Important Instructions to examiners:

1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
3) The language errors such as grammatical, spelling errors should not be given more Importance (Not applicable for subject English and Communication Skills.
4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
7) For programming language papers, credit may be given to any other program based on equivalent concept.

Q.1.

a) Attempt any Three of the following:

i. State the meaning of following terms related to hard disk.

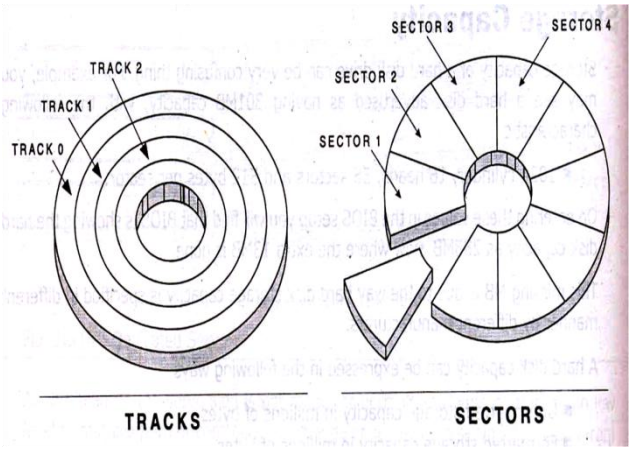
1) Track
2) Sector
3) Cylinder
4) Cluster

1) Track: (1 Marks)

- Each side of HDD platter's surface is divided into concentric circles called tracks
- They are magnetic information written during formatting of HDD
- Outermost track is called track 0. The innermost will have the highest number

2) Sector: (1 Mark)

- A track is a big area to store data(5000 bytes)
- Hence tracks are divided into sectors
- The formatting program divides disk surface into sectors by writing magnetic pattern on disk surface
- Different HDD capacities have different number of tracks
- 512 byte data can be stored in each sector. Sector no. starts from 1

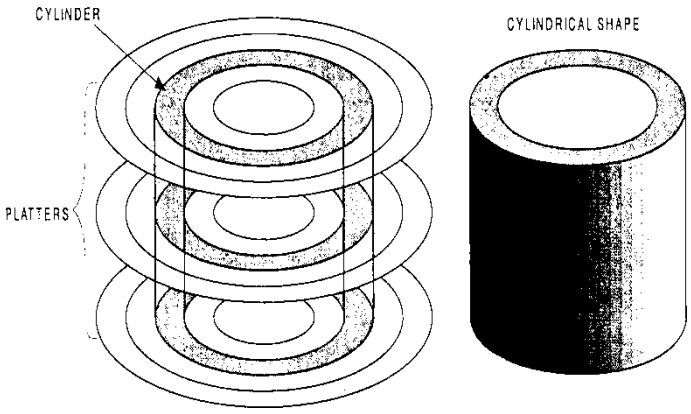


3) Cylinder: (1 Mark)

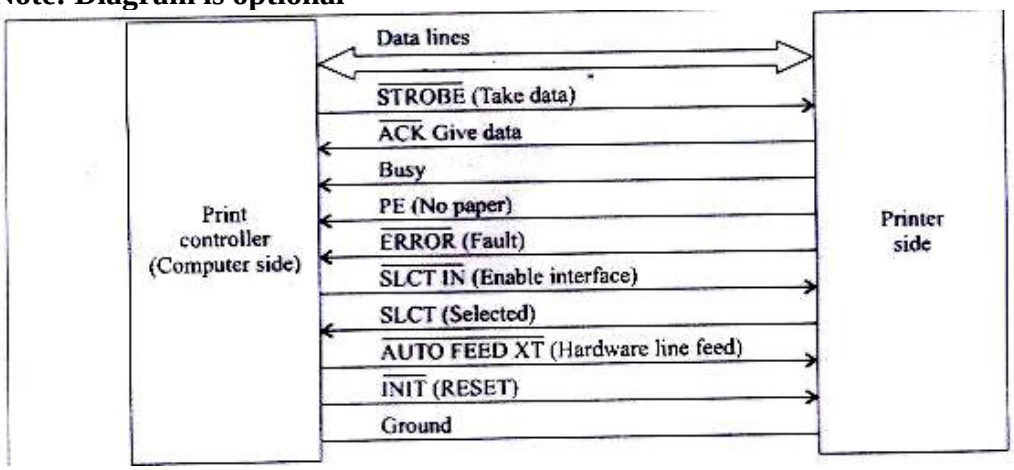
- Same tracks of different platters form an imaginary cylinder like structure
- Data is stored cylinder by cylinder
- All tracks on a cylinder are written and then the R/W head moves to the next Cylinder. This reduces movement of R/W head and increases the speed of read and write operation

4) Cluster : (1 Mark)

When OS writes some information on the hard disk, it does not allocate the space sector wise, instead uses a new unit of storage called "Cluster"
Clusters are the minimum space allocated by DOS when storing any information on the disk



ii. List and explain the centronics signal from computer to printer (any four 1 mark each)
Note: Diagram is optional



Centronics interface
The Centronics Interface is a handshake protocol between a computer and a printer. It supports maximum data transfer speed of 100Kb/s. There are 12 signals from printer to PC. Out of these, 8signals are data bits and four signals are control signals. All control signals are active low. The control signals are:

$\overrightarrow{\text{STROBE}}$: The printer should take data when this signal is low.

$\overrightarrow{\text{INIT}}$: When it is low the printer resets the electronics logic and clears the printer buffer.

$\overrightarrow{\text{SLCT IN}}$: It is an interface unable signal. When it is low the printer responds to the signals from the controller.

$\overrightarrow{\text{AUTO FEED XT}}$**:** After printer every line, the printer will provide one line feed automatically if this signal is low. This type of line feed is known as hardware line feed. There are five status signals from printer to PC.

$\overrightarrow{\text{ACK}}$: It is an acknowledgement for strobe signal from the PC. When active it indicates that printer has received data sent by the PC and the printer is ready to receive the next data byte.

PE: When PE is high it indicates that there is no paper in the printer. Either the paper is torn or the paper is over.

$\overrightarrow{\text{SLCT}}$: It indicates that the printer is selected and logically connected to the PC.

$\overrightarrow{\text{BUSY}}$: When the busy signal is high, it indicates that the printer is busy and it cannot receive data

$\overrightarrow{\text{ERROR}}$: It indicates that there is some error condition in the printer.

iii. List out any four specifications of Dot-Matrix printer.(1 Mark each)

1. Printing Method: 9 Pin /24 Pin impact dot matrix
2. Printing speed:
   - High speed draft: 533 characters /sec/ line
   - Normal draft: 400 characters /sec/ line
   - Near letter quality 80 characters /sec/ line
   - Draft 480 characters /sec/ line
3. Print direction: Bidirectional for text printing, unidirectional for graphics printing
4. Line spacing: 1/6 inch 1/8 inch or programmable increments.
5. Print head Life 400 million strokes/wire
6. Graphics resolution: 72 – 360 DPI
7. Copies (Original +): 4 to 5

iv. Give the preventative maintenance of keyboard.(1 Mark each)

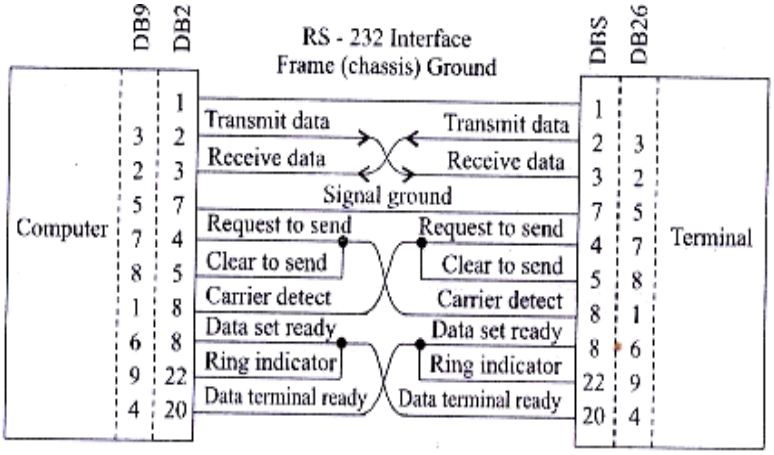
Preventive maintenance of Keyboard:

- Handle the keyboard gently and carefully.
- Press the keys gently without applying force and do not rest hands on the keyboards.
- Do not spill liquid on the keyboard.
- Do not play with the keyboard after powering off the system.
- Make sure that the keyboard cable is not subjected to high stress at the keyboard end. This will lead to break in signal wire inside keyboard cable.
- Periodically clean interior the keyboard with a miniature vacuum cleaner or turn it upside down to blow out the accumulated dirt.
- For cleaning conducting parts of keyboard, use denatured alcohol along with lint free material.
- Use special dust protection cover for covering the keyboard when not in use.

b) Attempt any ONE of the following:

i. Draw the block diagram of RS232 communication system. Explain it with sequence of events with signals.(2 Marks for diagram, 4 Marks for Explanation)

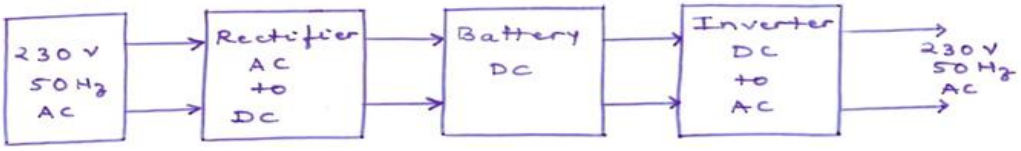
- **Transmit Data**: The serial data leaving the port travels on Transmit data line
- **Receive Data**: The bits coming in from a distant serial port go through receive data line.
- **Data Terminal Ready**: when the data terminal is able to participate in communications, it signals its readiness by applying a positive voltage on the DTR line.
- **Data Set Ready**: When the data terminal is ready to receive data, it signals its readiness by applying a positive voltage on the DSR line.
- **Request To send**: When the data terminal is on and capable of receiving transmissions, it puts a positive voltage on the request to send line. Absence of RTS signal will prevent the data set from sending out the data.
- **Clear To Send**: The data set needs to control the signal flow of from the data terminal. The CTS signal indicates to the data set that data can be sent. Absence of CTS signal will prevent the data set from sending out the data.
- **Carrier Detect**: This signal gives a modem a means of signaling the data terminal that it has made a connection with the distant modem.
- **Signal Ground**: It provides the return path to all the signals used in the serial port.



: RS232 interface signal connections between computer and terminal device

ii. Draw the block diagram and explain the working of online UPS.(2 Marks diagram, 4 Marks for explanation)

BLOCK DIAGRAM OF ON-LINE UPS



- It contains a transformer, a rectifier and a filter which convert AC into DC
- This DC is given to the battery charger which charges the battery. The output of the battery is given to the inverter which converts DC to AC and gives it to the PC.
- In this type of UPS the system is supplied power from the batteries continuously.
- Thus the battery charges continuously and it provides DC voltage to the inverter
- The inverter converts DC to 230V, 50Hz AC signal and gives it to the computer.
- As switching is not involved, spikes are not generated.
- It isolates the AC mains from the PC.

Q.2. Attempt any FOUR of the following:

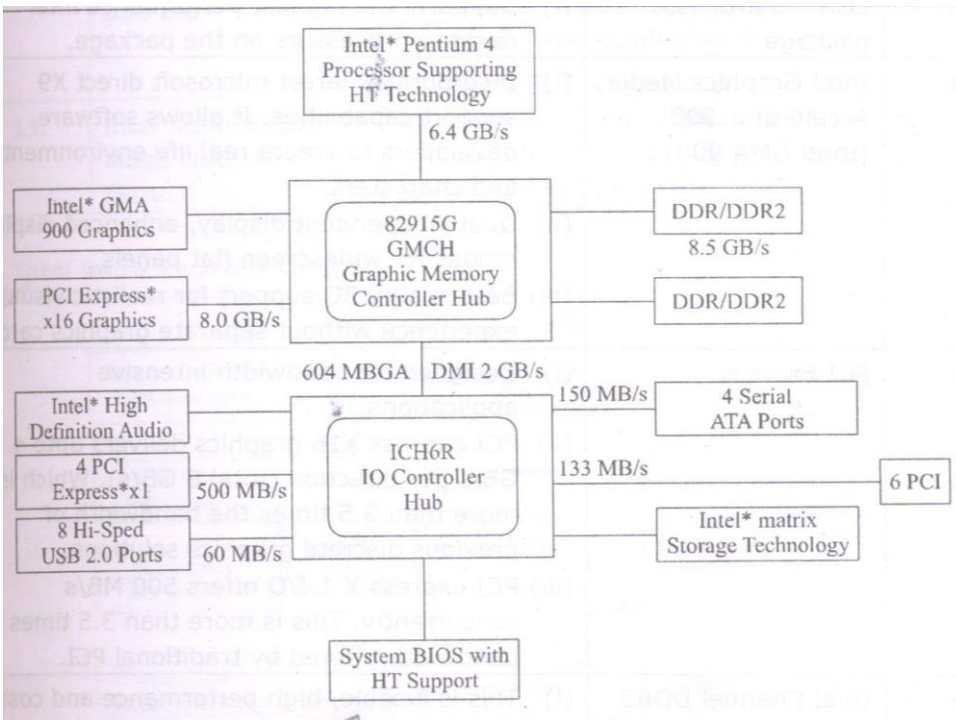
a) What is AGP? State any six feature of AGP?(AGP 1mark,1/2 mark each for features)

- Accelerated Graphics Port (AGP). It is a high speed bus for graphics and video support.

Features of AGP:

- It allows the video board to use system memory (RAM), as video memory.
- It is 4 to 8 times faster than PCI bus.
- AGP is a high speed connection and runs at a base frequency of 66.66MHz, which is double the standard PCI. In the basic AGP mode called 1x, single transfer is in every cycle. As AGP bus is 32 bits (4 bytes) wide.
- 66 x 4 = 266MBps
- In AGP 2x, two transfers are performed per cycle, giving 533MBps.
- AGP is considered a port, and not a bus, because it only involves two devices (the processor and video card) and is not expandable. One of the great advantages of AGP is that it isolates the video subsystem from the rest of the PC so there isn't nearly as much contention over I/O bandwidth as there is with PCI. With the video card removed from the PCI bus, other PCI devices will also benefit from improved bandwidth.
- Because AGP is independent of PCI, using an AGP video card frees up the PCI bus for I/O communications. AGP allows the video card to a high speed connection to the system RAM.

b) Draw neat labeled diagram of 915G Intel chipset.(4 Marks)



c) Explain the following terms.(2marks each)

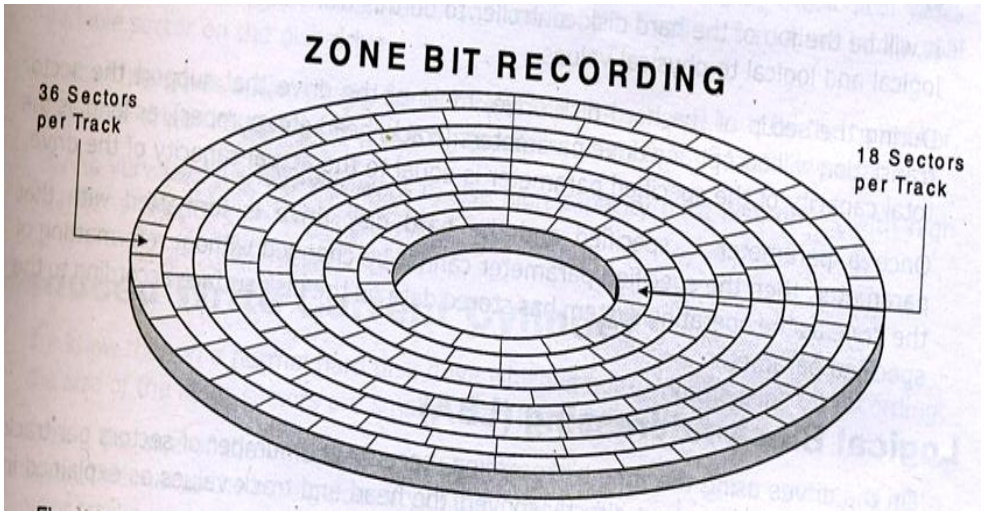
i. Zone bit recording.

ii. MBR.

i. Zone Bit Recording:

Using the same number of sectors in the inner as well as outer tracks of a drive is a waste of storage capacity of the disk drive. The outer tracks because of their large circumference can hold 50% more data than the inner tracks.

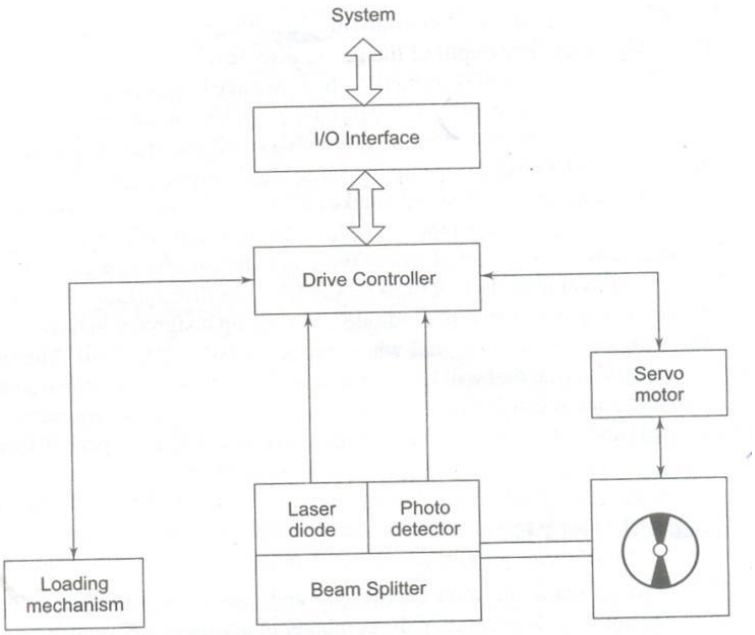
In zone bit recording the complete surface of the disk platter is divided into a number of different zones. Each zone will have a fixed number of sectors per track. The outer zone will have maximum number of sectors per track and the innermost zone will have minimum number of sectors per track. For e.g. 9 tracks can be divided into 3 zones each having 3 tracks. Outermost zone can have 24 sectors, middle zone 16 sectors, and innermost zone 8 sectors.



ii. Master Boot Record (MBR)

- It contains a small program to load and start the active/bootable partition.
- It also contains the information about the four primary partitions (if created), their starting sector, ending sector, size etc in a format called Partition Table Record.
- The MBR is always located at cylinder 0.head 0; sector 1 and the partition boot sector are located at the beginning of each partition volume.

d) Explain working of CD-ROM Drive.(4Marks for working)
Note: Diagram is optional



The CD-ROM drive reads the data on the CD and sends the information to the interface connector (expansion board) attached to the computer motherboard. The information then travels to the CPU for processing to make video, text or sound. The CD recording method makes use of optical recording, using a beam of light from a minute semiconductor laser. Such a beam is of low power (milli watts) but the focus of the beam can be a very small point so that low melting point materials like plastics can be vaporized by a focused beam. Turning the recording beam onto a place on a plastic disc for a fraction of a millionth of a second will therefore vaporize the material to leave a tiny created pit, about 0.6 μm (1 μm- 1 millionth of a meter, equal to one thousandth of a millimeter) in diameter a human hair e.g. is around 50 μ in diameter. The depth of the pits is also very small of the order of 0.1 μm. if no beam strikes the disc, then no pit is formed, so that we have here a system that can digitally code pulses into the form of pit or no pit. Reading a set of dimples on a disc also makes use of semiconductor laser, but of much lower power since it need not vaporize material. The reading beam will be reflected from the disc where no dimple exits, but scattered where there is a dimple. By using an optical system that allows the light to travel in both directions to and from the disc surface, it is possible to focus a reflected beam onto a detector, a photodiode and pick up a signal when the beam is reflected from the disc. There will be no signal when the beam falls onto a pit. The output from the detector is the digital signal that will be amplified and then processed into an audio signal.

e) Describe the following characteristics of CRT monitor.(1Mark each)

i. Dot pitch(CRTs)
ii. Resolution.
iii. Video Bandwidth.
iv. Frame rate.

i. **Dot Pitch**: Measurement of how close the holes (in the mask) are to each other. The closer the holes, smaller is the dot pitch and sharper is the image.

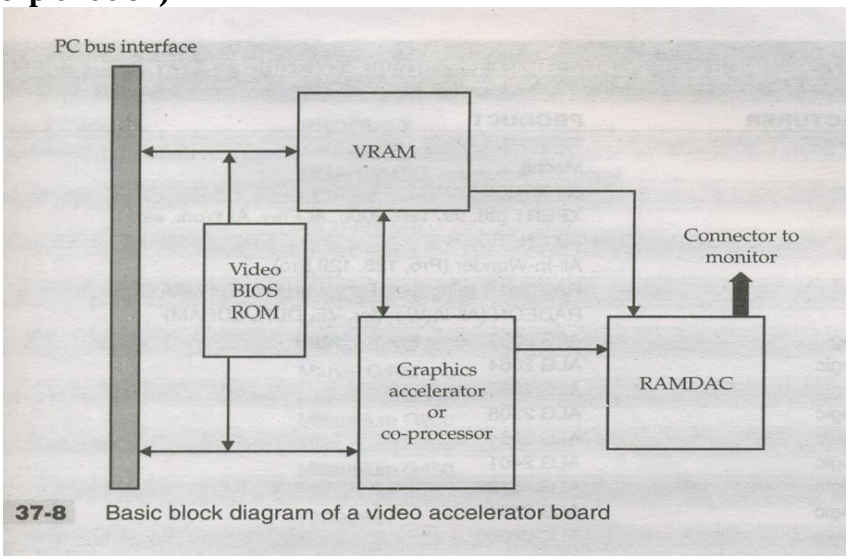
ii. **Resolution**: Amount of detail a monitor can show. It is expressed in terms of number of horizontal and vertical pixels contained in the screen.

CRT	RESOLUTION
15”	800 X 600
17”	1024 X 768
19”	1280 X 1024
21”	1600 X 1200

iii. **Video Bandwidth**: It is the maximum input frequency that a monitor can handle. It helps in determining the resolution capability of the monitor.

iv. **Frame Rate**: It is the frequency at which an imaging device produces unique consecutive images called Frames.

f) Draw and explain block diagram of video accelerator card.(2Mark diagram, 2 Mark explanation)



Block diagram The core of the accelerator is the graphics chip (or Video chipset). The graphics chip connects directly with the PC expansion bus. Graphics command and data are transmitted into pixel data and stored in Video memory offers a second data bus that is routed directly to the Video board’s RAM DAC (Random Access Memory Video to Analog Converter). The graphics chip directs RAM DAC operation and ensures that VRAM data is available. The RAM DAC then translates Video data into red, green and horizontal and vertical synchronization signals output signals generated by the monitor. This architecture may appear simple, but this is due to high level of integration provided by the chipsets being used.

Added support for long physical sectors i.e. allows the device to be formatted so that there are multiple logical sectors per sector.

1. Added support for long logical sectors, which enables additional data bytes to be used per sector (520 or 528 instead of 512).
2. Power consumption 5V.
3. True Maximum data transfer rate of PATA is 100 MBps with bursts up to 133 MBps.

Q.3. Attempt any FOUR of the following:

a) List and explain signals of keyboard connector.(D/N-5 and USB) (2M each)

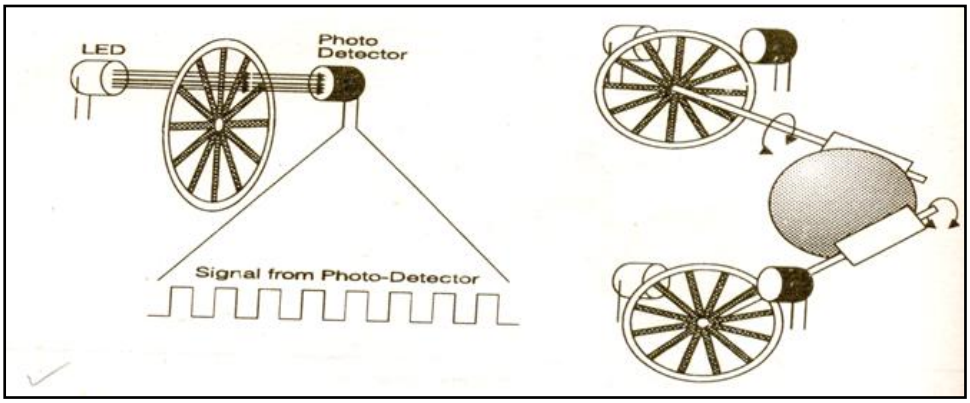
D/N-5 connector pin description:

Pin	Pin Name	Function of signal
1	KBDCLK(clock)	It provides clock pulses to the keyboard
2	KBDAT(data)	Transmit and receive data
3	KBRST(reset)	Reset the internal buffer of keyboard
4	GND	Ground signal
5	VCC	+5V power to keyboard

USB keyboard Connector pin description

Pin	Pin Name	Function of Signal
1	VCC	+5V power to keyboard
2	Data-	Carries negative data
3	Data+	Carries positive data
4	GND	Ground signal

b) Sketch internal diagram of opto-mechanical mouse. Describe mouse operation.(2M diagram, 2M Explanation) (Any other correct diagram should be given complete marks)



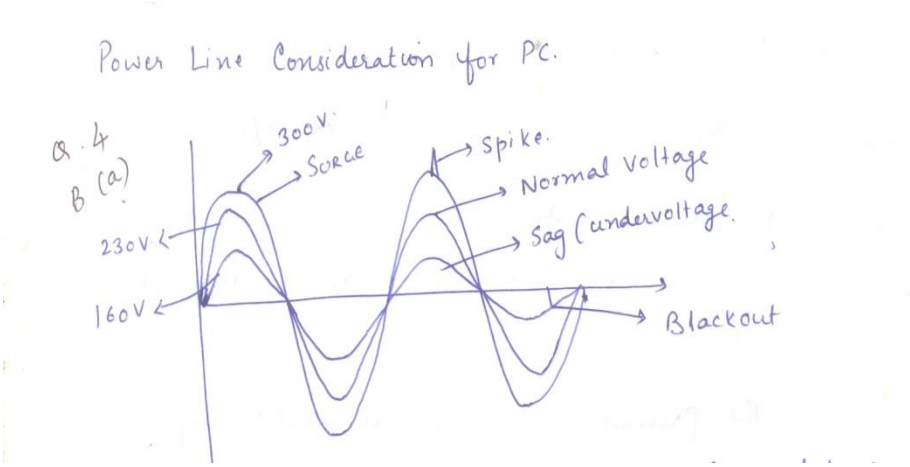
- A combination of LED and photo detector is used to sense the distance traveled by the mouse.
- When mouse is moved across a flat surface, the ball protruding from the underside of the mouse and touching the surface starts to rotate in the direction of the movement.
- Rotating ball touches and turns two rollers inside the mouse. These rollers are mounted at 90 degree angles to each other.
- One roller is used for vertical movement and the other roller is used for horizontal movement of cursor on the screen.
- Each roller is connected to a wheel, which rotates with movement of rollers.

- As the wheel rotates, a pair of photo detector detects the number of openings on the wheel passing between them.
- Each opening on the wheel allows light from the LED to fall on the photo detector and generate electrical signal.
- The direction in which the mouse is moving can be found out by finding the number of signals from vertical and horizontal rollers.
- These signals are sent serially to the PC over the mouse cable. The mouse driver software converts these signals into distance direction and speed necessary to move the cursor on the screen.

c) Explain any four power supply characteristics.(1 mark each)

- **Ripple:** also sometimes called AC ripple or simply noise. As the power supply produces DC output from AC input, some amounts of AC component are always present in the DC output. Typically these values are very small in the range of miliVolt.
- **Wattage** the total maximum output power of all the voltages that power supply can provide is called as the wattage rating of the power supply. Typical power ranges from 200 to 500Watts.
- **Regulation:** the ability of power supply to maintain an output voltage within the specified limit under varying of input voltage and output load is called as regulation.
- **Load Regulation:** the ability of power supply to control the output voltage level as the load increases or decreases.
- **Line Regulation:** the ability of power supply to control its output voltage as the level of AC input varies from its minimum acceptable level to maximum acceptable level.

d) List and explain power problems(any four)(4 M)



The power problems can be divided into two main categories, that is

- Overvoltage
- Undervoltage

Overvoltage:

- Spikes: Spikes are very high voltage, split second events that can disrupt the operation of electronic devices such as computers.
- Surges: these are overvoltage that last for more than one cycle. Surges are caused when some heavy electrical load is suddenly switched off.
  Spikes and surges are a leading cause of aging and destruction of the electronic equipments.

Undervoltage can be further divided into three categories, sags, brownout and blackout.

- Sags: Sags are undervoltage that last for more than one cycle. Sags can slow down the computer disk-drives, leading to data errors and can cause head crash making permanent data loss.
- Brownout: Brownout is the low voltage condition that can be present even for several hours. This is often created when the power demand exceeds the capacity of the power generator.
- Blackout: Blackout is the complete no power condition. Sometimes sudden power failure can bring about wastage of time, money and resources.
- Line Noise: Any signal present on the power line besides the expected alternating current of 50 Hz is called the line noise.
- Common Mode Noise: Common mode noise appears between the ground and the neutral or the ground and the live wire of the computer.
- Harmonic Distortion: Harmonic Distortion is the deviation of the power supply wave shape from a pure sine wave. It can disrupt the operation of some sensitive devices like computers and communication equipments.

e) Describe any four USB features.(Each feature 1 mark, any 4 features)
Universal Serial Bus (USB)

1. Up to 127 different devices can be connected on a single USB bus.
2. Initial USB standard supported 12 Mbps transfer rate. Currently 60 Mbps is supported.
3. Supports wide range of peripherals such as keyboard, mouse, printer, FDD, game pad, joystick etc.
4. Devices are not daisy chained. Each device is connected to USB hub, which is an intelligent device interacting with the PC on one side and USB peripheral devices on the other side.
5. A USB device can be connected without powering off the PC. The plug and play feature in the BIOS together with intelligence in the USB device takes care of detection, device recognition and handling.
6. USB controller in the PC detects the presence or absence of USB devices and does power allocation.
7. Easy installation, faster transfer rate, simple cabling and multiple device connections.
8. CPU/software initiates every transaction on the USB bus. Hence the over head on the PC software increases.
9. A single 4 pin cable serves all the devices.

Pin no.	**Signal**
1	Power
2	Signal-
3	Signal+
4	Ground

Q.4.

a) Attempt any THREE of the following:

i. List and explain any four functions of BIOS.(1 mark for each function any 4)

The BIOS (Basic Input Output System) provides the processor with the information required to boot the system from a non-volatile storage unit (HDD, FDD, CD or other). It provides the system with the settings and resources that are available on the system

Main functions of BIOS

1. The main function of the BIOS is to give instructions for the power-on-self-test (POST). This self-test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts.

2. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem. Error codes are typically a series of beeps heard shortly after startup.

3. The BIOS also works to give the computer basic information about how to interact with some critical components such as drives and memory that it will need to load the operating system.

4. Once the basic instructions have been loaded and the self-test has been passed, the computer can proceed with loading the operating system from one of the attached drives.

5. Computer users can often make certain adjustments to the BIOS through a configuration screen on the computer. The setup screen is typically accessed with a special key sequence during the first moments of the startup. This setup screen often allows users to change the order in which drives are accessed during startup and control the functionality of a number of critical devices. Features vary among individual BIOS versions.

6. Many PC manufacturers today use flash memory cards to hold BIOS information. This allows users to update the BIOS version on computers after a vendor releases an update. This system was designed to solve problems with the original BIOS or to add new functionality. Users can periodically check for updated BIOS versions, as some vendors release a dozen or more updates over the course of a products lifetime. To check for updated BIOS, users can check the website of the specific hardware vendor.

ii. How hard disk is formatted? What is partitioning of disk. (2 M for formatting, 2M for partitioning)

Formatting

Hard Disk requires a low level formatting and a high level formatting to make it useful for data storage

- **Low level formatting**

It magnetically divides the disk into tracks and sectors

- **High Level Formatting**

1. It is done with the help of OS.
2. High level Format program scans the disk for tracks and sectors marked bad during low level formatting. The scanning program performs five retries to read the tracks or sectors. If the tracks are still unreadable, the area is noted as bad cluster in FAT.
3. After scanning the entire disk, the drive heads return to the first sector of the partition and write MBR. Immediately in the next sector 1st copy of FAT is written and after that 2nd copy of FAT is written. Initially FATS are blank except for the bad cluster marks found in the initial scan.
4. After the 2nd copy of FAT blank root directory is created.
5. High level formatting is done on hard disk to make the disk DOS compatible by writing DBR, FATs and empty root directory information on the drive

Partitioning

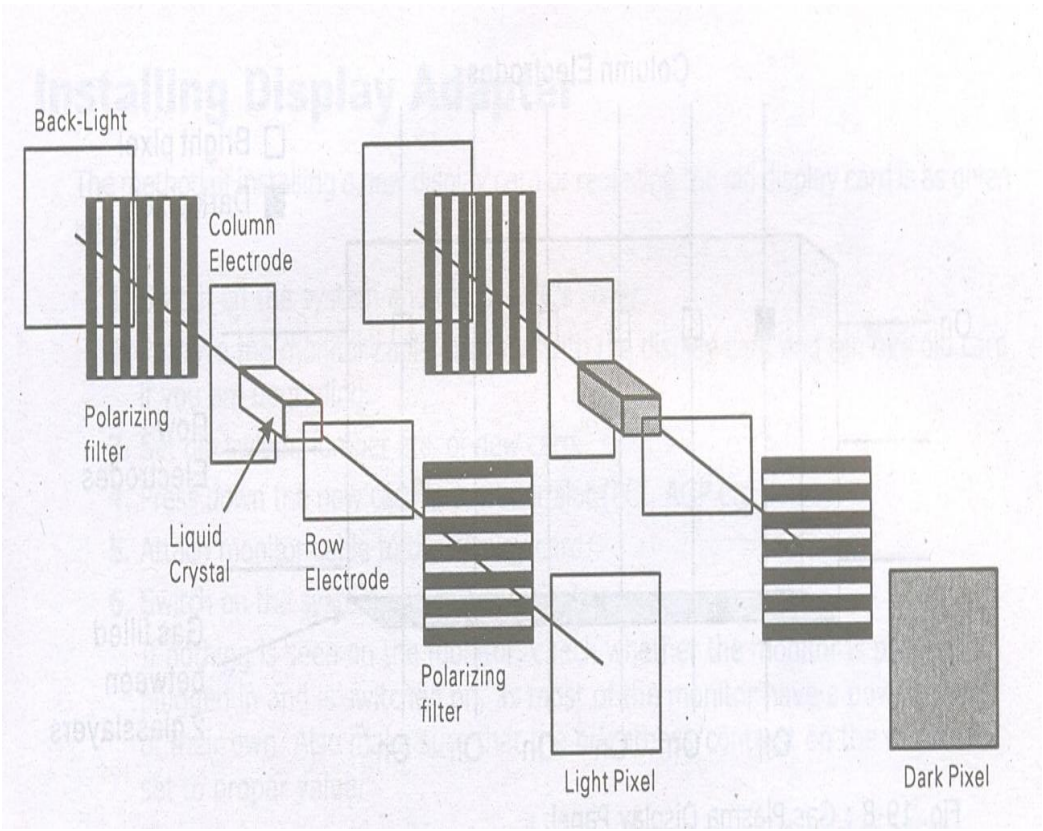
1. Partitioning means dividing the drive into logical parts or volumes
2. It is done to have more than one operating system on the same drive
3. To have more than one logical drive

iii. Compare CD and DVD on the basis of:

1) No. of sides.
2) Number of layers
3) Capacity.
4) Track pitch.
(1 M for 1Point)

Sr. No.	Comparison Point	CD	DVD
1.	Number of Sides	Data can be written on only one side	Data can be written on both sides
2.	Number of Layers	Data can be written in only one layer	Data can be written in two layers on both sides
3.	Capacity	680 Mb	4.7 GB (one layer) (5 GB (two layer) 17 GB (Two layers two sides)
4.	Track Pitch	1.6 µm	0.74 µm

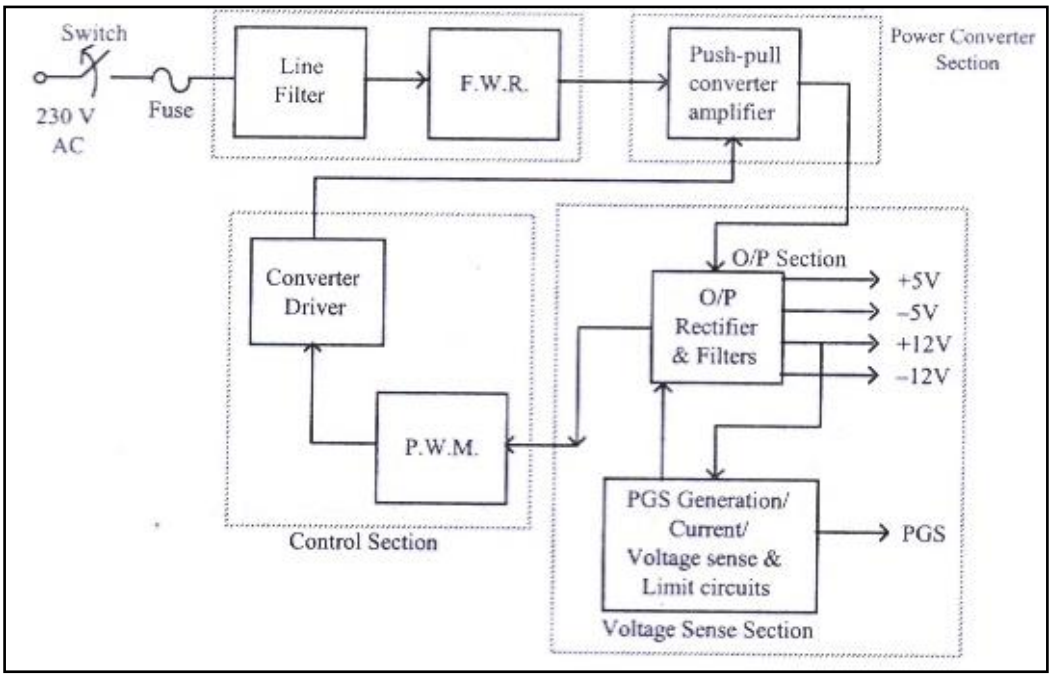
iv. Explain working principle of LCD monitor with neat diagram.
(Block diagram – 2 m; working – 2m)



- Light source is used to produce light in the background.
- Light passes through polarizing filter which allows light vibrating in only one direction to pass.
- Polarized light passes through liquid crystal sandwiched between row and column electrodes.
- When current is passed through electrodes the molecules of the liquid crystal twist and rotate the incoming light through 90^0
- Light source is used to produce light in the background.
- Light passes through polarizing filter which allows light vibrating in only one direction to pass.
- Polarized light passes through liquid crystal sandwiched between row and column electrodes.
- When current is passed through electrodes the molecules of the liquid crystal twist and rotate the incoming light through 90^0

b) Attempt any ONE of the following:

i. Sketch and label block diagram of SMPS. Describe the function of PWM of SMPS.
(2M for diagram, 2M for explanation, 2M PWM)



SMPS used in a PC has five sections

AC input section

- Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining.

Power converter

- It consists of push pull configuration of transistors which are driven by converter driver from the control section. Only desired quantity of power is delivered to the load.

Control section

- It senses over voltage or over current at load.
- It changes the turn on time of the transistors in the push pull amplifier so that output power can be controlled.
- It applies Pulse Width Modulated Waveforms to converter driver circuit at 22 KHz frequency.

Output section

- It rectifies and filters the power received from the power section
- It provides short circuit and overload protection to the power applied to the load.

Voltage sense section

- It generates Power Good Signal (PGS). When all four voltage outputs (+5V, -5V, +12V, -12V) are steady above minimum sense levels for more than 100ms, PGS is generated by this section.
- It checks the maximum load current and compares it with specified current. If the connected load exceeds the specified load, current limit circuits shut off the output section of the SMPS, thereby avoiding damage due to over current flow.

Functions of PWM:
Pulse – width modulation (PWM) sets the on off duty cycle of the devices. The output voltage of the power supply is determined by this timing. Other features designed into the PWM controller help to regulate, stabilized and provide the requirement for higher load current and instantaneous current

ii. What is preventive maintenance? Give its importance? Write periodic maintenance procedure.
(2M definition, 2M for importance, 2M procedure)
Preventive Maintenance:

Preventive Maintenance is a set of procedures to be followed to obtain a trouble free service from the computer. It reduces the problematic behavior of PC, data loss, component failure, permanent damage etc. and ensures a long life of the computer**.**

Importance of Preventive Maintenance:

1. Preventive Maintenance gives reliable operation of PC component as well as peripheral devices and their long life.
2. Improved performance: without any maintenance some parts of PC start degrading in performance due to ageing, but preventive maintenance improves the speed of the system in this respect.
3. Preventive Maintenance avoids remedial problems that may occur in future.
4. Preventive Maintenance can increase the resale value of the system.
5. It also protects the data stored on the hard disk which is highly important**.**
6.

Periodic maintenance procedure:

1. Clean your system with standard cleaner solutions for example acetone, Freon.
2. Clean the pins of the chips.
3. Backup important files.
4. Delete all temporary files and empty the recycle bin.
5. Check and installed updated drivers for PC.
6. Use Air Conditioner for computer room for maintains the temperature of the room.
7. Check power protection devices of PC.
8. Uninstalled unused software from PC.

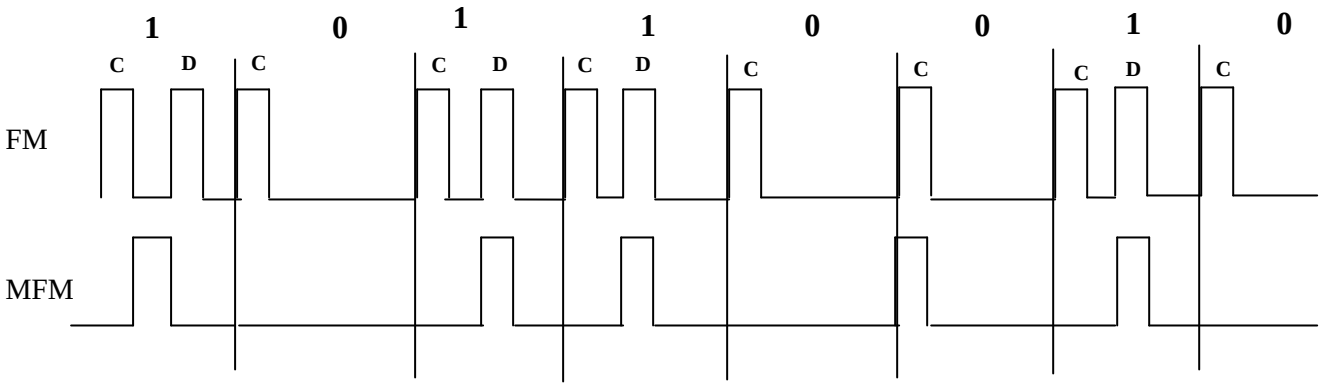
Q.5. Attempt any FOUR of the following:
a) Differentiate between internal modem and external modem(four points)
Any four points (1Mark each)

Internal Modem	**External modem**
Fits into a PCI or other expansion slot on the computer and communicates directly with the BUS.	Connects to a computer via a serial port, parallel port or USB port
Built-in UART	No built-in UART as it is connected

	externally
No additional cables such as RS232 is needed	RS 232 or other serial cables are required to be connected to PC.
Not portable	Portable, as it is connected external to the PC.
Powered by PC	Powered externally by plugging to the supply
Cannot be monitored as it is internally connected	External LED's help monitor the modem.
Interface type is PCI or ISA	Interface is RS232 or USB.

b) Draw FM and MFM waveforms for data pattern 10110010(FM -2M, MFM – 2M.)

FM and MFM waveforms for 10110010
FM-10110010→PPPNPPPPPNPNPPPN
MFM-10110010→NPNNNPNPNNPNNPNN



c) List out physical components of hard disk drive. Describe head actuator mechanism(any one)
(List – 1M;Diagram -1M; explanation – 2M)
(Any other correct diagram should be given complete marks)

The components of the Hard Disk

1. Disk Platter
2. Read/Write head
3. Head Arm/ Head Slider
4. Head Actuator mechanisms
5. Spindle motor
6. Bezel
7. Cable & connectors
8. Logic board
9. Air filter

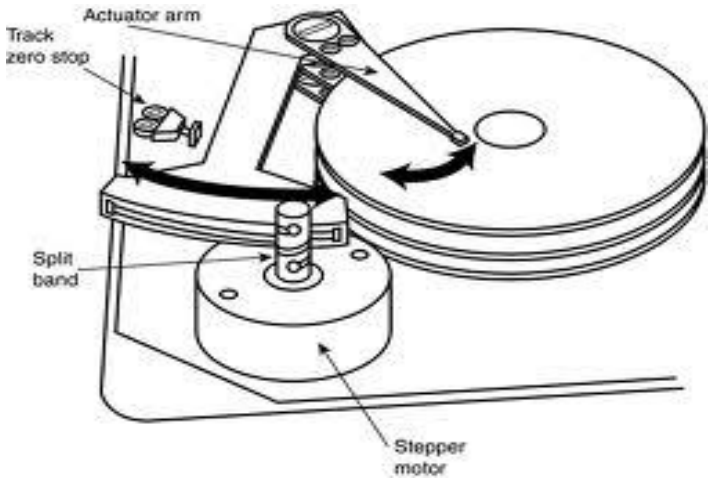
Head Actuator Mechanisms (Any one)

- Head actuators come in two general varieties:

- **Stepper Motor Actuator**
- **Voice Coil Actuator**

Stepper Motor :(Any type (band or rack & pinion type) may be considered)

- A stepper motor is a special type of dc motor used to accurately position the magnetic heads.
- A hard drive attaches the arms to the motor, and each time the motor steps one position clockwise or counterclockwise, the arms move in or out one position which in turn moves the heads .
- Each position defines a track on the surface of the disk.
- Stepper motor actuators are not used in modern drives because they are prone to alignment problems and are highly sensitive to heat.

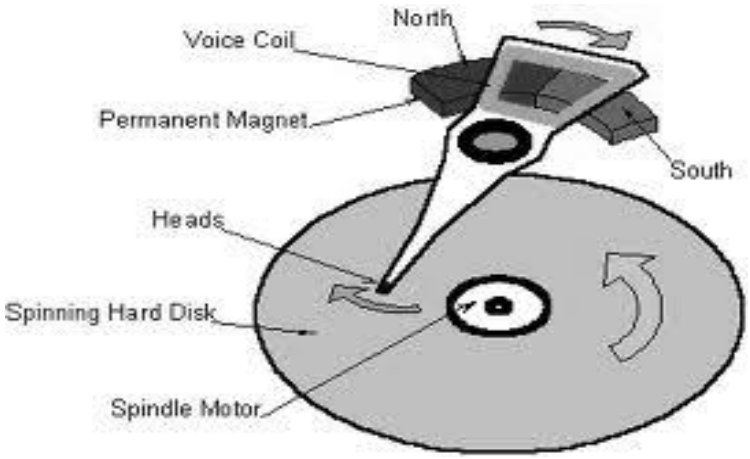


Voice Coil Actuator

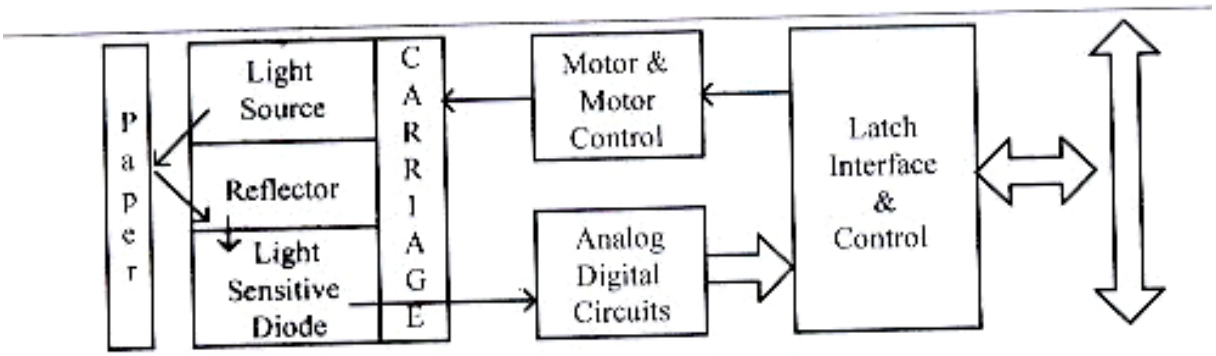
- Modern hard drives use a voice coil actuator.
- It uses a device called a voice coil to move the head arms in and out over the surface of the platters.
- The voice coil actuator is not only far more adaptable and insensitive to thermal issues, it is much faster and more reliable than a stepper motor.

Types of Voice coil

- In Linear Voice coil actuator system, the head is moved in and out over the disk surface in a straight line
- In rotary Voice coil uses a rotator arm to move the R/W head



d) Draw the functional block diagram of flat bed scanner.(Correct diagram -4M)



e) State the diagnosis steps when PC user gives complaint that "Dead System, No Booting and No Display".

(Any Four steps – 1M each)

Problem: System is dead, No booting; No display

Step1: Check for proper 230V ac supply using multimeter

Step2: Check if the power supply cable fits properly or not. Change if necessary.

Step3: Check for the proper outputs (plus/minus) 5V, (plus/minus) 12V, PGS, GND from the SMPS.

Step4: Check if Fan works; if yes, clean all edge connectors, Reseat CPU chip, Reseat DRAM check motherboard. Replace motherboard if not working properly.

Step5: Check video cable and monitor power switch on for display problem and check for display adapter problem.

f) What is SCSI? Which are different SCSI standards for SCSI? Compare SCSI cable length and noise immunity.

SCSI full form- 1M; Standards -1M Comparison -2M

SCSI is Small Computer Systems Interface fast bus that can connect lots of devices to a computer at the same time including hard drives, scanners, CD-ROM/RW drives, printers and tape drives.

Different Standards are, SCSI-1, SCSI-2 and SCSI-3

Comparison

Factor	SCSI 1	SCSI 2	SCSI 3
No. of bits	8 bits	16 bits	16 bits
Number of pins	**50 pins**	50 pins	68 pins
Cable length	6 m	3m	3m
Noise immunity	poor	good	better

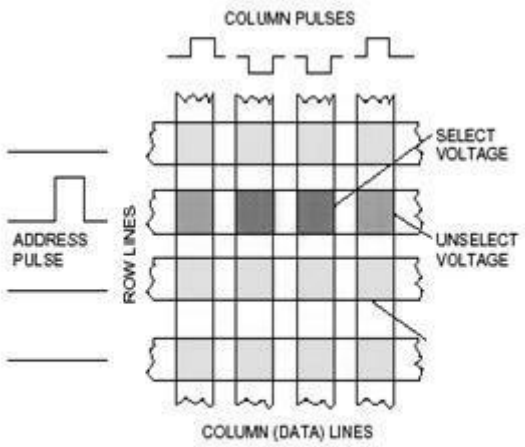
Q.6. Attempt any FOUR of the following:

a) Explain passive matrix LCD display? Give its advantages.

(Diagram -1M; Explanation -2M, Advantages any 2, 1M)

(Any other correct diagram should be given complete marks)

Note: Any other diagram showing ROW and COLUMN matrix may be considered



Passive Matrix

Passive Matrix:

- Passive-matrix is a technology that uses a grid of vertical and horizontal wires to display an image on the screen.
- Each pixel is controlled by an intersection of two wires in the grid.
- The liquid crystal material is sandwiched between the two glass substrates and a polarizing film is added to the outer side of each substrate. To turn on a pixel, the integrated circuit sends a charge down the correct column of one substrate and a ground activated on the correct row of the other.
- By altering the electrical charge at a given intersection, the color and brightness of the corresponding pixel can be changed.

- Since the charge of two wires (both vertical and horizontal) must be altered in order to change a single pixel, the response time of passive-matrix displays is relatively slow.
- To address a pixel the column containing the pixel is sent a charge, the corresponding row is connected to ground. When sufficient voltage is placed across the pixel, the liquid crystal molecules align parallel to the electric field.
- In passive matrix there are no switching devices, and each pixel is addressed for more than one frame time.

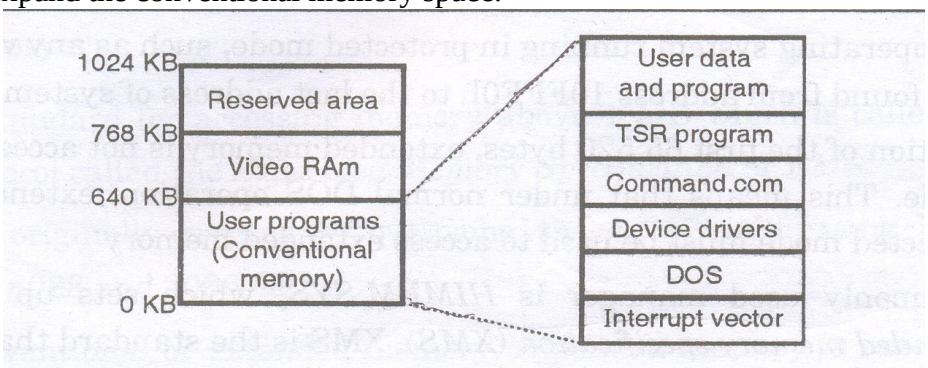
Advantages:

i. Simple design
ii. Less expensive when compare to Active Matrix
iii. Uses fewer transistor
iv. Requires less Power.

b) Explain conventional memory with diagram.
(Any other correct diagram should be given complete marks)
(Diagram 2 marks, Explanation 2 marks)

Conventional Memory

- The first 640 KB of system memory is called *conventional memory*. The name refers to the fact that this is where DOS, and DOS programs, conventionally run. This is the area is used by DOS programs, device drivers, memory resident programs. This area occupies addresses 00000 to 09FFFFH.
- Originally, this was the only place that programs could run; today, despite much more memory being added to the PC, this 640 KB area remains the most important in many cases. The reason is that without special software support, DOS cannot run programs that are not in this special area. Conventional memory occupies addresses 00000h to 9FFFFh.
- The reason for 640KB is for preserving compatibility with the first processors, which couldn't address over 1 MB of memory. This has caused the conventional memory area to be separated from the rest of the usable memory in the PC (extended memory).
- If the reserved area had been placed *below* conventional memory, it may have been possible to simply expand the conventional memory space.



c) Explain the following terms

i. Electrostatic discharge.

ii. RFI protection.

(Description of terms – 2M each)

Electrostatic discharge (**ESD**) is the sudden flow of electricity between two electrically charged objects caused by contact, an electrical short or dielectric breakdown. A buildup of static electricity can be caused by tribocharging or by electrostatic induction. The ESD occurs when differently-charged objects are brought close together or when the dielectric between them breaks down, often creating a visible spark. To prevent electrostatic discharge for a proper maintenance of computers

Keep all synthetic materials away from Computers.

When cleaning printed circuit boards/ motherboards, use a spray labeled as non-static forming.

When troubleshooting computers, always wear a static wrist strap that's grounded to the frame of the device. Also, wear the wrist strap when handling printed circuit boards.

Treat carpets and floors with compounds that reduce the buildup of static charges.

Use static floor mats where necessary.

Radio Frequency interference (RFI)

It is caused by any source of radio transmission near a PC. It is high frequency radiation (freq > 10 KHz).

Sources of RFI

High speed digital Circuits, Nearby radio source, Cordless telephones, Mobile phones, motors, Power line intercoms.

Prevention

Put all the sources which can produce RFI away from the PC.

d) Compare inkjet and laser printer (Any four points 1mark each)

Features	**Inkjet**	**Laser**
Print mechanism	Non-Impact	Non-Impact
Image formation method	Bit Image	Bit Image
Multi part stationary	No	No
Print quality	Better	Best
Cost	Moderate	High
Cost of Cartridge	High	Highest
Noise generated	No	No
Speed	High	good
Maintenance required	Low	Low from experts only
Support color printing	Yes	Yes

e) Define cache memory? Explain different levels of cache memory.
(Cache Memory 1 mark, Three levels 1 mark each)

Cache memory is extremely fast memory that is built into a CPU, or located next to it on a separate chip. It supplies the processor with the most frequently requested data and instructions. A cache controller always tries to make sure that the data required by the processor in the next memory access is available in the cache memory.

There are three types of cache memory:

L1, L2 & L3 cache memory.

L1 cache memory:

- The L1 cache also called internal or integral cache is always a part of the processor chip.
- L1 cache always runs at full processor speed.
- It was the fastest cache in the system.
- L1 cache was originally 8 KB.

L2 cache memory:

- The L2 cache originally called external cache because it was external to the processor chip when it was introduced.
- It was present on the motherboard and used to run at CPU bus speed.
- To improve the performance of the system, L2 cache was directly incorporated as part of the processor die.
- L2 cache was originally 128 KB.

L3 cache memory:

- The L3 cache has been present in high end work stations and servers such as Xenon and Itanium.
- Pentium 4 Extreme Edition was the first desktop PC processor with L3 cache.
- Later Editions of same processor were introduced with larger L2 cache rather than L3 cache.