very fast. But very fast memory is very expensive. If a fast microprocessor operates with conventional main memory, it has to operate with several wait states. This will reduce the speed of the computer. A compromise is made and a high speed cache memory is used to supply currently needed instructions and data to CPU. The main memory stores program and data which is to be processed by CPU. The currently needed instructions and data of the program are loaded into the cache from the main memory.