<u>**Important Instructions to examiners:**</u>
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 six questions from the following:

    i. List any 4 features of PCI bus. (Any four features ½ M each)
1. Peak Transfer rate of 133 MBPs for 32 bit bus width (33.33x 32 = 133MBPs)
2. Peak Transfer rate of 266 MBPs for 64 bit bus width
3. It can work with 32 or 64 bit bus width
4. It uses 3.3V or 2.2V for operations and consumes less power
5. It is device independent i.e. it can be used with different devices such as hard disk controller, sound cards, LAN cards etc.

    ii. Explain the term cluster. (Explanation 2M)
Cluster: When the OS writes some information on the hard disk, it uses a unit called cluster. It is the minimum space allocated by the OS while storing any information on the disk. Since a cluster can be made of more than one sector, using clusters as allocation unit reduces the size of the FAT. Clusters are used to allocate storage area for the data area only. Each cluster has a unique ID, which enables the hard drive to locate all the clusters on the disk. For e.g. in DOS a cluster can store 512 MB of data

    iii. List advantages of CRT display related to LCD (Any four 1/2M each)).
1. CRT monitors cost less than LCDs.
2. CRT monitors represent colors and different generations of colors better than LCD monitors.
3. CRT monitors have fewer problems with ghosting and blurring because they redraw screen image faster than LCD monitors.
4. CRT monitors can handle multiple resolutions, LCD monitors do not.
5. CRT monitors are more rugged than LCD monitors.
6. Viewing angle is much larger than LCD monitor(approx 180)

    iv. Define Landing zone. (Definition 2M)
Landing Zone: It is the non-data space on a computer's hard disk where the read/write heads rest, or park, when the computer's power is turned off.

v.   **State symptoms of power problem. (Any 2 -1M each)**

Following are some of the situations that suggest chronic power problems.
1. The lights tend to flicker or periodically vary in intensity.
2. There are frequent or regular errors in data transmission between network nodes.
3. The PC stalls, crashes or reboots for no apparent reason.
4. Chronic or frequent component failure.
5. Chronic or frequent hard drive failure or file access problems.
6. The CMOS RAM or modem NVRAM periodically loses its contents or becomes corrupted.
7. The PC behaves erratically when other high energy devices are turned on.
8. The modem regularly loses its connection or fails data transfers.
9. The monitor display flickers or waves.
10. Chronic or frequent errors while writing data to the disk.

vi.   **List 2 features of SCSI interface. (Any 2 features 1M each)**
1. It is a system level interface which is not based on any specific device, but it uses signals converted from device level signals to the signals used by the host computer system. A HDD, printer, scanner etc require different device level interface, but can use same system level interface.
2. A SCSI connection is an expansion bus into which up to 8 different devices can be supported. (8 different deices for SCSI 1 up to 32 devices for SCSI 3)A SCSI adapter card used to connect a SCSI device to the system I/O port is treated as one of the devices hence 7 more devices can be connected in single SCSI host adapter.
3. One of its main uses is to connect HDD, printer, scanner, CD-ROM drive that require high speed communication with the computer.
4. In SCSI different peripherals are connected in daisy chain, each new device is connected at the end of the old device.

vii.   **Name any 2 H/W and S/W tools used for troubleshooting of PC.(Any 2 – 1m each)**
Hardware tools (Any 2)

- Analog Oscilloscope
- Digital Oscilloscope
- Logic Analyzer
- Logic Probe

Software tools (Any 2)
- Microsoft diagnostics DOS MSD command.
- Norton utilities.
- CHECKIT.
- Quick analysis (QA+).
- ATDIAGS
- POST

B.   Attempt any two questions from the following.

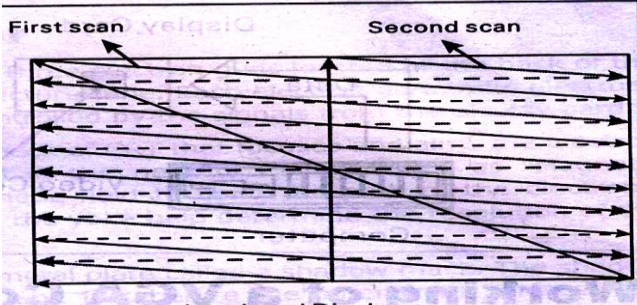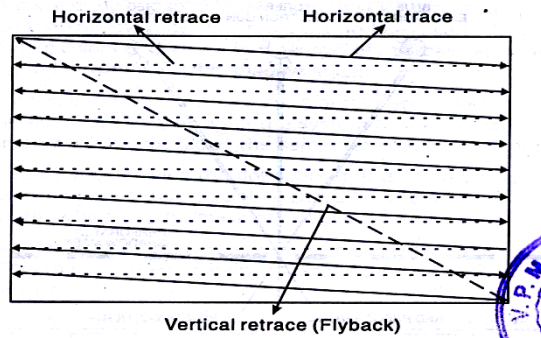**i)**   **Differentiate between interlaced and non-interlaced display((Any four 1M each)**

Interlaced	Non - interlaced
1. Scans every other line of the image in one pass & the remaining lines in other pass	Scans all lines in single pass
2. Difficult on the eyes	easy on the eyes
3. Flicker is more	Flicker is less

| 4. Effective image refresh rate is half the vertical scanning rate	Entire image is refresh at vertical Scanning rate
5. Interlaced Display	

ii)   Explain partitioning in detail. (Explanation 4M)

Partitioning
Partitioning is done for two purposes:
1. To have more than one operating system on the same drive.
2. To have more than one logical drive.

- When a disk is partitioned, the partition program writes a Master Boot Record (MBR) in the first physical sector of the hard disk i.e. Cylinder 0, head 0. Sector 1.
- The MBR sector contains a small program to load the operating system from the bootable partition.
- It also contains the partition table which gives information about the different partitions on the drive, their starting cylinder, head sector, ending cylinder, head sector locations etc.
- The partition table also indicates to the ROM BIOS which partition is bootable, so that BIOS can load the proper operating system.
- It also contains the partition table which gives information about the different partitions on the drive, their starting cylinder, head sector, ending cylinder, head sector locations etc.
- The partition table also indicates to the ROM BIOS which partition is bootable, so that BIOS can load the proper operating system.

iii)   Draw and explain block diagram of SMPS.(Diagram 2 M, Explanation 2M)
(Any other correct diagram and explanation can also be considered)
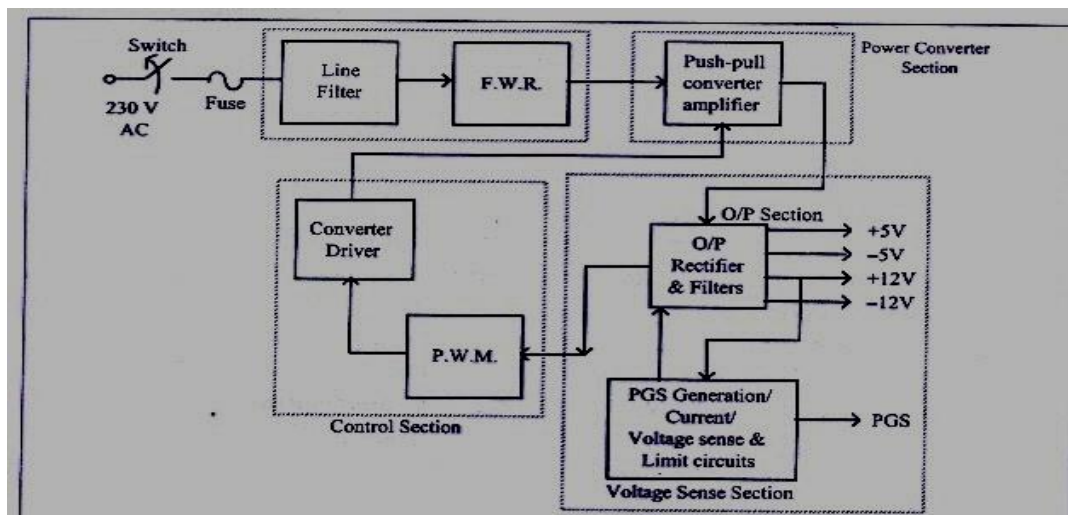
SMPS used in a PC has five sections
AC input section
- Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining.

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, -!2V) 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.

Q.2. Attempt any four question from the following:

a) **Explain the concept of cache memory with its types. (mark for definition & 1 mark for each type of cache)**

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.
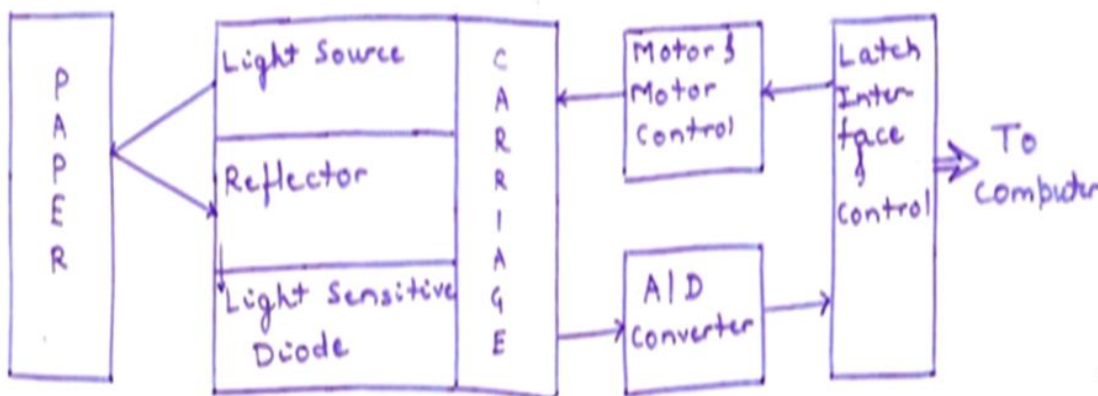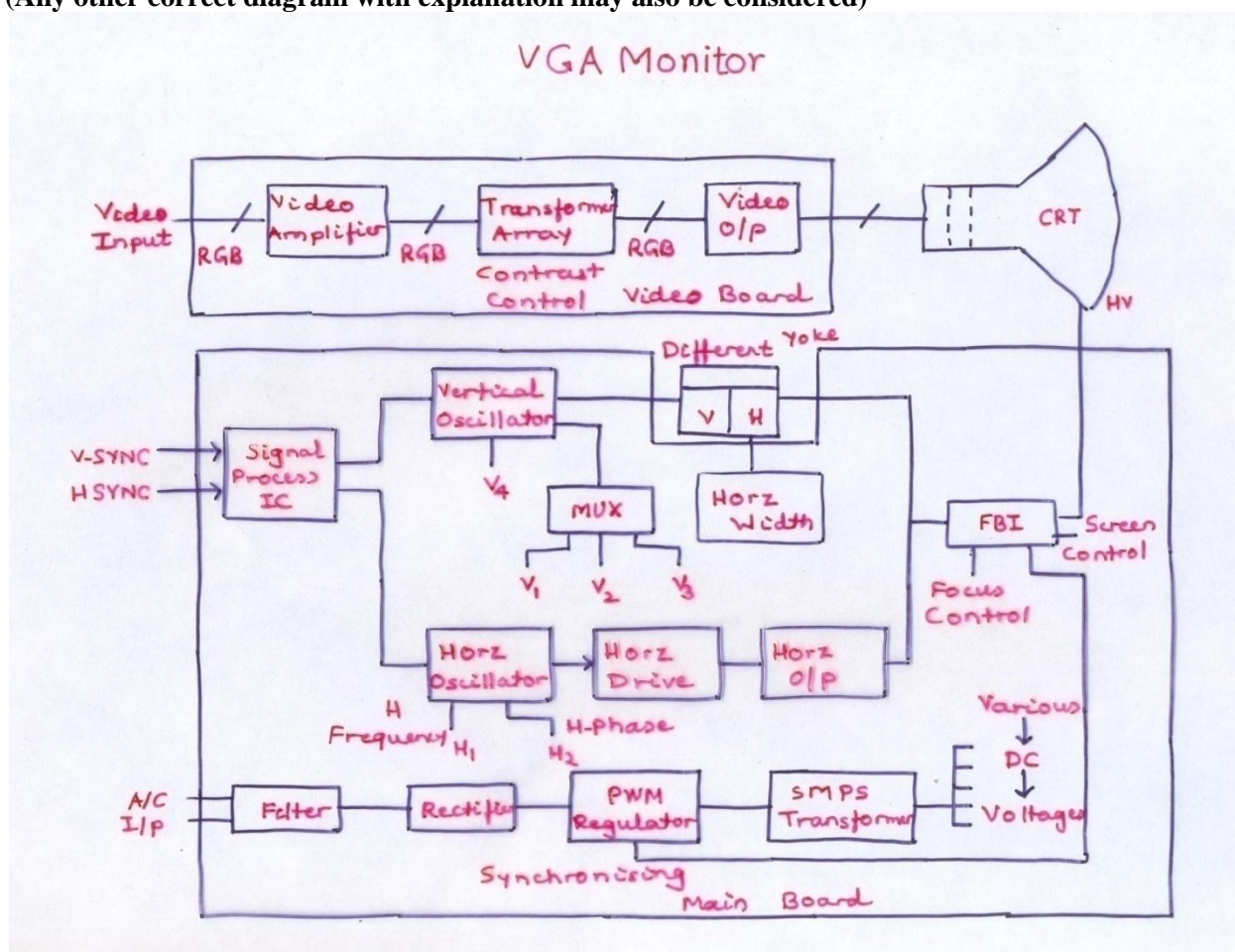
b) **Draw functional block diagram of flat bed scanner. (diagram with correct labels 4M)**

c) **Draw and explain block diagram of CRT color monitor. (Diagram 2M, Explanation 2M)**
(Any other correct diagram with explanation may also be considered)

POWER CIRCUIT: To provide different DC voltages required in the monitor. AC input is filtered & rectified & modulated using PWM and is then given to the primary of SMPS transformer. The O/P of the transformer is the DC voltage of various values such as 75V, 165V, 5V, 15V, 6.3V, -12V etc.

VIDEO BOARD:
1. It contains circuits for displaying the video information as dots on the CRT screen.
2. It receives video signal from the PC and displays it on the monitor.
3. Three separate electron guns are used for three primary colors R, G, B.
4. Three complete video drive circuits are required to process information about three colors.
5. R, G, B analog signals are amplified using video amplifier and then applied to the transistor array for further amplification.
6. Signal processing IC separates the horizontal and vertical signals which   are sent to the horizontal and vertical processing circuits.

VERTICAL DEFLECTION CITCUITS
They contain the vertical oscillator circuit and a multiplexer. V-sync signal is applied to the vertical oscillator which works as voltage controlled oscillator.
Frequency of the oscillator is controlled by varying voltage V4.

HORIZONTAL DEFLECTION CIRCUIT:
H-sync is applied to the horizontal drive IC horizontal oscillator frequency is controlled by H1, H2 inputs.

FBT (FLY BACK TRANSFORMER)
The FBT's primary winding is coupled to the horizontal O/P transistor. Another primary winding is used to compensate the high voltage level for changes in brightness and contrast. Flyback voltage is generated during horizontal retrace.
The topmost tap from the FBT secondary provides high voltage to CRT anode; lower tap provides voltage to focus circuit.

d) **Explain working of membrane key switch. ((Diagram 2M, Explanation 2M)**
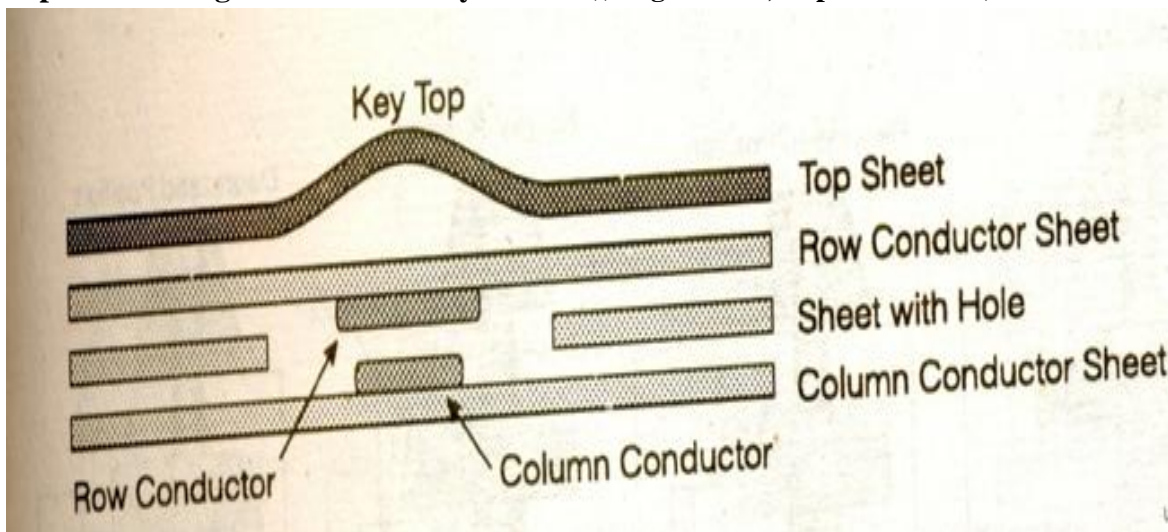
1. It is a multi-layer plastic or rubber assembly.
2. It is used as keyboard in video game machines, calculators, medical instruments, cash registers etc.
3. Two rubber or plastic sheets are used as row conductor sheet and column conductor sheet.
4. Row and column lines are made on the plastic or rubber sheet using silver or some other conductor ink.
5. The sheets are separated by another sheet with holes at the key top positions.
6. When key top is pressed it forces the row conductor sheet to touch the column conductor sheet through the hole.
7. When there is a contact between row and column lines, it is interpreted by the keyboard interface as key closure.

e) **Describe the following related to LCD. (Each explanation 2M)**

   a) **Refresh Rate :** rate at which electronics in the monitor address the brightness of each pixel on the screen. Typically is 60 to 75 Hz. For each LCD monitor maintains constant light output from one addressing cycle to the next. Hence there is no need to set a high refresh rate.

   b) **Response time:** Time taken by throughput of a pixel to fully react to a change in its brightnes**s.** Recommended < 12ms,Typical 4 – 6 ms.

f) **List and explain motherboard selection criteria (Any four 1M each)**
   - **Motherboard Chipset**: Motherboard should use a high performance chipset that supports DDR or DDR2 SDRAM DIMMs. It should also support PCI- Express X16 video support and Serial ATA or faster hard drive support.
   - **Processor**: A modern system should use a socket based processor with on-die L2 cache. The processor should have highest speed CPU bus (Front Side Bus: FSB).
   - **Processor Sockets**: For maximum upgradability and performance, a socket based system should be used. The main sockets used are Socket A(Socket 426) for Athlon XP and Socket 775 for Pentium 4.
   - **Motherboard Speed:** 200MHz to 400MHz for Duron/Athlon/Athlon XP –based boards and 400MHz to 1066MHz for Pentium 4 based boards.
   - **Cache Memory:** Use a processor with full core speed on-die L2 cache as it offers maximum in performance.
   - **SIMM/DIMM/RIMM memory:** Current systems use either DDR or DDR2 DIMMs. Currently DDR and DDR2 SDRAM and RDRAM are the fastest type of memory available, with RDRAM being by far the most costly.
   - **Bus Type:** Current systems offer PCI as well as PCI Express slots. PCI slots should confirm with PCI 2.1 or later revision. Systems without on-board video should also feature PCI Express X 16 slot.
   - **Basic Input Output System (BIOS):** The motherboard should use industry standard BIOS such as those from AMI, Phoenix or Award. The BIOS should be of a flash ROM or EEPROM design for easy updating.
   - **Form Factor:** For maximum flexibility, performance, reliability and ease of use, motherboard with ATX form factor should be used.
   - **Built-in Interfaces:** The motherboard should contain as many built-in standard controllers and interfaces as possible.
   - **On-board IDE interfaces:** It should be included on the motherboard.
   - **Power Management:** The motherboard should support the latest standard for power management which is ACPI.
   - **Documentation:** Good technical documentation is essential. It should include information on all jumpers and switches found on the board, connector pin out for all connectors, specifications for other plug-in components etc.
   - **Technical Support:** Good online technical support goes beyond documentation. It includes driver and BIOS updates, FAQs, updated tables of processor and memory compatibility, and the utility programs to help you monitor the condition of your system.

Q.3. Attempt any four questions from the following:
   a) **Draw and explain block diagram of internal modem.**

   Internal Modem (diagram 2 marks, explanation 2 marks)
- It contains its own Universal Asynchronous Receiver/Transmitter (UART).
- A modulator Circuit converts the serial data from the computer into audio signals to be transmitted over telephone lines. This modulated audio is then coupled to the telephone line. The signal passes through telephone jack (RJ 11) connector at the rate of the modem to the telephone line.
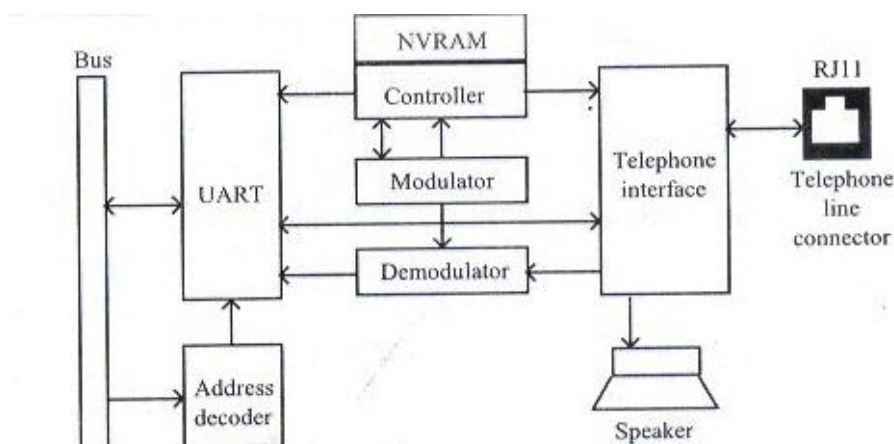
- On the receiver side, signals received from the telephone line must be translated into serial data. The telephone interface separates the received signals and passes them to the demodulator. After demodulation the resulting serial data is passed to UART, which in turn converts the serial bits into parallel words that are placed on the system's data bus.
- The telephone interface also generates Dual Tone multi Frequency (DTFM) dialing signals needed to reach a remote modem. When the remote modem dials in, the telephone interface detects the incoming signal and alerts the UART to begin negotiating a connection.
- The telephone interface drives a speaker. During the initial stages of modem operation the speaker is used to hear the dial tone, dialing signals, and audio negotiation between the two modems. Once the connection is established, the speaker is disabled.
- The controller circuit manages the overall operation of the modem. It switches the modem between the control and data operating modes. The controller accepts commands from the modulator that allow the modem characteristics and operating parameters to be changed.
- In the event of power loss or reset conditions default modem parameters can be loaded from NVRAM. Permanent changes to modem parameters are stored in the NVRAM.

b) Differentiate between online and offline UPS (any 4 pt 1 M each).

| Sr. No	Online UPS	Offline UPS
1.	An on-line UPS continuously powers the protected load from its reserves (usually lead-acid batteries or stored kinetic energy), while simultaneously replenishing the reserves from the AC power.	An off-line UPS remains idle until a power failure occurs, and then switches from utility power to its own power source, almost instantaneously.
2.	The on-line type of UPS, in addition to providing protection against complete failure of the utility supply, provides protection against all common power problems, and for this reason it is also known as a power conditioner and a line conditioner.	The Off-line type of UPS provides no protection against common power problems
3.	The online UPS runs all the time. The charger now runs the inverter, as well as maintaining charge on the battery. The inverter supplies the load. Power goes from input to charger to inverter to output.	The offline UPS is in standby mode. The charger is maintaining the battery, but the inverter stage is not running. Power goes from input to output, bypassing the inverter.
4.	In this type of UPS isolation from mains is	In this type UPS isolation from mains is not

	available.	available.
5.	In this type of UPS frequency stability is not available on the mains power.	In this type of UPS frequency stability is always available.

c) **Draw functional block diagram of Dot matrix printer. (4M for diagram)**
   (Any other correct diagram may also be considered)

Fig. 4.29 Block diagram of Dot Matrix Printer
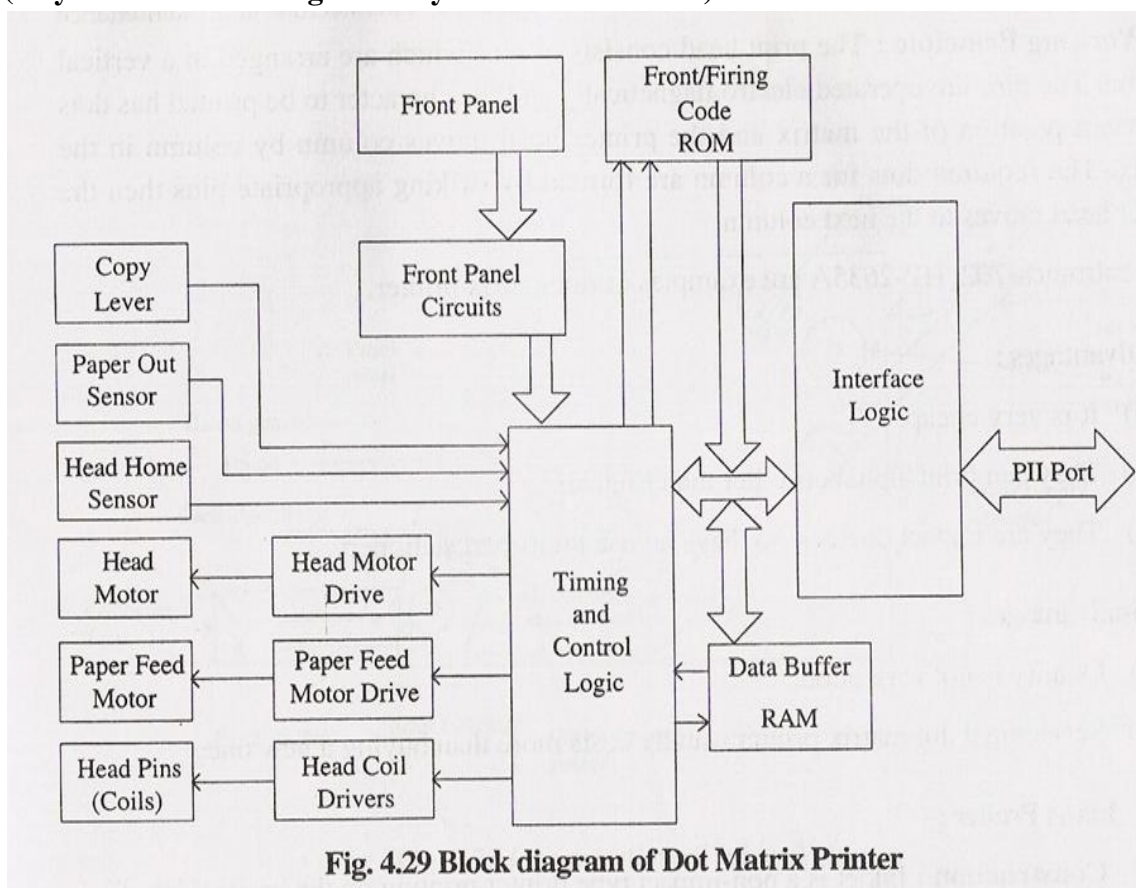
d) **Describe any 4 signals of centronics interface from printer to PC. (Any 4 signals 1M each) (Diagram optional)**
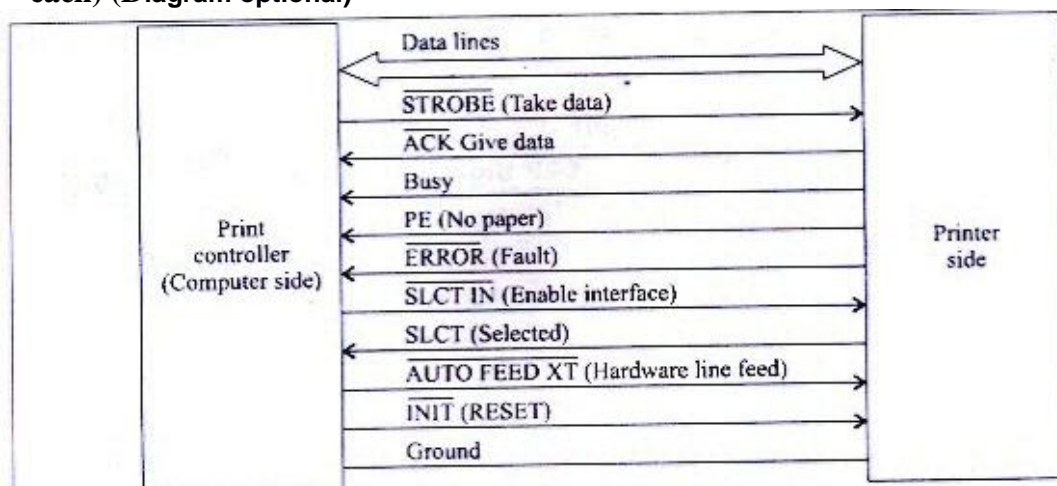
Centronics interface

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, 8

signals are data bits and four signals are control signals. All control signals are active low. The control signals are:

There are five status signals from printer to PC.

$\overline{\text{ACK}}$: 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.

SLCT: It indicates that the printer is selected and logically connected to the PC.

BUSY: When the busy signal is high, it indicates that the printer is busy and it cannot receive data. This signal can become high in any of the following conditions:

1. On receiving active strobe signal.
2. During printing operation.
3. When the printer is in offline state.
4. When the printer senses some error condition.

   ERROR: It indicates that there is some error condition in the printer. There can be three reasons for this signal to go high.
1. Mechanical fault or electronic fault in the printer.
2. The printer is in offline state.
3. There is no paper in the printer.

   e) **Explain the following power related problems.(2 marks each) (Diagram optional)**
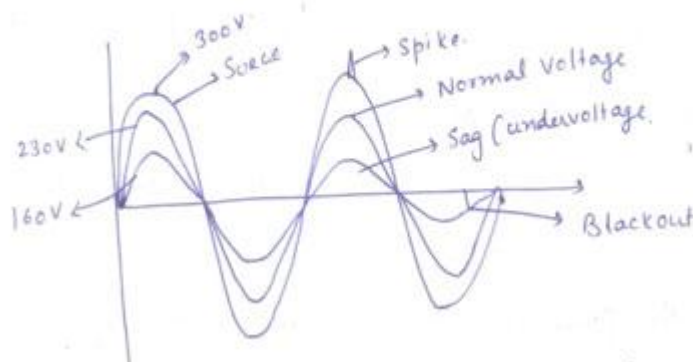
   a) **Blackout**

   Blackout: It is the complete loss of electrical power where voltage and current drop to a very low value (typically zero). They are caused due to physical interruption in the local network.

   b) **Brownout**

   Brownout: It is the under voltage condition caused by faulty electrical wiring or excessive electrical load on an AC circuit.

   f) **Explain four features of USB. (Each feature 1 mark, any 4 features)**

   Universal Serial Bus (USB)

   Easy installation, faster transfer rate, simple cabling, and multiple device connections.

- Up to 127 devices can connect to the host, either directly or by way of USB hubs.
- Individual USB cables can run as long as 5 meters; with hubs, devices can be up to 30 meters (six cables' worth) away from the host.
- With USB 2.0,the bus has a maximum data rate of 480 megabits per second.
- A USB cable has two wires for power (+5 volts and ground) and a twisted pair of wires to carry the data.
- On the power wires, the computer can supply up to 500 milliamps of power at 5 volts.
- Low-power devices (such as mice) can draw their power directly from the bus. High-power devices (such as printers) have their own power supplies and draw minimal power from the bus. Hubs can have their own power supplies to provide power to devices connected to the hub.
- USB devices are hot-swappable, meaning you can plug them into the bus and unplug them any time.
- Many USB devices can be put to sleep by the host computer when the computer enters a power-saving mode.
- The devices connected to a USB port rely on the USB cable to carry power and data**.**

Q.4. Attempt any four of the following:
   a) Describe in brief: (2 Marks Each)

   a) Conventional memory
   - The PC and PC-XT systems used 8086/8088 processor. These chips had 20 address lines hence the processor could access 2^{20} bytes or 1 MB of memory.
   - Out of 1MB, 0 – 640 Mb of this memory was used by DOS and other programs such as WordStar, Lotus etc. This 640 KB is known as conventional memory or Dos memory or Base memory. Even today to make the older software and hardware compatible to the new generation software and hardware the 640 KB limitation exists.

   b) Extended Memory:
   It is the memory beyond 1 MB limit. Any memory available after 1 MB is called extended memory. It is available in 286 and later processors only. Extended memory is of no use for DOS users because DOS does no the use of this memory. For windows users this memory is very useful as the OS can use this extended memory by allowing multiple Dos programs to run in the extended memory in its own 640 KB memory area.

   b) Enlist servo technique and explain embedded servo. (2 marks for type and 2 marks for explanation)

   Servo based system is also called as track following system as the R/W head follows the track on the disk surface.
   Three types of servo information can be used to control the voice coil based head positioning system.
   1.   **Wedge Servo**:
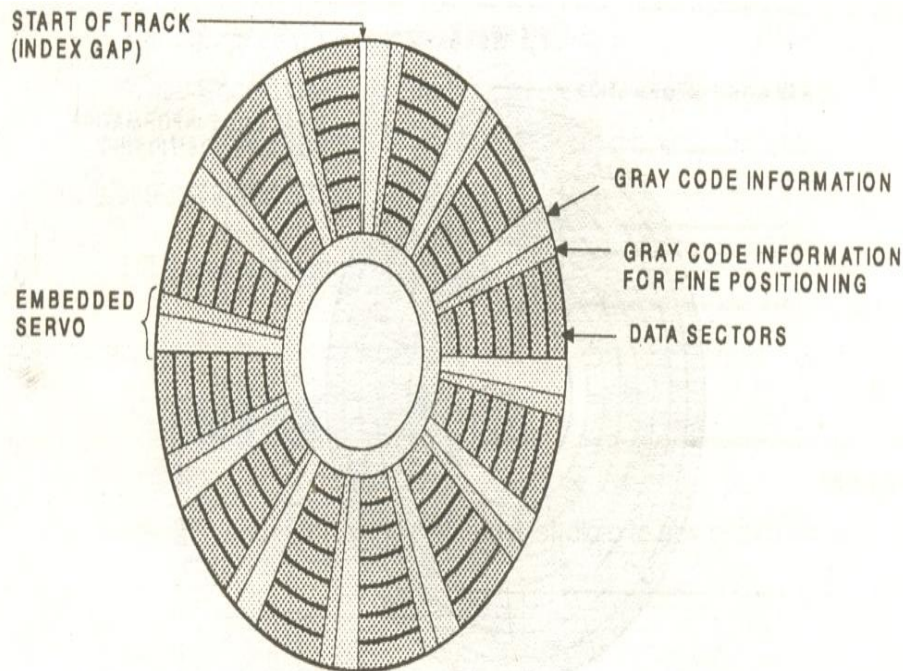   2.   **Embedded servo**
   3.   **Dedicated Servo**

Embedded servo: Servo information is kept at the beginning of each sector. This allows the head positioning system to receive the current position many times in a single rotation; this makes the head positioning to be more precise and faster.

c) **Draw and explain block diagram of LCD monitor.**

LCD monitors. (Block diagram – 2 m; explanation – 2m)
(Any other correct diagram and explanation may also be considered)
Backlight: The amount of light supplied by Back Light is determined by the amount of movement of the liquid crystals in such a way as to generate color.
Driving Circuit Unit
Driving an a-Si TFT LCD (Thin Film Transistor Liquid Crystal Display) requires a driving circuit unit consisting of a set of LCD driving IC (LDI) chips and printed-circuit-boards (PCBs).
LCD Panel:
A TFT LCD panel contains a specific number of unit pixels often called subpixels.
Each unit pixel has a TFT, a pixel electrode (IT0), and a storage capacitor (Cs).
**Generation of colors:**
The color filter of a TFT LCD TV consists of three primary colors - red (R), green (G), and blue (B) - which are included on the color-filter substrate.
The elements of this color filter line up one-to-one with the unit pixels on the TFT-array substrate.
Each pixel in a color LCD is subdivided into three subpixels, where one set of RGB subpixels is equal to one pixel.

LCD Module   LDI: LCD Driving IC
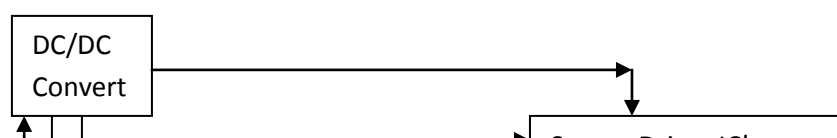
d) Explain steps involved in high level formatting.(1 mark for each point)
High Level Formatting

- It is done with the help of OS.
- 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.
- 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.
  After the 2nd copy of FAT blank root directory is created

e) Explain the following protection devices:(2 Marks each)
a) Circuit Breaker

- This device is a switch capable of responding to dangerous overload levels in an electrical circuit.
- When installed the switch detects if the current level of the line is too high and instantaneously trips and switches off.
- This effectively disconnects the circuit.
- It protects the computer from damage due to failure or malfunction of other equipments that are present in the same line.

b) Surge Suppressor

- These circuits are designed to absorb high voltage transients produced by lightning and other high energy equipment. Protection is accomplished by clamping voltages above a certain level. Metal oxide varistor's are often included that respond quickly and clamp the voltage.
- The MOV is a disc shaped electronic component made from a layer of zinc oxide particles held between two electrodes. The granular zinc oxide offers a high resistance to electricity until the voltage reaches a break over point. The electrical current then forms a low resistance path between the zinc oxide particles. The MOVs are designed to accept voltages as high as 6000V and divert any power above 250V to ground.
- MOVs degrade with each spike. Once they have passed a number of surges they must be replaced by new a one. Many suppressers show a LED when the MOV has blown.

f) Draw and explain pin diagram of RS-232.(2 marks diagram 2 marks 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.
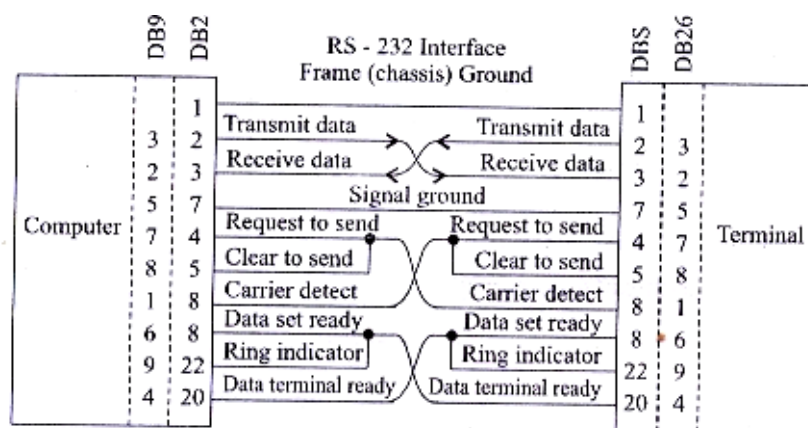
: **RS232 interface signal connections between computer and terminal device**

Q.5. Attempt any four of the following:

a) Draw and explain intel hub architecture in detail.(Diagram 2 marks explanation 2 marks)

Intel's hub architecture for 8x and 9xx chipsets uses Memory Controller Hub (MCH) and I/O Controller Hub (ICH) via a 266MB/s bus known as Direct Memory Interface(DMI). MCH supports memory and AGP where as ICH provides connectivity for PCI, USB, sound, IDE and LAN.

Since ICH is not connected to PCI bus, hub architecture enables greater throughput for devices directly connected to ICH such as USB, IDE interfaces etc.

MCH interfaces between high speed processor bus (800/533/400/133/100/66MHz), hub interface (66MHz) and AGP bus (533/266/133/66MHz). ICH interfaces between hub interface and IDE ports and the PCI bus. The ICH includes Low Pin Count bus (LPC) which is 4 bit wide version of PCI to support motherboard ROM BIOS.
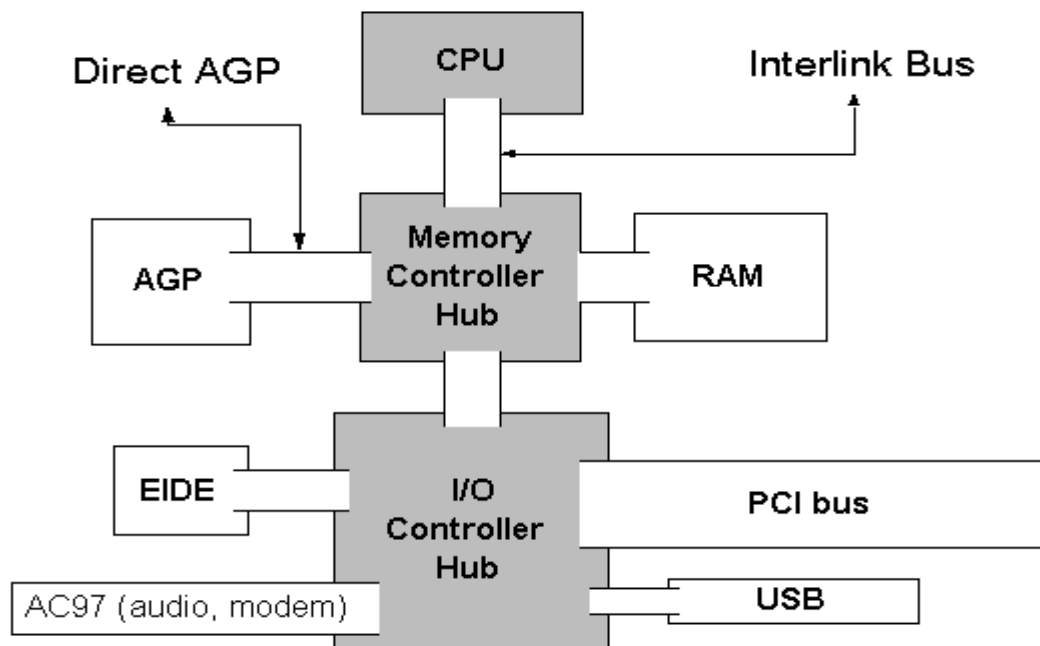
b) Draw waveform of FM, MFM recording technique for the data pattern 11011000 and also count the number of pulses.(Diagram- 1½ M each ; pulse count ½ M each)
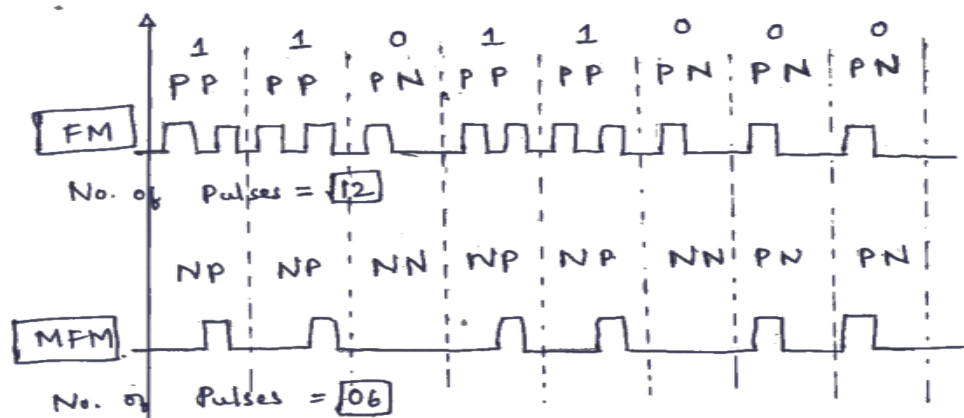
c) **Write causes and preliminary checks for the following. (any two causes (1M) and two preliminary checks (1M) in each)**

a) **Won't boot :**
This problem is faced under startup, when the system is powered on. The causes are,
- Damaged OS hard disk; Bad bootable disk
- Defective read/write head in hard disk
- Bad signal cable
- DMA controller fault
- Incorrect power supply output
- Bad command.com

Preliminary checks:
- Check external power cable is plugged into the system unit and wall unit
- Check SMPS
- Power supply output connected to motherboard
- Check hard drive connections
- Check CMOS setup

b) **Run Problems:**
These occur while the system is running
Causes:
- Bad Hard disk
- Motherboard problem
- Virus problem
- Bad hard disk cable
- Memory problem

Preliminary Checks:
- Check hard disk connections, jumper settings
- Check antivirus updates
- Check memory cards and insert them properly
- Try HDD on another good system

d) **Explain the following terms related to HDD.(each for 2 Marks) (Diagram optional)**
a) **Cylinder:** 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
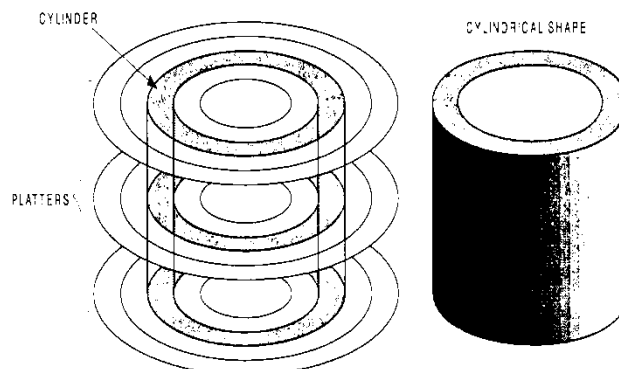
a) **Zone bit recording:**

- A new recording scheme is used by current high capacity IDE and SCSI HDDs to store more sectors in outer track compared to the number in the inner track
- This method is called zone bit recording
- In this method, the platter is divided into number of zones, each zone will have a fixed number of sectors / track
- The controller used with the drive has one additional job of converting the odd number of sectors/ track in different tracks into standard no. of sectors/track
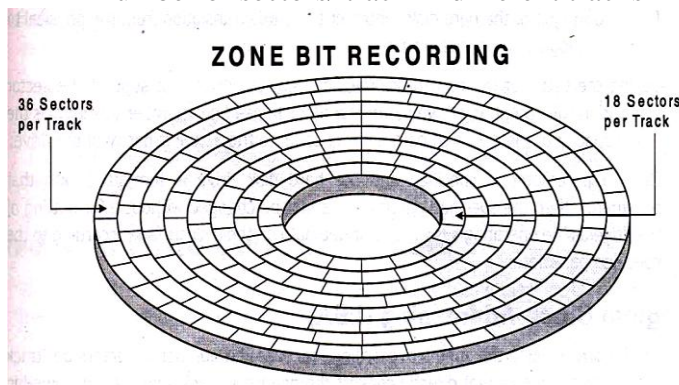
e) **Differentiate between Firewire and USB.(any 4 points each 1M.)**

USB	FIREWIRE
Speed low 12Mbps High 480 mbps	Speed low 400 Mps High 800 Mbps
Max 127 devices	Max 63 devices
All devices talk with the host adapter and the adapter talks with other devices. Device to device communication not possible	All devices talk with the host adapter as well as other devices on the same peer. Device to device communication possible
Inexpensive and widely used	Expensive hence used less widely
Cable type- twisted pair (4 wires – 2 power , 1 twisted pair set)	Cable type-Twisted pair (6 wires-2 power,2 twisted pair set)
Network topology-Daisy chain	Network topology-Hub

f) **Give the preventive maintenance for keyboard.**
Preventive maintenance of KEYBOARD – (Any 4 points 1M each)
- Handle the keyboard carefully.
- Press the keys gently without applying pressure.
- Do not spill liquids on the keyboard.
- Clean interior of the keyboard using vacuum cleaner or blow away the accumulated dirt.
- Use dust cover for keyboard when not in use.
- Make sure the cable is not subjected to high stress at the keyboard end.

Q.6. Attempt any four of the following:

a) Write 4 feature of blue ray disk specification. (Any four points -1M each)

Blue ray disk specifications:

1. Large Storage Capacity
   There are presently two main types of Blu-ray Discs, single layer and dual layer, or BD-25 and BD-50, respectively. A BD-25 can hold up to 25GB (Gigabytes) of data. A BD-50 can hold up to 50GB of data. This translates into approximately 4 hours of HD video (or 11 hours of SD video) on a BD-25.

2. High Resolution Video
   Blu-ray Disc delivers up to 48 Megabits per second of rich, high definition video content.

3. Superior Audio Experience
   Blu-ray Disc has support for up to 7.1 channels of high definition, uncompressed surround sound; with additional support for up to 32 simultaneous streams of audio.

4. Increased Durability
   Recent advancements in polymer technology have made the surface of Blu-ray Discs more durable than their CD and DVD counterparts. Replicated BDs use proprietary "hard coating" techniques to add a scratch-resistant layer to the discs and duplicated BD-R and BD-RE used a similar spin-coated protection layer

b) Explain the following modes of processor.(each mode 2 marks)

a) Real mode:
Real Mode (8086 mode)
Original IBM PC could address only 1 MB of RAM as it had only 20 address lines. It could execute 16 bit instructions using 16 bit internal registers. E.g. DOS operating system. When a processor is running in real mode it has the advantage of speed but it accesses memory with some restrictions.
Later processors like 286 could run the same 16 bit instructions but much faster. The 16 bit instruction mode of 8088 and 286 processors is known as real mode. All software running in real mode must use only 16 bit instructions and live within the 20 bit (1 MB) architecture it supports. Software of this type is usually single tasking – only one program can run at a time. No built in protection exists to keep one program from overwriting another program or even the operating system in the memory.

b) protected mode:

- This is used to protect the memory from the accidental overwriting by the user.
- Also called as protected virtual address mode (PVAM)
- First added for 80286 then extended to 386 compatible CPU
- It includes paging in 286 & 386
- Virtual memory is implemented for large memory applications.
- Safe multitasking
- Protected mode is backward compatibility which means the OS with real mode can also be implemented.
- Protected mode makes use of 24-bit addressing in 286
- Protected mode include 32-bit physical and virtual address space in 386
- It has 32-bit segment offset in 386.

**c) Explain working of logic probe with suitable diagram.**
Logic probe: **(Diagram 2 marks explanation 2 marks)**

         The logic probe is a small device with a sampling tip, and a number of LEDs that indicate the state of the signal connected to the sampling tip. Two "direct" LEDs show whether the signal is high (red LED), low (green LED), off unconnected (no LED). If the signal switches quickly between the two states, both LEDs seem to be on continuously (although they aren't). A pulse logic detects transition to a state (HIGH or LOW) and generates a 0.5sec pulse lighting up separate "pulse" LEDs. A state change can be detected, even if it is only a short pulse invisible on the direct LEDs. Additionally a second signal input can be used to latch the main signal at a low-high or low-high transition of the latch input.
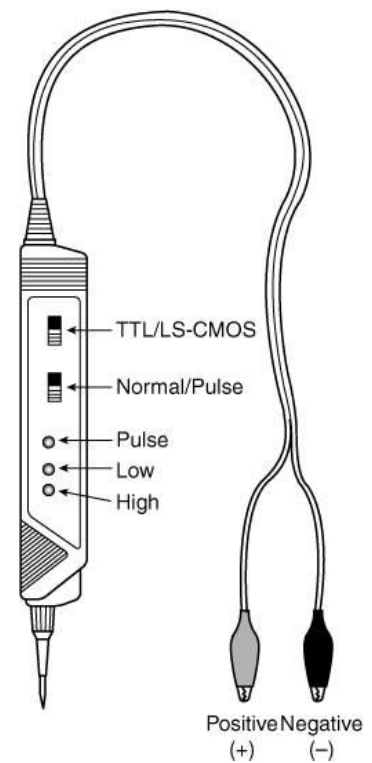
d) List symptoms of virus infection and state precaution to prevent it.(Any two - 2M symptoms, 2M for prevention)
Symptoms

  1) Unexplained slow down of the system:
      This is one main symptoms of the virus infection. If the system without any apparent reason start to take more time to load programs from the disk or starts to operates slower than the normal speed then you can suspect a virus infection.

  2) Decrease in the amount of available memory:
      When checked with CHK DSK, the system shows some KB of memory missing from the main memory or when checked with the MEM/D/P command, the memory module list shows some program resident in the memory without any proper module name.

  3) Increase in bad sectors/ lost cluster etc:
      When the number of lead sectors start increasing when the number of lost clusters reported by SCANDISK or CHKSDK start increasing without any special reason, then it could be virus infection.

  4) Cannot execute executable files:
      If .exe file start missing from directory or when executing them, we get error messages then this again is an indication of virus attacks

  5) Screen shows some unusual outputs getting messages as "or dropping of letters to the bottom of the screen. Or some special characters appearing or moving around on the screen or blank spots on the screen etc. could also be a symptoms of virus infection. Another indication could be some music being played by computer without running any specific music program**.**

6) **Driver's light turn on:**
The driver's light may turn on indicating that a read or write taking place when no R/W command is given, or when a read only disk is in the drive the system tries to write to the disk, Write to the disk, without any write command being issued are some other symptoms of virus infection. New ".com" files appear for the ".Exe" files
It shows a companion type viruses where the virus stays as a .com file for .exe file. This gives the virus a chance to get. Executed because the Dos always executed the .com file before executing a .exe file it both the file are of same name.

Prevention:
1.   Do not use pirated software.
2.   Get shareware from some reputed company BBS.
3.   Run virus scanner/ checker program regularly
4.   Use a memory residential antivirus program.
5.   Use write protect tab on the floppy disks.
6.   Always keep current version of antivirus software.
7.   Backup of data regularly
8.   Keep a watch when a service engineer visit
9.   Do not open a email attachment from unknown address.
10.   Take care when downloading files from internet.

e) **Draw and explain working of inkjet printer.(Diagram 2 marks explanation 2 marks)**
   (Any other correct diagram may also be considered)

It spits little drops of ink onto the paper to produce an image.
**Printing process**
- An ink filled print cartridge attached to ink jet's print head moves sideways across the width of sheet of paper. This sheet of paper is fed through the printer below the print head.
- The print head is made of small ink filled chambers, each attached to a nozzle smaller than human hair.
- An electrical pulse flows through a heating element i.e. thin resistors located at the back of the ink chambers.
- When current flows through the resistors, it heats a thin layer of ink at the bottom of the chamber to more than 9000 F, for several millionth of a second. This boils the ink forms a small bubble of ink vapor.
- As the bubble expands it pushes ink through the nozzle to form a droplet at the tip of the nozzle.
- When the bubble expands further, ink droplet overcomes the surface tension of ink and the pressure of the bubble forces the droplet onto the paper.
- A typical character is formed by the dot matrix of these drops.
- As the resistor cools, the bubble collapses and the resulting suction pulls fresh ink from the reservoir into the ink chamber.
- For color printing multiple cartridges of three basic colors Cyan, Magenta and yellow are used.
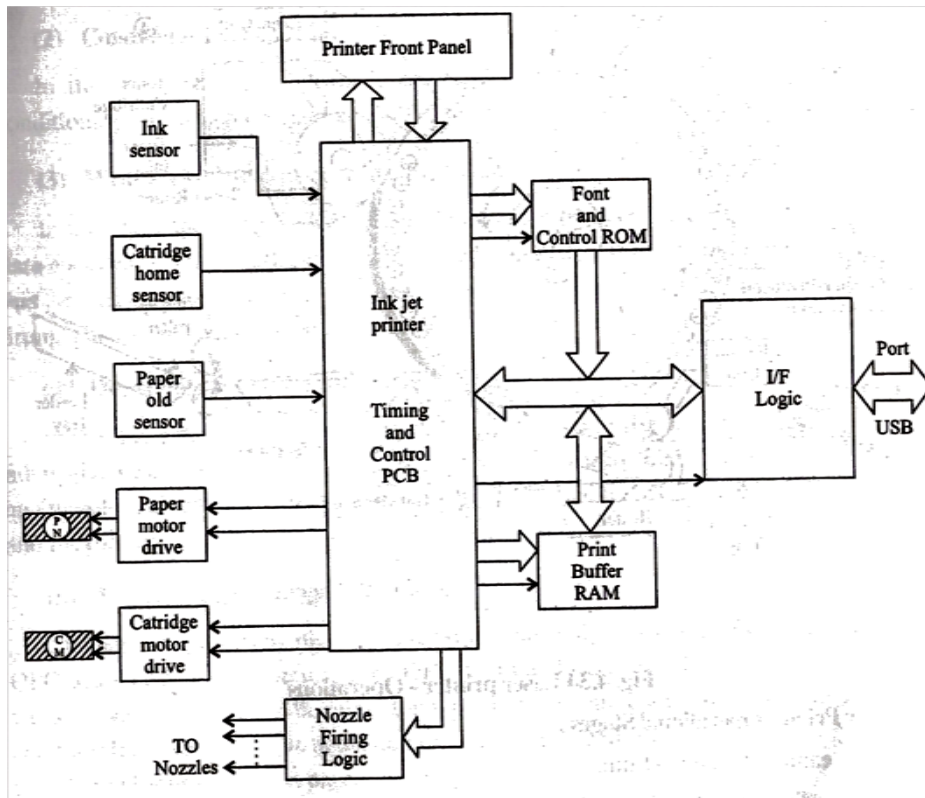
f) Explain the following term related to scanner.
a) TWAIN:(2Marks)

- TWAIN is a software driver which acts as an interpreter between scanner & software. The software can be a TWAIN compliant application. For the computer to communicate with the scanner, a TWAIN software driver should be installed.
- Although there is no full form or real acronym for TWAIN, sometimes it is referred as "Technology without an interesting name "
- TWAIN enables applications to acquire images from the scanner without having to know all the details about particular scanner. Recent versions of windows & major graphics – editing programs such as photoshop are TWAIN complaint.
- Thus the function of the TWAIN driver is the ability to acquire images directly from the scanner.

b) Interpolation : (2 marks)
Interpolation is a process that the scanning software uses to increase the perceived resolution of an image.
It does this by creating extra pixels in between the ones actually scanned by the CCD array. These extra pixels are an average of the adjacent pixels.
For example, if the hardware resolution is 300x300 and the interpolated resolution is 600x300, then the software is adding a pixel between every one scanned by a CCD sensor in each row.