

**Ques 01 : Discuss the data read-write mechanism of hard drive disk - 4.75mark**

Ans: 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 rapidly rotating disks (platters) coated with magnetic material. Disk read/write heads are the small parts of a disk drive.

Data read-write mechanism of hard drive disk:

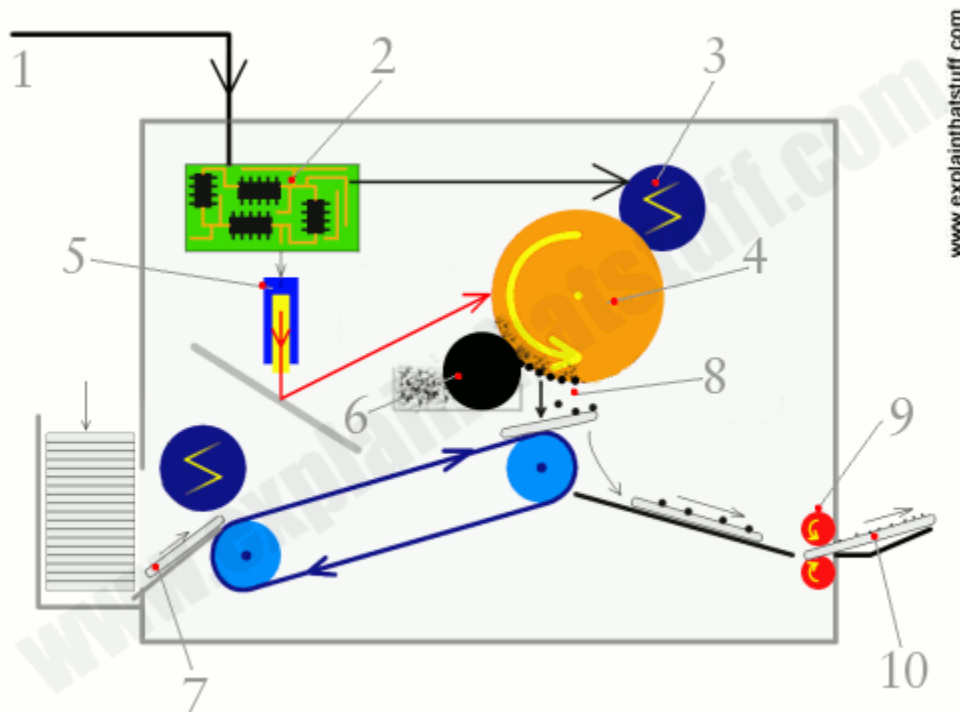
A modern HDD records data by magnetizing a thin film of ferromagnetic material on a disk. Sequential changes in the direction of magnetization represent binary data bits. The data is read from the disk by detecting the transitions in magnetization. User data is encoded using an encoding scheme, such as run-length limited encoding, which determines how the data is represented by the magnetic transitions. Information is written to and read from a platter as it rotates past devices called read-and-write heads that are positioned to operate very close to the magnetic surface, with their flying height often in the range of tens of nanometers. The read-and-write head is used to detect and modify the magnetization of the material passing immediately under it. In modern drives, there is one head for each magnetic platter surface on the spindle, mounted on a common arm. An actuator arm (or access arm) moves the heads on an arc (roughly radially) across the platters as they spin, allowing each head to access almost the entire surface of the platter as it spins. The arm is moved using a voice coil actuator or in some older designs a stepper motor. Early hard disk drives wrote data at some constant bits per second, resulting in all tracks having the same amount of data per track but modern drives (since the 1990s) use zone bit recording – increasing the write speed from inner to outer zone and thereby storing more data per track in the outer zone.

**Ques 02 : Discuss the printing mechanism of laser printer -4mark**

Answer: A laser printer is a popular type of personal computer printer that uses a non-impact (keys don't strike the paper), photocopier technology. When a document is sent to the printer, a laser beam "draws" the document on a selenium-coated drum using electrical charges.

Mechanism of laser printer-

When you print something, your computer sends a vast stream of electronic data (typically a few megabytes or million characters) to your laser printer. An electronic circuit in the printer figures out what all this data means and what it needs to look like on the page. It makes a laser beam scan back and forth across a drum inside the printer, building up a pattern of static electricity. The static electricity attracts onto the page a kind of powdered ink called toner. Finally, as in a photocopier, a fuser unit bonds the toner to the paper.



1. Millions of bytes (characters) of data stream into the printer from your computer.
2. An electronic circuit in the printer (effectively, a small computer in its own right) figures out how to print this data so it looks correct on the page.
3. The electronic circuit activates the corona wire. This is a high-voltage wire that gives a static electric charge to anything nearby.
4. The corona wire charges up the photoreceptor drum so the drum gains a positive charge spread uniformly across its surface.
5. At the same time, the circuit activates the laser to make it draw the image of the page onto the drum. The laser beam doesn't actually

move: it bounces off a moving mirror that scans it over the drum. Where the laser beam hits the drum, it erases the positive charge that was there and creates an area of negative charge instead. Gradually, an image of the entire page builds up on the drum: where the page should be white, there are areas with a positive charge; where the page should be black, there are areas of negative charge.

6. An ink roller touching the photoreceptor drum coats it with tiny particles of powdered ink (toner). The toner has been given a positive electrical charge, so it sticks to the parts of the photoreceptor drum that have a negative charge (remember that opposite electrical charges attract in the same way that opposite poles of a magnet attract). No ink is attracted to the parts of the drum that have a positive charge. An inked image of the page builds up on the drum.
7. A sheet of paper from a hopper on the other side of the printer feeds up toward the drum. As it moves along, the paper is given a strong positive electrical charge by another corona wire.
8. When the paper moves near the drum, its positive charge attracts the negatively charged toner particles away from the drum. The image is transferred from the drum onto the paper but, for the moment, the toner particles are just resting lightly on the paper's surface.
9. The inked paper passes through two hot rollers (the fuser unit). The heat and pressure from the rollers fuse the toner particles permanently into the fibers of the paper.
10. The printout emerges from the side of the copier. Thanks to the fuser unit, the paper is still warm. It's literally hot off the press!

**Ques 03: Discuss the functional mechanism of a hard disk drive during data read and write operation. -3.75Mark**

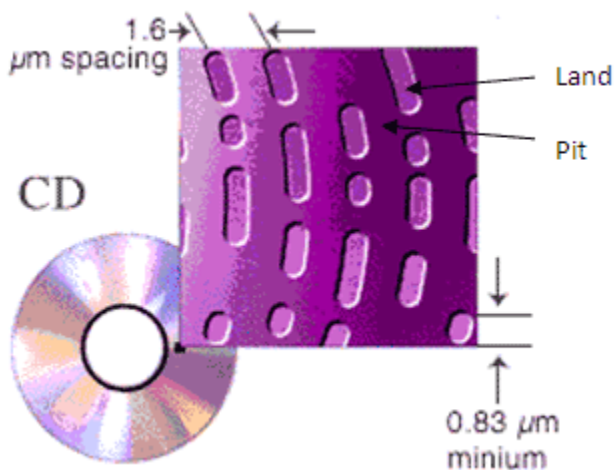
Answer: A hard disk drive, also known as a hard drive or HDD, is used to store data long term. Data can include the computer's operating system and applications as well as personal files including photographs, documents and music. When a computer is booted up, or turned on, the computer access the hard drive to load the operating system, such as Windows, OSX or Linux.

The major characteristics of hard drives are the amount of data it can store, called capacity, and performance. The capacity is measured in gigabytes or terabytes. For example, 1 GB is equal to 1,024 megabytes and 1 TB is equal to 1,024 GB. When it comes to selling hard drives, however, the manufacturer usually uses multiples of 1,000 rather than 1,024. This can make some hard drives show less capacity in the operating system than they do on the box.

Hard drive performance can refer to read speeds, write speeds, latency and the seek time. The seek time and latency are measured in the time it takes for the magnetic heads in a magnetic hard drive to access the data desired. The read and write speeds, or data transfer rate, are measured by how much data can be written to the drive or read from the drive within a specified period.

Ques 04 : Discuss how data is read from a CD?

Answer: CD, Compact Disc, is a quite popular storage media. It is basically an optical disc generally having a capacity of data storage equivalent to 700mb. While CDs are played they rotate around and a laser beam is used to read the data.



The surface of a CD is made of a polycarbonete layer with molded spiral tracks on the top. The data are stored on the CD as a series of minute grooves which are known as 'pits' encoded on these spiral tracks. The areas between the 'pits' are known as 'lands'. These pits and lands do not

represent the 1s and 0s, rather each change from pit to land or land to pit is interpreted as 0 while no change is read as 1.

The burning process of a CD is nothing but creating a pattern of pits and lands over the polycarbonate layer. But since the data must be accurately encoded on such a small scale, the burning process must be extremely précised. A CD burner is used to write (burn) the data on a CD. It incorporates a moving laser quite similar to a CD player which is known as 'Write Laser'. The Write Laser which is more powerful than the 'Read Laser', has the capability to alter the surface of CD instead of just bouncing the laser light off. During burning process, as per the data (binary values) the Write Laser bounces the light beam over the CD surface and creates a series of pits on it.

When you play the CD, the Read Laser bounces the light beams (not capable to modify the surface of CD) on the surface and detects the pits and lands. Each change between pit to land or vice versa is translated as zero and no change (pit to pit or land to land) is translated as one. These binary values form the actual data.

**Ques05:** Explain whether the touch screen of a tablet pc is an I/O device - 2.75 mark

**Ans:** Touch screen is only an **input device** as it only takes the input resistance(or capacitance in new touch screens) value as per the touch on the screen. And this value of resistance would determine the location of the touch on the screen.

The output work is done by the LCD or LED displays, which displays some images and texts on screen.

Touch Screen is only a transparent glass which is place on that display and synchronized with the LED displays such that user is able to 'touch' or have a 'sense of touch' on the actual displays.

**Ans 02:**

1) You send data from your controller (Simple eg : When you power on your phone to displaying Motorola/ Samsung or Nokia, some company

brand at the power start up) to the Touch LCD controllers input and that data is displayed as output on the screen.

2) When you touch a certain option or feature on your touch screen, the data relevant to the corresponding option being pressed with respect to the change in the capacitance/resistance, will go as output from display and input to the controller, and the controller will process the desired data and revert back to the display.

So the flow in simple, is like this:

[ user input ---> LCD -----> Controller] and [Process user input[(Controller)->LCD ----> UI(Display)]

Ques06: What happens when you press a key on your computer keyboard?

Ans: It is the job of the operating system to handle the input from the hardware and provide those inputs to the software applications. So, what happens after you press a key is as follows:

1. An electrical signal is sent to the computer from the keyboard. (see: [Inside the Keyboard - How Computer Keyboards Work](#) ).
2. The operating system has a hardware driver, a program that works with a particular hardware device, to accept the input from the keyboard.
3. The operating system also knows which program is waiting on the keyboard input because that program is in an Input/Output (or I/O) wait state.
4. The operating system gives the keyboard character input to that program via a key down "event". The application processes that event and does what it is supposed to with that key (like write it to the screen which uses the OS again and another hardware driver!).

Ques 07: What is computer memory? How is it measured?

Ans: **Computer memory** is any physical device capable of storing information temporarily or permanently. For example, Random Access **Memory** (RAM), is a volatile **memory** that stores information on an integrated circuit used by the operating system, software, and hardware.

Computer storage and memory is often measured in megabytes (MB) and gigabytes (GB). A medium-sized novel contains about 1 MB of information. 1 MB is 1,024 kilobytes, or 1,048,576 (1024x1024) bytes, not one million bytes. Similarly, one 1 GB is 1,024 MB, or 1,073,741,824 (1024x1024x1024) bytes. A terabyte (TB) is 1,024 GB; 1 TB is about the same amount of information as all of the books in a large library, or roughly 1,610 CDs worth of data. Many hard drive manufacturers use a decimal number system to define amounts of storage space. As a result, 1 MB is defined as one million bytes, 1 GB is defined as one billion bytes, and so on. Since your computer uses a binary system as mentioned above, you may notice a discrepancy between your hard drive's published capacity and the capacity acknowledged by your computer. For example, a hard drive that is said to contain 10 GB of storage space using a decimal system is actually capable of storing 10,000,000,000 bytes. However, in a binary system, 10 GB is 10,737,418,240 bytes. As a result, instead of acknowledging 10 GB, your computer will acknowledge 9.31 GB. This is not a malfunction but a matter of different definitions.

Ques: Difference between magnetic tapes and magnetic disk ?

### **Magnetic Tapes**

A magnetic tape is a thin and a long plastic strip coated with a magnetizable material. The recorder orders the magnetizable material on the magnetic tape according to the incoming signal. The reading process is simply done by sending the tape near a coil which produces a current which can be decoded to the original source. Magnetic tapes are also used as computer data storage. These were used before hard disc drives were invented. Magnetic tapes are still used to archive large amounts of data for non-frequent usage. The magnetic tape is a sequential storage device. The data

can only be read as a serial input. Magnetic tapes are mostly used in Audio cassettes and video cassettes. Magnetic tapes are used as digital data storage devices as well as analog data storage devices.

## Magnetic Disks

A magnetic disk operates the same way a magnetic tape does, but magnetic disks can usually store a large amount of data than the magnetic tapes. The main advantage of the magnetic disk is that data can be read from anywhere. A magnetic disk is also more portable than the magnetic tape. Computer hard disc drives are the main devices that use magnetic disks. Magnetic disks are not shockproof. A shock can change the current magnetic condition of a material. However, since magnetic tapes are not solid, the chance of a shock is minimal. Magnetic disks are used as digital data storage devices rather than analog data storage devices. A certain area on the disk is known as a block. The net magnetic orientation of a block decides whether it is a digital 0 or a 1.

Ques : Define 1.Latency 2.seek time 3. Transfer rate 4. Access time

latency time :

Seek **Time** is measured defines the amount of **time** it takes a **hard drive's** read/write head to find the physical location of a piece of data on the **disk**. **Latency** is the average **time** for the sector being accessed to rotate into position under a head, after a completed seek.

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Transfer rate:

Hard Drive **Transfer Rates**. The **disk transfer rate** (sometimes called media **rate**) is the speed at which data is transferred to and from the **disk** media (actual **disk**platter) and is a function of the recording frequency. It is generally described in megabytes per second (MBps)

Access time:



Definition of: **access time** (1) Memory **access time** is how long it takes for a character in memory to be transferred to or from the CPU. In a **PC** or Mac, fast RAM chips have an **access time** of 70 nanoseconds (ns) or less. SDRAM chips have a burst mode that obtains the second and subsequent characters in 10 ns or less