

Peripheral And Interfaces Previous Year Questions:

2 marker:

1. What is actuator ?
2. Differentiate between impact and non-impact printers ?
3. What is meant by peripheral devices ?
4. What is Disc Drive Formatting ?
5. State the basic concept of PAL, SECAM and NTSC ?
6. Differentiate between low level and high level formatting ?
7. Define Interface with example ?
8. What is resolution, bandwidth of monitors ?
9. What is Raster Scan and Vector Scan ?
10. Explain Refresh Rate ?
11. What are Tape Drives ?
12. Define Monochromatic Monitor ?
13. What is meant by resolution in CRT ?
14. PAL stands for _____ ?
15. State purpose of scanner ?
16. Define some data encoding techniques ?
17. What is disk driver ?
18. DMP stands for _____ ?
19. What is Display Buffer ?
20. What is Optical Storage Media ?
21. What is Hard Disk ?
22. A Hard disk is divided into tracks which are further divided into _____ ?
23. CD-ROM stands for _____ ?
24. What is the concept of light pen ?
25. How many devices can be managed by a single SCSI controller ?
26. Define Partitioning, Bandwidth of MODEM ?
27. What is Printer ?
28. What is Zip-Drive ?
29. List the basic principles of monitors ?

4 Marker :

1. Explain in working principle of laser printer ?
2. What is meant by sector interleaving ? Explain

3. Explain basic concept of NTSC standards ?
4. What are video display adapter ? Explain VGA
5. Explain the construction of hard disk ?
6. Explain the working of digitizers ?
7. Difference between SCSI & IDE ?
8. Explain Partitioning ?
9. Differentiate between Impact and Non-Impact Printers ?
10. What is Touchscreen ? State its types and working mechanism ?
11. What is a Zip Drive ? State its purpose
12. Differentiate between PAL and NTSC standards ?
13. Write a short notes on HDD ?
14. Compare features of SCSI over EIDE interface ?
15. Differentiate between inkjet and laser printer ?
16. Differentiate between Raster Scan and Vector Scan ?
17. Explain functioning of stepper motor ?
18. Write about printers specification ?
19. Write a short note on Digitizer ?

20 Marker :

1. Explain the basic principle and working of monitor ?
2. Explain common fault of inkjet printer and state its remedies ?
3. State the difference between High level and Low level formatting ?
4. What are different types of actuators ? Explain
5. What is meant by MFM and RLL ? State the differences
6. Explain any one type of interfaces and its working ?
7. Explain the construction and working principle of CD-ROM ?
8. Explain the construction and working of DMP ?
9. Explain working mechanism of keyboard and mouse ?
10. Explain IDE interface ?
11. Explain the working of Pendrive ?
12. What are optical storage media ? Explain working of DVD
13. Explain the working principle of color monitor ?
14. Explain the working of CRT with diagram ?
15. Explain following :
VGA, SVGA
16. Explain common faults of Dot Matrix Printer ?

- 17.Explain Following Terms :
 Monitor Resolution
 Sector Interleaving
- 18.Explain the concept of tape drive in detail ?
- 19.List the specification of Impact – Non- Impact Printers ?

ANSWERS

2 Marker :

1. An **actuator** is a device that produces a motion by converting energy and signals going into the system. The motion it produces can be either rotary or linear.
2. Difference Btw Impact and Non-Impact Answer:

Impact Printer

Produces characters and graphics on a piece of paper by striking it is called impact printer.

It prints by hammering a set of metal pin or character set.

Electromechanical devices are used

Faster speeds around 250 words per second.

Have banging noise of needle on paper

Dot-matrix printer, Daisy wheel printers, line printer are examples .

It generally cost less.

They are not suited for printing photograph or any high quality media.

Non Impact Printer

A type of printer that produces characters and graphics on a piece of paper without striking.

Printing is done by depositing ink in any form.

No electromechanical device is used.

Slower speeds around 1 page per 30 seconds.

Works silently

inkjet printers, photo printers, laser printers are examples .

It cost more than impact printers.

They are best suited for printing photograph or any high quality media.

3. A **peripheral device** is an internal or external device that connects directly to a computer or other digital device but does not contribute to the

computer's primary function, such as computing. It helps end users access and use the functionalities of a computer.

4. **Disk formatting** is the configuring process of a data storage media such as a hard disk drive, floppy disk or flash drive for initial usage. Any existing files on the drive would be erased with disk formatting. Disk formatting is usually done before initial installation or before installation of a new operating system. Disk formatting is also done if there is a requirement for additional storage in the computer.
5. **NTSC** is an abbreviation for National Television Standards Committee, named for the group that originally developed the black & white and subsequently color television system that is used in the United States, Japan and many other countries. An NTSC picture is made up of 525 interlaced lines and is displayed at a rate of 29.97 frames per second.
PAL is an abbreviation for Phase Alternate Line. This is the video format standard used in many European countries. A PAL picture is made up of 625 interlaced lines and is displayed at a rate of 25 frames per second.
SECAM is an abbreviation for Sequential Color and Memory. This video format is used in many Eastern countries such as the USSR, China, Pakistan, France, and a few others. Like PAL, a SECAM picture is also made up of 625 interlaced lines and is displayed at a rate of 25 frames per second. However, the way SECAM processes the color information, it is not compatible with the PAL video format standard.
6. **LOW-LEVEL-FORMATting:**
 - Low-level formatting is the process of outlining cylinders and tracks for a blank hard disk, and then dividing tracks into multiple sectors. This process is often called the "real" formatting since it creates physical format which defines where the data is saved.
 - It really creates the physical format that defines where the data is stored on the disk.
 - If users perform low-level formatting when data have been installed, all existing files will be erased, and it is almost impossible to recover them. Therefore, some users make such a format to avoid privacy leakage. Nevertheless, performing low-level formatting will bring great influence on hard disk, thus shortening hard disk service time. Therefore, it is not suggested.
 - To low level format a hard disk, users can make use of specific tools as well as Debug assembler languages. That's relatively complicated.
 - A PC can not perform an low level formatting on a modern IDE/ATA or SCSI hard disk, and doing so would destroy the hard disk. Older MFM drives could be low-level formatted to extend the life of the disk, but modern hard drives no longer use MFM technology.
 - It takes more time for formatting.
 - It can be used to remove virus from MBR(Master Boot Record)

HIGH-LEVEL-FORMATting:

- High level formatting is a formatting method that initializes portions of the hard disk and creates the file system structures on the disk, such as the master boot record and the file allocation tables.
 - High-level formatting is the process of writing the file system structures on the disk that let the disk be used for storing programs and data.
 - If you are using DOS, for example, the DOS FORMAT command performs this work, writing such structures as the master boot record and file allocation tables to the disk.
 - It takes less time and also referred to as quick formatting.
 - This can't remove virus from MBR(Master Boot Record)
 - High-level formatting is typically done to erase the hard disk and reinstall the operating system back onto the disk drive.
7. An **interface** is a concept that refers to a point of interaction between objects or components and is applicable at the level of both hardware and software.
Thus peripheral Interfacing is a kind of interaction between processor and external or peripheral devices.
 8. The **display resolution** or display modes of a digital television, computer monitor or display device is the number of distinct pixels in each dimension that can be displayed. Monitor resolution describes the visual dimensions of any given display. A **bandwidth monitor** is a tool for measuring the actual available bandwidth on a local system
 9. **Raster Scan Display** in this technique the electron beam is swept across the screen one row at a time from top to bottom. As it moves across each row, the beam intensity is turned on and off to create a pattern of illuminated spots. This scanning process is called refreshing. Each complete scanning of a screen is normally called a **frame**.
Vector Scan or Random Scan Display in this technique, the electron beam is directed only to the part of the screen where the picture is to be drawn rather than scanning from left to right and top to bottom as in raster scan. It is also called stroke-writing display, or calligraphic display.
 10. **Refresh rate** is defined as how often your screen can display an image per second and is measured in hertz (Hz). In other words, refresh rate of your display refers to how many times per second the display is able to draw a new image. This is measured in Hertz (Hz). For example, if your display has a refresh rate of 144Hz, it is refreshing the image 144 times per second
 11. A **tape drive** is a device that stores computer data on magnetic tape, especially for backup and archiving purposes. Like an ordinary tape recorder, a tape drive records data on a loop of flexible celluloid like material that can be read and also erased.
 12. A **monochrome monitor** is a type of computer monitor in which computer text and images are displayed in varying tones of only one color, as opposed to a color monitor that can display text and images in multiple colors.
 13. Because a CRT uses electron beams to create images on a phosphor screen, it supports the resolution that matches its physical dot (pixel) size as well as several lesser resolutions. For example, a display with a physical grid of 1280 rows by 1024 columns can obviously support a maximum resolution of 1280x1024 pixels.

CRT's work on a different principle. There is a horizontal and vertical frequency; the higher the frequency the more pixels you can fit on a line. Same for the vertical frequency. There is also the quality of the tube; how quickly the phosphors can react to the guns, the quality of the mask, etc.

In simple words, the horizontal and vertical frequencies in CRT determine the resolution in CRT.

14. PAL stands for **Phase Alternating Line**
15. A **scanner** is a device that captures images from photographic prints, posters, magazine pages and similar sources for computer editing and display. Scanners work by converting the image on the document into digital information that can be stored on a computer through optical character recognition (OCR).
16. Some **data encoding techniques** are :
 - RLL (Run-Length-Limited)
 - MFM (Modified Frequency Modulation)
 - FM (Frequency Modulation)
17. A **disk driver** is a device driver that allows a specific disk drive to communicate with the remainder of the computer.
18. DMP stands for **Dot Matrix Printer**
19. A **Display buffer** is a part of computer memory used by a computer application for the representation of the content to be shown on the computer display. The screen buffer may also be called the video buffer, the regeneration buffer, or regen buffer for short. A buffer is a portion of a computer's physical memory that is used to store information as it moves from one location in the system to another. A screen buffer is a buffer that specifically holds information that is going to the system's display screen. Buffers as a whole are used to organize data and ensure that it moves from place to place efficiently.
20. **Optical Storage Devices** are sometimes referred to as Optical Media or Optical Memory. Optical storage is known to be a storage medium that exhibits the ability to store and retrieve data electronically by the use of low-power laser beams. The storage devices that make use of this scheme are known as Optical Storage Devices.
21. A **hard disk** is also known as a hard drive or fixed disk. It is said to be rigid magnetic disc that stores data. It is located within a drive unit. Hard disk is a non-volatile storage device that contains platters and magnetic disks rotating at high speeds.

22. Sectors

23. CD-ROM stands for **Compact Disk Read Only Memory**
24. A **light pen** is a light-sensitive computer input device, basically a stylus, that is used to select text, draw pictures and interact with user interface elements on a computer screen or monitor. The light pen works well with CRT monitors because of the way such monitors scan the screen, which is one pixel at a time, giving the computer a way to keep track of the expected scanning time by the electron beam and infer the pen's position based on the latest timestamp of the scanning.

25. Upto 8 devices

26. **Partitioning** is the process of dividing the hard-disk into one or more regions. The regions are called as partitions.

The maximum amount of data transmitted over an internet connection in a given amount of time is called **Bandwidth of MODEM**.

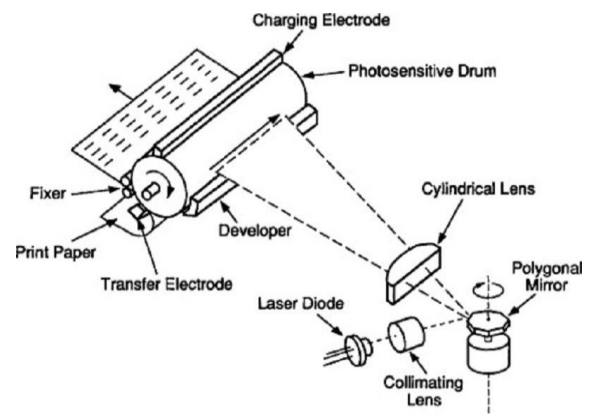
27. A **printer** is a hardware output device that is used to generate hard copy and print any document. A document can be of any type such as a text file, image, or the combination of both. It accepts input command by users on a computer or on other devices to print the documents.
28. A **Zip disk** was an advanced version of the floppy disk developed by Iomega. The disk needed a special drive called the Zip drive in order to be used. Zip disks were available in 100- and 250-MB capacities and were used to store, share and back up large amounts of data, which was not possible with ordinary floppy disks

4 Marker :

1. A laser printer is a type of printer that makes use of an electrostatic digital printing process. The working of a laser printer is quite similar to that of a photocopy machine. It makes use of static electricity and toner powder in place of liquid ink. The application of toner to specific areas of the paper is determined with the help of the charge difference or static electricity.

Working: A laser printer typically works on the basic principle of conversion of an image from digital format to electrostatic format and finally to physical format. It makes use of a computer program to determine the characteristics of the digital input image that is required to be printed. Initially, the digital image received by the printer gets converted into an electrical signal.

The electrical signal is used to excite a ray of light. The light energy further helps in the formation of an invisible electrostatic image. A series of charge transfer operations that take place inside the printer circuitry helps in the formation of a visible image onto a neutral sheet of paper. Finally, pressure and fusing operation lead to the development of a permanent image.



2. **Sector Interleaving:**

The way sectors are numbered on a hard disk. Created with a low-level format, the optimum interleave is determined by the speed of the drive. In a 1:1 interleave, sectors are one after the other (0,1,2,3, etc.). Interleave factor is a term describing the ratio of physical disk sectors on a hard disk that are skipped for every single one sector that is actually used for write operations on the disk. The interleave factor is set by the hard disk manufacturer, but it isn't absolute – it can be changed by software that is capable of performing low-level formatting. Interleaving improves access performance between a computer and a storage medium. If data was placed in every sector, it would take longer for the computer to fully find

the info it needs. After reading out one sector, some time passes before the computer is ready to receive information again. This means that while the computer processes information received, sectors with information are skipped – if the info the computer needs is in one of them, the machine needs to circle back around in order to access it. Lower ratios mean faster speed, and improvements to computer speeds also helped this process along.

3. The **NTSC** (National Television Standards Committee) was responsible for developing, in 1953, a set of standard protocol for television (TV) broadcast transmission and reception in the United States. An NTSC TV image has 525 horizontal lines per frame (complete screen image). These lines are scanned from left to right, and from top to bottom. Every other line is skipped. Thus it takes two screen scans to complete a frame: one scan for the odd-numbered horizontal lines, and another scan for the even-numbered lines. Each half-frame screen scan takes approximately 1/60 of a second; a complete frame is scanned every 1/30 second. This alternate-line scanning system is known as interlacing. Adapters exist that can convert NTSC signals to digital video that a computer can "understand." Conversely, there are devices that can convert computer video to NTSC signals, allowing a TV receiver to be used as a computer display. But because a conventional TV receiver has lower resolution than a typical computer monitor, this does not work well for all computer applications, even if the TV screen is very large.
4. A **video display adapter** is a device that enables one hardware interface to adapt to another hardware interface without any loss of function and then transmits signals to another hardware interface. Video display adapters allow the transmission of video signals to monitors, projectors, or televisions. In other words, A video adapter is an adapter (a physical device that allows one electronic or hardware interface to be adapted without loss of function and then transmitted to another electronic or hardware interface) that is used to transmit video signals to a monitor, television, or projector.

Types:

SVGA (Super Video Graphics Array). This graphic card supports 256 colours at a higher resolution than VGA. It also comes with two graphic modes: 800×600 pixels and 1024×768. It is the most common standard used today and is also known as 8-bit colour.

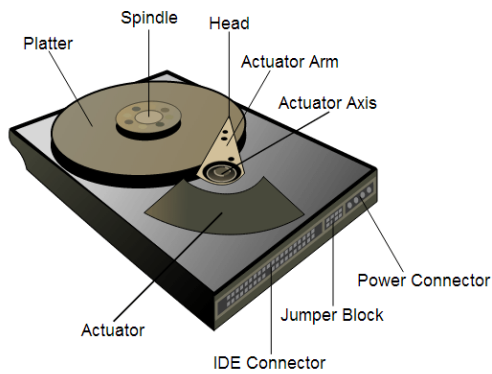
XGA (Extended Graphics Array). XGA can support up to 16.7 million colours at a resolution of 1024×768 pixels. It supports 256, 65536 or 16,777,216 colours depending on the video display adapter memory chip. This type of graphic card provides the most sophisticated standard for colour and resolution. It is also called the 24-bit colour or true colour.

VGA (VGA (Video Graphics Array or Video Graphics Adapter) is a type of video adapter that transmits video signals only, and it is typically a 15-pin cable. Each of the VGA connector's socket pins displays some aspect of an

RGBHV video signal and also plays a role in transferring and displaying some aspect of an RGBHV video signal. The RGBHV stands for red, green, blue, horizontal sync, and vertical sync. When output by a laptop, video/graphics card, or PC, these components are being combined to form a cohesive video signal which is then viewable on the screen of devices at the other end of the VGA cable. The VGA adapter has multiple uses in the electronic field. It is used as a connector in electronic devices like televisions, video cards, laptops, etc. It connects and sends signals between computers and laptops, between computers and monitors, and between computers and televisions.)

5. **Construction of HDD:**

Hard disks are rigid platters, composed of a substrate and a magnetic medium. The substrate – the platter's base material – must be non-magnetic and capable of being machined to a smooth finish. It is made either of aluminum alloy or a mixture of glass and ceramic. To allow data storage, both sides of each platter are coated with a magnetic medium – formerly magnetic oxide. This stores data in magnetic patterns, with each platter capable of storing a billion or so bits per square inch (bps) of platter surface. Platters vary in size and hard disk drives come in two form factors, 5.25in or 3.5in. The inside of a hard disk drive must be kept as dust-free as the factory where it was built. To eliminate internal contamination, air pressure is equalised via special filters and the platters are hermetically sealed in a case with the interior kept in a partial vacuum. This sealed chamber is often referred to as the head disk assembly (HDA). Typically two, three or more platters are stacked on top of each other with a common spindle that turns the whole assembly at several thousand revolutions per minute. There's a gap between the platters, making room for magnetic read/write head, mounted on the end of an actuator arm. This is so close to the platters that it's only the rush of air pulled round by the rotation of the platters that keeps the head away from the surface of the disk – it flies a fraction of a millimetre above the disk. A small particle of dirt could cause a head to crash, touching the disk and scraping off the magnetic coating. On IDE and SCSI drives the disk controller is part of the drive itself. There's a read/write head for each side of each platter, mounted on arms which can move them towards the central spindle or towards the edge. The arms are moved by the head actuator, which contains a voice-coil – an electromagnetic coil that can move a magnet very rapidly. The heads are designed to touch the platters when the disk stops spinning – that is, when the drive is powered off. During the spin-down period, the airflow diminishes until it stops completely, when the head lands gently on the platter surface



– to a dedicated spot called the landing zone (LZ). The LZ is dedicated to providing a parking spot for the read/write heads,

6. A **digitizer** is a hardware machine that converts an analog signal such as sound, image, signal, light, etc. into a digital format that is widely accepted in machine language. Digitizer is a machine, a hardware device, or an input device that converts analog signals such as sound, light, image, audio, or other signals into a digital format for storage, transfer, and editing using computer means.

Working : A motherboard, a plastic or metal frame, an LCD screen, and a digitizer—all powered by a battery—come standard with every touchscreen device. Consider the motherboard and touch assembly while describing the graphic tablet's workings. So, a touch initiates the operation of a digitizer as a whole. Users using touchscreen phones really transmit analogue signals by touching the screen. Small, undetectable electrostatic nodes are scattered throughout the digitizer's screen in an equidistant pattern. These nodes are engaged when the user touches the screen. In terms of coordinates, these active nodes indicate a specific area on the screen. A flex cable connects the graphic tablet to the motherboard, which receive data about the touch location from the graphic tablet. The motherboard evaluates the supplied data and triggers the touch-specific function from its memory of the currently displayed LCD image. So, if someone presses the dial pad's middle number five, the graphic tablet will send those coordinates to the motherboard, which will then process and activate the dial pad screen's number five function. The LCD would show the output, which could be seen through the graphic tablet. The entire operation is completed in less than a millisecond.

7. Comparison Between SCSI and IDE:

Parameters of Comparison	SCSI	IDE
--------------------------------	------	-----

Stands for	SCSI is an acronym for Small Computer System Interface.	IDE is an acronym for Integrated Drive Electronics.
Transfer Rate	SCSI hard drives provide for a quicker data transfer rate, which improves performance and yields better results.	The IDE has a slower data transfer rate.
Ease	SCSI configuration is more complex for most users.	IDE configuration is simpler as compared to SCSI.
Resources	Unlike IDE, SCSI almost always necessitates the use of an interface extension card (unless the motherboard already has it). Adding more hardware necessitates the use of additional system resources.	Today's motherboards all feature an ATA/IDE interface. Thus no more resources are required until additional drives are required.
Cost	SCSI is more expensive.	IDE is less expensive.

SCSI : SCSI is a high-speed bus that can connect a computer to multiple devices at the same time, such as hard drives and tape drives. Other technologies, such as Serial ATA (SATA), have mainly replaced it in current computers, but SCSI is still in use. SCSI has a lot of benefits. It's fairly fast, reaching download rates of up to 320 megabytes per second

IDE : Storage devices, including hard drives and CD/DVD drives, are usually connected to the motherboard through an integrated drive electronics (IDE) interface. The original IDE had a 16-bit interface and used a ribbon cable to connect two devices. An integrated disk drive controller and its own electronics are incorporated into this low-cost IDE device.

8. **Disk partitioning** is one step of disk formatting. It is the process of dividing a disk into one or more regions, the so called partitions. If a partition is created, the disk will store the information about the location and size of partitions in partition table that is usually located in the first sector of a disk. With the partition table, each partition can appear to the operating system as a logical disk and users can read and write data on disk. And each

partition can be managed separately.

Benefits of :

Use of New Hard Disk: A newly bought hard disk can't be used to save data unless users partition it. To be specific, users should initialize the disk (MBR or GPT) and create one or more partitions with capacity, file system, cluster size, drive letter, etc.

Ease of Windows Reinstallation : It's better to have two or more partitions in a computer. One partition is used as system partition to store operating system boot files that can boot Windows. The rest partitions can be used to store apps' installation packages and other personal files. If you want to reinstall Windows someday, all you have to do is to format the system partition and reinstall the OS. The installed programs and personal files will stay where you left them.

Better Organization: Some users like to place their data into a certain place according to data types. Partitions make it easier. You can create partitions for games, music, or other documents.

Easier Backup: If you know on which partition the data you want to backup is stored, but you don't know the exact file path, you can back up the whole partition. Backing up partition is better than backing up whole hard drive or finding out the exact files in a huge number of files.

Simpler Data Recovery: If the data is deleted mistakenly, and you know where it is stored on, scanning a partition for data recovery is faster and more convenient than scanning the whole hard drive.

9. Explained above Q2

10. A **touch screen** is a computer display screen that is also an input device. The screens are sensitive to pressure; a user interacts with the computer by touching pictures or words on the screen. Types of Touch Screen The Touch screen is a 2-dimensional sensing device made of 2 sheets of material separated by spacers. There are four main touch screen technologies: Resistive, Capacitive, Surface Acoustical wave (SAW), and infrared (IR).

- **Resistive:** Resistive touchscreens (currently the most popular technology) work a bit like "transparent keyboards" overlaid on top of the screen. There's a flexible upper layer of conducting polyester plastic bonded to a rigid lower layer of conducting glass and separated by an insulating membrane. When you press on the screen, you force the polyester to touch the glass and complete a circuit—just like pressing the key on a keyboard. A chip inside the screen figures out the coordinates of the place you touched.
- **Capacitive:** These screens are made from multiple layers of glass. The inner layer conducts electricity and so does the outer layer, so effectively the screen behaves like two electrical conductors separated by an insulator. When you bring your finger up to the screen, you alter the electrical field by a certain amount that varies according to where your hand is. Capacitive screens can be touched in more than one place at

once. Unlike most other types of touchscreen, they don't work if you touch them with a plastic stylus.

- **Infrared:** An infrared touchscreen uses a grid pattern of LEDs and light-detector photocells arranged on opposite sides of the screen. The LEDs shine infrared light in front of the screen. If you touch the screen at a certain point, you interrupt two or more beams. A microchip inside the screen can calculate where you touched by seeing which beams you interrupted. Since you're interrupting a beam, infrared screens work just as well whether you use your finger or a stylus.
- **Surface Acoustic Wave:** This touchscreen technology detects your fingers using sound instead of light. Ultrasonic sound waves (too high pitched for humans to hear) are generated at the edges of the screen and reflected back and forth across its surface. When you touch the screen, you interrupt the sound beams and absorb some of their energy. The screen's microchip controller figures out from this where exactly you touched the screen.

11. A **Zip drive** is a medium-capacity and portable magnetic disk storage system launched by Iomega in the mid-1990s. It was popular at the time of launch as cost per storage unit was lower than that of hard disks, and it could store a larger amount of data than a floppy disk. The Zip drive was capable of fast data transfer and was durable and reliable. A Zip drive system is a removable disk-storage and disk-reading device system for computers and was introduced in the mid-1990s. The system consists of a Zip drive, or Zip disk reader, which has a slot that allows for the insertion of a Zip disk. The Zip drive is similar to a CD, DVD, or other disk-drive system but, instead, Zip disks are inserted into them. There are both internal Zip drives that are installed on computers and external Zip drives which can be plugged into a computer system. Zip drives look similar to floppy disk drives with external ones being almost 2 inches thick, 4.5 inches wide, and a little over 5-6 inches long. Internal drives are a little larger or thicker and sit inside a computer tower. Zip drive disks, Zip disks, or Zip cartridges were, and still are, about the same size as a 3.5-inch floppy disk but just a little thicker. The Zip disk held about 100 megabytes (MB) of storage and eventually included 250 MB and 750 MB options, all of which were considered medium-to-high-storage capacities during the 1990s.

12. Comparison Between NTSC and PAL

	NTSC	PAL
--	------	-----

Acronym	It stands for 'Nationalized Televisions Standards Committee'.	It stands for 'Phase Alternating Line'.
---------	---	---

Countries	It is a standard broadcast format in United States.	It is standard broadcast format in Europe, Australia, and parts of Asia.
Origin	This format was first used in the year 1941.	It was adopted after the introduction of color picture.
Electrical power	It is generated at 60Hz.	It is generated at 50hz.
Standard line resolution	It has a standard 525 line broadcast.	It has a standard 625 line broadcast.
Signal sent	The signal is transmitted at 60 fields per second.	The signal is transmitted at 50 pulses per second.
Images sent	30 images are sent out per second.	25 images per second.
Pixels	720×480	720×576
Speed	It has higher image and frame sending speed.	It has low image and frame sending speed.
Characteristic	It has better resolution quality.	It has better image quality.
Convert into other formats	To convert NTSC to PAL, first rip the DVD into videos and then burn the DVD into PAL format.	To convert PAL into NTSC, an Aimer-soft Video Converter is required.

13. A **hard disk** is also known as a hard drive or fixed disk. It is said to be rigid magnetic disc that stores data. It is located within a drive unit. Hard disk is a non-volatile storage device that contains platters and magnetic disks

rotating at high speeds. Non-volatile means the data retains when the computer shuts down. It is installed internally in our computer systems. Hard disk is located within a drive unit on the computer's motherboard and comprises one or more platters packed in an air-sealed casing. The hard disk is a secondary storage device, which is designed to store data permanently. The secondary storage devices include a large storage capacity as compared to the primary storage devices. The data stored in a hard disk is retained when our computer system shuts down. The data stored in the hard disk can be of many types such as the operating system, installed software, documents, and other files of computer. The size of hard drives is measured in gigabytes and terabytes. Usually, 500GB hard disks are common in modern computers. As an instance, a song of length four-minute is approx. 4MB in size, and in 1 gigabyte, there are 1,000 megabytes, it means that a 500GB hard drive can store approx. 250,000 songs.

Advantages:

- One of the significant advantages of a Hard Disk drive is that its cost is low.
- Another advantage of a Hard Disk is that it is readily available in the market.
- Hard Disk is faster than optical disks.
- The capacity for storing the data in HDDs is large.

Disadvantages :

- The speed of reading and writing in HDD is slower than the RAM.
- HDDs are noisy.
- Another disadvantage of HDD is energy inefficiency.
- HDDs consume more power.
- The form factor of HDDs is heavier than the SSDs.

14. **Difference Between EIDE and SCSI** is that Enhanced Integrated Drive Electronics is a hard disk interface that uses parallel signals to transfer data, instructions, and information. While SCSI interfaces, which also use parallel signals, can support up to eight or fifteen peripheral devices. Supported devices include hard disks, optical disc drives, tape drives, printers, scanners, network cards, and much more. EIDE (Enhanced Integrated Drive Electronics) is a hard disk interface that uses parallel signals to transfer data, instructions, and information. EIDE interfaces can support up to four hard disks at 137 GB per disk. EIDE interfaces also provide connections for optical disc drives and tape drives.

SCSI interfaces, which also use parallel signals, can support up to eight or fifteen peripheral devices. Supported devices include hard disks, optical disc drives, tape drives, printers, scanners, network cards, and much more. Some computers have a built-in SCSI interface, while others use an adapter card to add a SCSI interface.

15. **Difference Between Inkjet & Laser Printer:**

Inkjet Printer

It is cheap in price.

They have nozzle from which ink is sprayed onto paper and it gets printed.

Ink in the cartridges is in liquid form, which dries if not used for a long time.

Ink should be refilled in a short span of time, which makes it quite expensive.

At last, buying these printers is not expensive but using it over time costs more and more.

If you are student or if you print assignments, projects or print colourful pictures, then one can prefer Inkjet printers.

Laser Printer

It is expensive than Inkjet Printers.

They do not have nozzle.

Ink is in the form of toner (powder), it does not dry up even if you don't use it for a long time.

Ink in these printers lasts long. So, there is no need to refill the bar again and again.

Buying these laser printers, is expensive at first but using it over time it costs less than Inkjet Printers.

If you want to print only text like documents or PDFs or want to print normal pages, then one can prefer Laser printers.

16. Difference Between Random and Raster Scan:

Random Scan	Raster Scan
1. It has high Resolution	1. Its resolution is low.
2. It is more expensive	2. It is less expensive
3. Any modification if needed is easy	3. Modification is tough

4. Solid pattern is tough to fill	4.Solid pattern is easy to fill
5. Refresh rate depends or resolution	5. Refresh rate does not depend on the picture.
6. Only screen with view on an area is displayed.	6. Whole screen is scanned.
7. Beam Penetration technology come under it.	7. Shadow mark technology came under this.
8. It does not use interlacing method.	8. It uses interlacing
9. It is restricted to line drawing applications	9. It is suitable for realistic display.

17. A **stepper motor** is an electric motor whose main feature is that its shaft rotates by performing steps, that is, by moving by a fixed amount of degrees. This feature is obtained thanks to the internal structure of the motor, and allows to know the exact angular position of the shaft by simply counting how many steps have been performed, with no need for a sensor. The basic working principle of the stepper motor is the following: By energizing one or more of the stator phases, a magnetic field is generated by the current flowing in the coil and the rotor aligns with this field. By supplying different phases in sequence, the rotor can be rotated by a specific amount to reach the desired final position.. At the beginning, coil A is energized and the rotor is aligned with the magnetic field it produces. When coil B is energized, the rotor rotates clockwise by 60° to align with the new magnetic field. The same happens when coil C is energized. In the pictures, the colors of the stator teeth indicate the direction of the magnetic field

generated by the stator winding.

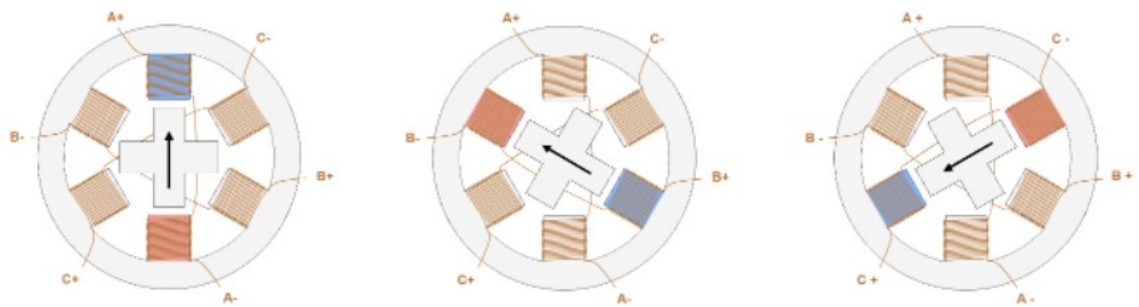


Figure 2: Stepper Motor Steps

18. Will Write Later

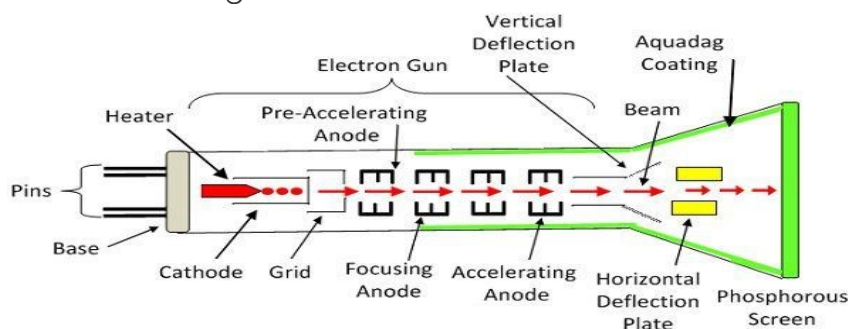
19. Answered above on Q6

20 Marker :

1. There are two types of working principle for monitors :

Cathode ray tube (CRT) monitor

As mentioned earlier, the formerly common type of monitor is CRT technology. A CRT has a large vacuum tube in the back. Most people will recognise these as the box monitors which taper in the back, as opposed to the flat-panel monitors we use today. It has a cathode that contains a heated filament which becomes an electron gun. These electron guns fire off streams of electrons in response to the visual signal it receives from the computer. Ahead of the cathode, is a set of electromagnets that activate in response to the same signal, altering the course of the electron stream. The back of the glass plate contains millions of tiny phosphor dots divided into three groups: red, blue, and green. These are the pixels. When the electron stream touches the pixels, the correct combination of the phosphors will create any colour in the spectrum. The stream passes over the monitor at a rate of 50 to 100 times per second, creating a continuous interactive image.



Cathode Ray Tube

Circuit Globe

Liquid crystal display (LCD) monitor

LCD is a type of flat panel monitor, meaning it is designed to be thin instead of curved like CRT. An LCD screen is also composed of two treated plates of polarised glass pressed together.

Between these plates is where the liquid crystal material lies, responding to an electrical current. This also allows different wavelengths of light to pass through at various points across its surface.

Meaning, it blocks out the majority of light, enabling only specific wavelengths.

You might also have heard of LED, OLED, and QLED monitors. These are all forms of LCD displays, with the difference being the type of back-lighting. Monitors referred to / advertised as LCD have florescent back-lighting.

2. Common faults which arises with inkjet printer is poor print quality i.e strange horizontal white lines running through each line of print.

CAUSE: By far the most common problem with inkjet printers is poor print quality. Usually, these problems manifest themselves in the form of horizontal white lines running through each line of print. These white lines are caused by clogged nozzles that aren't dispensing ink. Some printer manufacturers are trying to solve this problem by incorporating the print head into the ink cartridge. By doing so, each time you get a new ink cartridge, you also get a new print head.

Remedy:

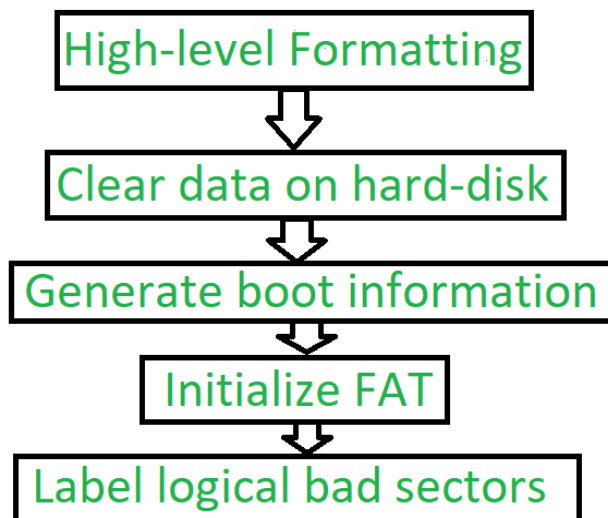
- Replacing the print head nozzle either by changing the ink cartridge or by using disposable print head nozzles.
- Cleaning the print head
- Checking the print head ribbon. Ensure that print head ribbon is secured firmly to the print head.
- Cleaning the paper dust which might affect the electrical connections.
- Failed communication of printer and the instructing device (Computer).

3. **Low-level Formatting :**

Low level formatting is a type of physical formatting. It is the process of marking of cylinders and tracks of the blank hard-disk. After this there is the division of tracks into sectors with the sector markers. Now-a-days low-level formatting is performed by the hard-disk manufactures themselves. We have data in our hard-disks and when we perform low-level formatting in the presence of data in the hard-disk all the data have been erased and it is impossible to recover that data. Some users make such a format that they can avoid their privacy leakage. Otherwise low-level will cause damage to hard-disk shortens the service-life.

High-level Formatting :

High-level formatting is the process of writing. Writing on a file system, cluster size, partition label, and so on for a newly created partition or volume. It is done to erase the hard-disk and again installing the operating system on the disk-drive. Firstly High-level formatting clears the data on



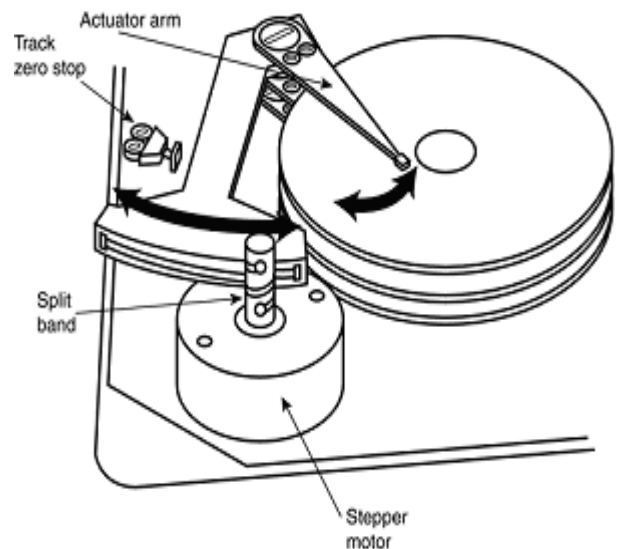
hard-disk, then it will generate boot information, then it will initialize FAT after this it will go for label logical bad sectors when partition has existed. Formatting done by the user is the high-level formatting. Generally, It does not harm the hard-disk. It can be done easily with the Administrator, Windows snap-in Disk Management tool, diskpart, etc. We can use such a format to fix some problems like errors in the file system, corrupted

hard-drive and develop bad sectors.

4. Different types of Actuators are as follows :

Stepper Motor Actuators

A stepper motor is an electrical motor that can "step," or move from position to position, with mechanical detents or click-stop positions. If you were to grip the spindle of one of these motors and spin it manually, you would hear a clicking or buzzing sound as the motor passed each detent position with a soft click. Stepper motors can't position themselves between step positions; they can stop only at the predetermined detent positions. The motors are small (between 1" and 3") and can be square, cylindrical, or flat. Stepper motors are outside the sealed HDA, although the spindle of the motor penetrates the HDA through a sealed hole. Stepper motor mechanisms are affected by a variety of problems, but the greatest problem is temperature. As the drive platters heat and cool, they expand and contract, and the tracks on the platters move in relation to a predetermined track position. The stepper mechanism can't move in increments of less than a single track to correct for these temperature-induced errors. The drive positions the heads to a particular cylinder according to a predetermined number of steps from the stepper motor, with no room for nuance. Stepper motor actuators were commonly used on hard drives made during the 1980s and early 1990s with capacities of 100MB or less. All the drives I've seen with greater storage capacity use a voice coil actuator. Floppy disk drives position their heads by using a stepper motor actuator. The accuracy of the stepper mechanism is suited to a floppy disk drive because the track densities usually are nowhere near



those of a hard disk. The track density of a 1.44MB floppy disk is 135 tracks per inch, whereas hard disk drives have densities of more than 5,000 tracks per inch.

Voice Coil Actuators :

A voice coil actuator works by pure electromagnetic force. The construction of the mechanism is similar to that of a typical audio speaker, from which the term voice coil is derived. An audio speaker uses a stationary magnet surrounded by a voice coil, which is connected to the speaker's paper cone. Energizing the coil causes it to move relative to the stationary magnet, which produces sound from the cone. In a typical hard disk drive's voice coil system, the electromagnetic coil is attached to the end of the head rack and placed near a stationary magnet. No physical contact occurs between the coil and the magnet; instead, the coil moves by pure magnetic force. As the electromagnetic coils are energized, they attract or repulse the stationary magnet and move the head rack. Systems like these are extremely quick, efficient, and usually much quieter than systems driven by stepper motors. Unlike a stepper motor, a voice coil actuator has no click-stops or detent positions; rather, a special guidance system stops the head rack above a particular cylinder. Because it has no detents, the voice coil actuator can slide the heads in and out smoothly to any position desired. Voice coil actuators use a guidance mechanism called a servo to tell the actuator where the heads are in relation to the cylinders and to place the heads accurately at the desired positions. This positioning system often is called a closed loop feedback mechanism. It works by sending the index (or servo) signal to the positioning electronics, which return a feedback signal that is used to position the heads accurately. The system also is called servo-controlled, which refers to the index or servo information that is used to dictate or control head-positioning accuracy. A voice coil actuator with servo control is not affected by temperature changes, as a stepper motor is. When temperature changes cause the disk platters to expand or contract, the voice coil system compensates automatically because it never positions the heads in predetermined track positions. Rather, the voice coil system searches for the specific track, guided by the prewritten servo information, and then positions the head rack precisely above the desired track, wherever it happens to be. Because of the continuous feedback of servo information, the heads adjust to the current position of the track at all times.

5. RLL Encoding Scheme

- The RLL is encoding or the run length limited encoding is the most common encoding scheme used in the hard disk storage.
- This encoding scheme can be more accurately called as 2,7 RLL encoding because in this scheme in a series or in a running length the minimum number of 0s next to each other is two, and the maximum number of 0s together can not be more than seven.
- The RLL encoding scheme can store 50 percent more information than MFM encoding scheme on a given surface and it can store three times as much information as the FM encoding scheme. The Run length Limited name comes from the minimum number (run Length) and maximum number (run Limit) of “no pulse” values allowed between two pulses.
- For the RLL encoding, an encoder/decoder (Endec) table is used to find the pulse signal to

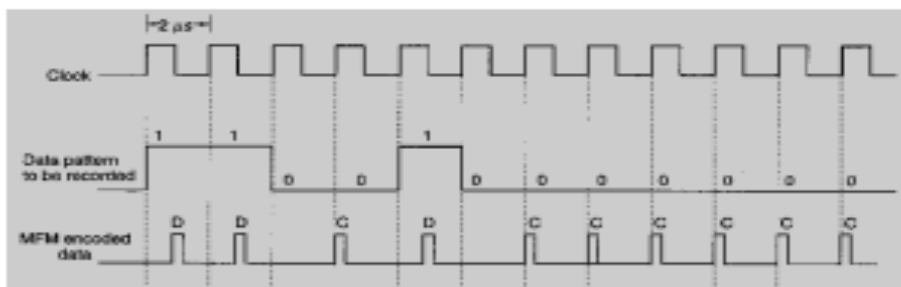
be used for different data bit groups. Endec table used by the IBM to convert bit information to the pulse signal is shown

Data Bit	Pulse Encoding
10	NPNN
11	PNNN
000	NNNPNN
010	PNNPNN
011	NNPNNN
0010	NNPNPNNN
0011	NNNNPNNN

- For example, if you want to encode a byte 100011 to proper RLL pulse signal then the
- Bit 10 can be encoded as NPNN
- Bit 0011 can be encoded as NNNPNNN

MFM Encoding Scheme

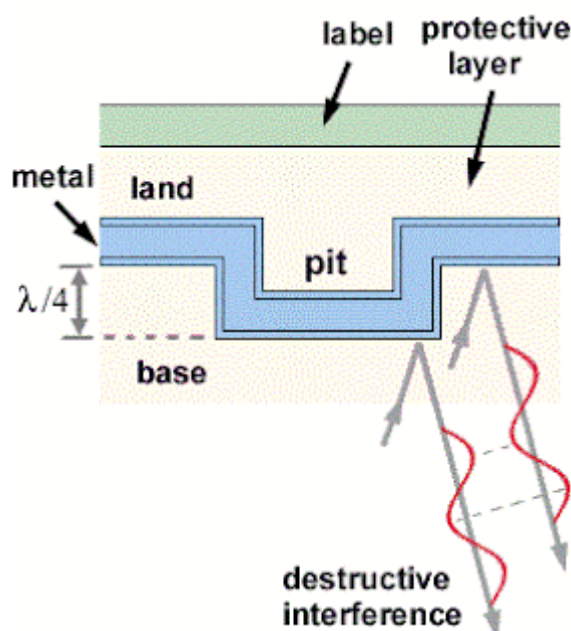
- More data can be stored on the same surface or the data storage density can be increased, if the number of pulses required to store the data can be minimized.
- When minimizing the pulses, one should be careful that the number of no pulses together should not be very long; otherwise the disk controller may go out of synchronization with the data.
- The MFM (modified frequency modulation) method of data storage, by reducing the number of pulses, is able to store more data without any data and synchronization number of pulses, is able to store more data without any data and synchronization loss. In MFM recording the 0s and 1s are encoded as given below
- 1 is always stored as no pulse, and a pulse(NP)
- 0, when preceded by another 0, is stored as a pulse, and no pulse(PN)
- 0, when preceded by a 1, is stored as two no pulses(NN)
- If you store 1001 on the disk surface using the MFM storage method, it would be stored as NP NN PN NP.



6. IDE (Integrated Drive Electronics) is an electronic interface standard that defines the connection between a bus on a computer's motherboard and the computer's disk storage devices. The IDE interface was originally based on the IBM PC Industry Standard Architecture 16-bit bus standard, but it has since been implemented in computers that use other bus standards. An IDE interface is an industry-standard adapter for connecting IDE devices and enabling them to communicate with each other. At one time, most computers included at least one IDE interface built into the motherboard. The interface provided a 40-pin connector for attaching an IDE hard disk drive (HDD) to the computer. A flat ribbon cable connected the drive to the motherboard by attaching to the IDE interfaces on the computer and HDD. The IDE interface standard grew out of the effort to combine a storage

controller and the storage disk into a single unit. Before that, controllers and disks were implemented as separate devices, often built by different manufacturers. Not only did this result in integration issues, but the distance between the two could impact performance. IDE changed this by providing an interface that supports HDDs with integrated controllers. The IDE interface was originally developed for HDDs, but it evolved to include floppy and tape drives, as well as various types of compact disc (CD) and digital video disc drives. A single IDE interface and ribbon can support two devices. In this configuration, one device is designated as primary, or leading, and the other device is designated as secondary, or alternative. In this way, two drives can share the same cable without conflict. Many computer motherboards came with two IDE interface connectors, in which case, one was designated as primary and the other as secondary. The primary connector could support primary leading and primary alternative, and the secondary connector could support secondary leading and secondary alternative.

7. CD-ROM is an optical disk and contains data that can only be read. We can't write or erase data from CD-ROM. CD-ROM stands for Compact Disk-Read Only Memory. CD-ROM is very popular in the mid of 1990s and 2000s. A CD-ROM has three layers. CD-ROM has transparent substrate on its base. On the base, there is a reflecting layer and this reflecting layer stores data. On the reflecting layer, there is a protective coating. The information to be stored is digitized, that is, the data can be represented by binary numbers, which are made up of '1' and '0' digits. This information is stored on the metal layer. The data is represented using pits (1) and space between pits is called land (0).

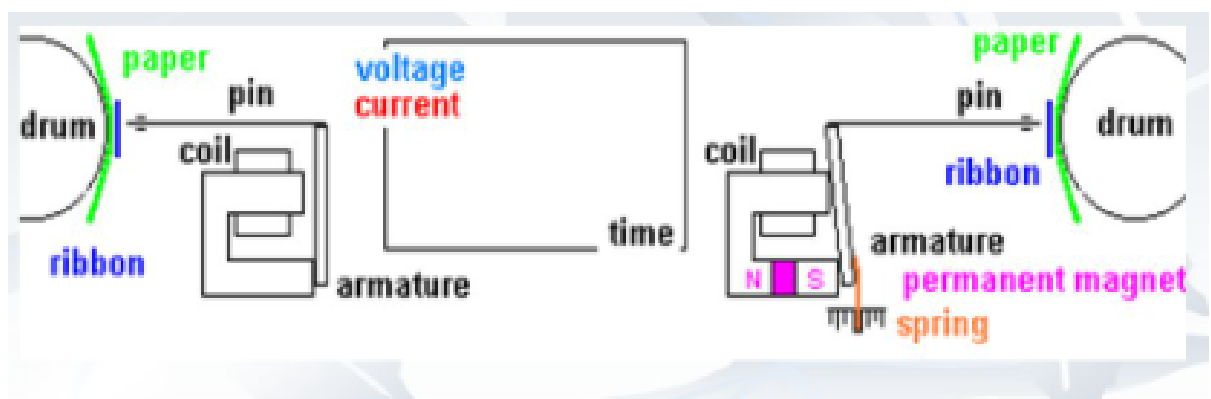


Laser beam is used for storing data on CD-ROM. Data is stored on a single spiral track. Each track is divided into sector. The track has length of 5 km and 650 mb of data can be stored. The tracks have high density with a gap of 1.6 microns.

Laser beam is used to read the data from compact disk. CD is moving on a head at very high rpm. A laser is shone onto the reflective surface of the disc to read the pattern of pits (1) and lands (0). The depth of the pits is approximately one-quarter to one-sixth of the wavelength of the laser light used to read the disc. The laser rays reflected by the pits and the lands have a path difference of half the wavelength. It leads to destructive interference, means, the two rays cancel each other and no reflected ray is resulted, and this produces a '1' digit. The path difference is zero for two rays both reflected by the pits, or both by the lands. No destructive interference occurs and we say it is a '0' digit. Therefore we have digit '1' at the edge of pits and digit '0' elsewhere.

8. The **dot-matrix printer** (sometimes called a matrix printer or an impact printer) allows you to print documents on paper thanks to the "back and forth" motion of a carriage housing a print head. The head is made up of tiny metal pins, driven by electromagnets, which strike a carbon ribbon called an "inked ribbon", located between the head and the paper. The carbon ribbon scrolls by so that there is always ink on it. At the end of each line, a roller makes the sheet advance. The most recent dot-matrix printers are equipped with 24-needle printer heads, which allows them to print with a resolution of 216 dpi (dots per inch).

Working principle of Dot matrix printers: It is widely used to print multipart forms and address labels. Also known as a "serial dot matrix printer," the tractor and sprocket mechanism in these devices handles thicker media better than laser and inkjet printers. Hammers Hit the Ribbon The dot matrix printer uses one or two columns of dot hammers that are moved across the paper. The hammers hit the ribbon into the paper, which causes the ink to be deposited. The more hammers, the higher the resolution. For example, 9-pin heads produce draft quality text, while 24-pin heads produce typewriter quality output. Speeds range from 200 to 400 cps, which is about 90 to 180 lpm. Dot Matrix Mechanism Dot matrix printers print columns of dots in a serial fashion. The more dot hammers (pins), the better looking the printed results



9. Keyboard Working :

A keyboard is a lot like a miniature computer. It has its own processor and circuitry that carries information to and from that processor. A large part of this circuitry makes up the key matrix. The key matrix is a grid of circuits

underneath the keys. In all keyboards (except for capacitive models, which we'll discuss in the next section), each circuit is broken at a point below each key. When you press a key, it presses a switch, completing the circuit and allowing a tiny amount of current to flow through. The mechanical action of the switch causes some vibration, called bounce, which the processor filters out. If you press and hold a key, the processor recognizes it as the equivalent of pressing a key repeatedly. When the processor finds a circuit that is closed, it compares the location of that circuit on the key matrix to the character map in its read-only memory (ROM). A character map is basically a comparison chart or lookup table. It tells the processor the position of each key in the matrix and what each keystroke or combination of keystrokes represents. A computer can also use separate character maps, overriding the one found in the keyboard. This can be useful if a person is typing in a language that uses letters that don't have English equivalents on a keyboard with English letters.

Mouse Working :

Mechanical Mouse:

When you move the mouse, the ball rolls beneath it, pushing the two plastic wheels/rollers linked to it in the process. One of those wheels detects side-to-side movement (x-axis wheel) and the other (y-axis wheel) detects movement in the up-and-down direction. Both of these wheels consist of spokes that 'break' a thin light beam inside the mouse. The number of times the beam breaks helps to calculate how far the mouse has moved. When the mouse is moved at an angle, the calculations obtained from the movement of both of these wheels are used.

Optical Mouse :

The LED installed at the bottom of the mouse emits a bright light in the downward direction. Since a mouse is usually used on plain surfaces, the light bounces back from the surface and enters a photocell that's also mounted on the bottom, almost next to the LED. This photocell has a frontal lens that magnifies any light reaching it. As you move the mouse around, the pattern of the reflected beam changes; this is then used by the light-detector chip to figure out how and in which direction you're moving the mouse.

10. Explained above in Q6 (20 marker)

11. **"Pen drive"** is another name used to describe a certain type of universal serial bus (USB) flash drive. Pen drives are NAND-type flash memory cards that can be plugged into a computer's USB port. The term "Pen" refers to its size. This type of flash drive is so small that it can fit into the palm of your hand or hang on a lanyard. Also, it is often flat and rectangular, similar to the shape of a highlighter pen. Pen drives are used to store data. These flash drives vary in storage capacity (64 MB to 32 GB) and are removable and rewritable.

Working :

The pen drive comprises a small printed circuit board (PCB), which is usually built of plastic or metallic body. This device used the technology of EPROM, i.e., Erasable Programmable Read-only Memory, which means the data stored in the pen drives can be read, written, and erased easily. The PCB is provided with a power circuit, integrated circuits, and USB connectors. One of the integrated circuits acts as the interface between the USB connectors and the memory, and another integrated circuit is a NAND flash memory, which stores all the data. The data stored in the pen drive is controlled by a 12MHz clock signal crystal oscillator.

In order to save your information, flash drives use an electrical signaling power source known as a transistor semiconductor. This includes: Source, Floating Gate, Control Gate, Drain.

Source: The source is the channel between the circuit board and the device that the USB is plugged into. The data moves through this channel via an electrical charge and is then "pushed" through the floating gate.

Floating Gate: The floating gate is where all of the data is gathered.

Control Gate: The control gate prevents the data from traveling back to the source.

Drain: Any excess energy is forced to the drain, which then pushes the energy through the rest of the device to keep it powered.

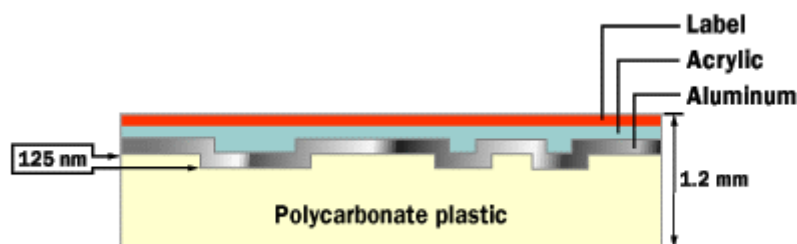
12. Define of Optical Storage is mentioned above Q21

Working of DVD(Same As CD Q7)

A Digital Versatile Disc/Digital Video Disc [DVD], is an optical disc storage medium like a compact disc [CD], but with greater data storage and high quality audio and video formats. The clarity, when comparison with a CD is almost six times higher.

Structure:

The DVD has a number of layers of plastic pieces with a total thickness of 1.2 millimetres. Clear poly-carbonate plastic is basically used for making these layers. Apart from the original plastic, there will be some impressions of microscopic bumps on the layers. Naturally, with the formation of bumps, there will also be pits. Thus a long spiral of data can be created which is together called a track. The track in any DVD is only 740 nanometers thick. There are several tracks in a DVD. Although the bumps are often mistaken for pits, it should be noted that they only appear as pits when seen from the aluminium side. They are actually bumps when read from the laser side. At the inner layers of the plastic, the bumps and p



its are

covered with the help of a reflective aluminium layer. But their outer layers are protected with the help of a very thin layer of semi-reflective gold. Thus the lasers that hit the DVD are made to completely focus on the outer and also into the inner layers. On top of all these layers a coating of lacquer is also put. The lacquer is strongly bonded with the help of infrared light.

Reason Why DVD has more storage capacity: The high density of tracks and smaller size of the pits and bumps is the main reason. In a CD, a lot of valuable space is simply wasted in codes, so as to avoid errors in the information. These codes are actually a repetition of the information that is already present in the disc. This shows that the method is not only efficient, but a wastage of storage space as well. But DVD's does not need such error correction codes.

13. Will Do Later

14. Explained Above in Q1 (20 markers)

15. Explained Above in Q4 (4 marker)

16. Troubleshooting the 6 most common dot matrix printer problems

<i>Common Problem</i>	<i>Possible Cause/Fixes</i>
Paper jam	<ul style="list-style-type: none"> • Small pieces of paper stuck in the rollers • Paper stuck beneath the tractor feed
White lines in printed text or graphics	<ul style="list-style-type: none"> • Faulty pin in the print head • Dirty print head • Loose or damaged print head data ribbon
Carriage movement but no printing	<ul style="list-style-type: none"> • Dry ink ribbon • Missing ink ribbon
Flashing fault lights	<ul style="list-style-type: none"> • Low ink • Paper jam • Faulty circuits
Print head does not move	<ul style="list-style-type: none"> • Faulty connection between the computer and the printer

	<ul style="list-style-type: none"> • No main power • Blown motor
Printing gibberish	<ul style="list-style-type: none"> • Check printer's dip switch • Update print driver • Check for loose or faulty printer cable

17. Explained above

Resolution Q8 (2 marker)

Sector Interleaving Q2(4 marker)

18. A magnetic tape drive is a storage device that makes use of magnetic tape as a medium for storage. It uses a long strip of narrow plastic film with tapes of thin magnetizable coating. It is essentially a device which records or perhaps plays back video and audio using magnetic tape, examples of which are tape recorders and video tape recorders.

Magnetic tape drives store data on magnetic tape using digital recording. The tapes are usually stored on cartridges or cassettes, but for drives that are used as data storage tape backups, the tape is often wound on reels. Magnetic tape is not the most dense data storage medium, but as of 2010 the record for the largest data capacity in magnetic tape was 29.5GB per square inch and the Linear Tape-Open (LTO) supported continuous data transfer rates up to 140 MB/s which was comparable to most hard disks drives. A tape drive is only able to move tape in a single direction and hence can only provide sequential access storage, unlike a disk drive which may provide random access as well as sequential access. The reason magnetic tape drives are still in use today, especially as an offline data backup, is because of long archival stability and very favorable unit costs.

Strengths and limitations of tape drives

There are several benefits to using tape drives, particularly for backup and archival uses. They include the following:

- Capacity. Tapes have a large capacity for storing data when compared to HDDs.
- Low cost. They are economical when compared to other storage media.
- Life span. Tapes stored in a suitable environment can last for decades, an important factor for archival storage.
- Transportable. Tapes can be easily moved from one location to another and are considered off-line storage.

- Security. Today, tapes support encryption such as Advanced Encryption Standard-256 and provide varying levels of data protection.
- Disaster recovery. Tape is often the storage medium of choice for data backup and DR. Storing critical systems and data on tape creates an air gap between systems that are at risk from cyber attacks simply by removing the tape cassette from the drive.

Tape systems access data sequentially. In the early years, that factor resulted in slower read/write speeds. Today, two primary tape technologies -- linear tape and helical scan systems -- have advanced tape performance, making it comparable to disk drive systems. While these technologies have improved drive performance, they are largely incompatible with each other

Linear tape

Linear tape technology has parallel tracks of data that extend the length of the tape. Multiple read/write heads operate in parallel, reading and writing data simultaneously. Tape cartridges consist of one tape spool. When the cartridge is inserted, the end of the tape connects into a take-up spool inside the device. Linear tape media is approximately a half-inch wide

Helical scan

Helical scan systems write data in diagonal strips along the tape and use two tape reels in the same cartridge with a quarter inch-wide tape media. This technology provides greater data storage density than linear tape. However, the helical scan cartridges may store less data than linear tape models.

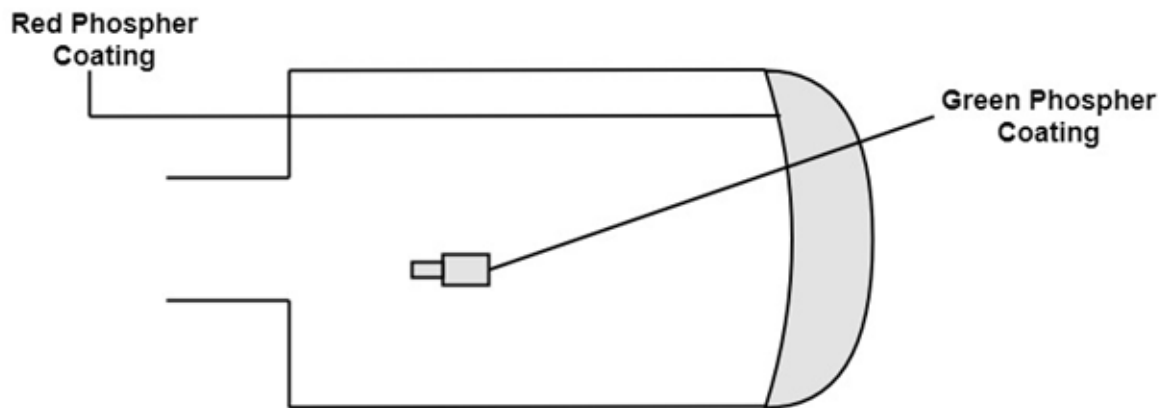
19. Color CRT Monitors:

The CRT Monitor display by using a combination of phosphors. The phosphors are different colors. There are two popular approaches for producing color displays with a CRT are:

- Beam Penetration Method

The Beam-Penetration method has been used with random-scan monitors. In this method, the CRT screen is coated with two layers of phosphor, red and green and the displayed color depends on how far the electron beam penetrates the phosphor layers. This method produces four colors only, red, green, orange and yellow. A beam of slow electrons excites the outer red layer only; hence screen shows red color only. A beam of high-speed electrons

excites the inner green layer. Thus screen shows a green color.



- Shadow Mask Method

Shadow Mask Method is commonly used in Raster-Scan System because they produce a much wider range of colors than the beam-penetration method. It is used in the majority of color TV sets and monitors.

Construction: A shadow mask CRT has 3 phosphor color dots at each pixel position.

- One phosphor dot emits: red light
- Another emits: green light
- Third emits: blue light
- This type of CRT has 3 electron guns, one for each color dot and a shadow mask grid just behind the phosphor coated screen. Shadow mask grid is pierced with small round holes in a triangular pattern.

Working :

The deflection system of the CRT operates on all 3 electron beams simultaneously; the 3 electron beams are deflected and focused as a group onto the shadow mask, which contains a sequence of holes aligned with the phosphor-dot patterns. When the three beams pass through a hole in the shadow mask, they activate a dotted triangle, which occurs as a small color spot on the screen. The phosphor dots in the triangles are organized so that each electron beam can activate only its corresponding color dot when it passes through the shadow mask.

