



Summer – 15 EXAMINATION
Model Answer

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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 six of the following:

12

**i. Write any two modes of operation of CPU. Also mention one effect of each.
(Any Two 1M each)**

Processor modes refer to the various operating environment that affect the instructions and capabilities of the chip. The processor mode controls how the processor sees and manages the system memory and the tasks that use it.

Different Modes of operation

1. **Real Mode (16 bit software):** These 16 bit operating systems and applications are designed to run on original 8088 processor. The 16 bit instruction mode of 8088 is called the **real mode**.

2. **IA -32 Mode:** It has multi tasking capabilities. It has backward compatibility to run 16 bit OS and applications without any modification

- Protected mode (32 bit software)

- Virtual real mode (16 bit program within 32 bit environment)

3. **IA 32 e – 64 bit extension mode:** When DOS prompt is created within windows, virtual real mode is created. Several real mode sessions can be run each having its own software on a virtual PC.

- 64 bit mode (64 bit software)

- Compatibility mode

ii. Write any four recording techniques. (any four, ½ M each)

1. FM (Frequency Modulation)

2. MFM(Modified Frequency Modulation)

3. RLL (Run Length Limited).

4. Perpendicular Recording



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iii. Write two advantages and two disadvantages of LCD monitor.

Advantages: (1/2 M each, any two)

1. Light weight; can be about 15 lbs for a thin LCD. Smaller footprint on desk leaving, freeing up the work area on the user's desk.
2. Low frequency radiation is practically eliminated
3. Energy efficient, they do not generate heat.
4. Potentially less eyestrain due to reduced screen glare.

Disadvantages: (1/2 M each, any two)

1. Designed only for one optimum resolution; cannot adjust images.
2. There can be pixel defects in LCD panels.
3. LCD has smaller viewing angle and at larger viewing angle the image quality is poor.
4. The colour reproduction is poor in LCD.

iv. Write four types of key switches used in keyboard. (any four, 1/2 M each)

Types of Key switches

1. Capacitive switch
2. Hall effect switch
3. Opto-electronic switch
4. Membrane switch
5. Mechanical switch
6. Rubber dome switch

v. Write two advantages and two disadvantages of Opto-mechanical mouse.

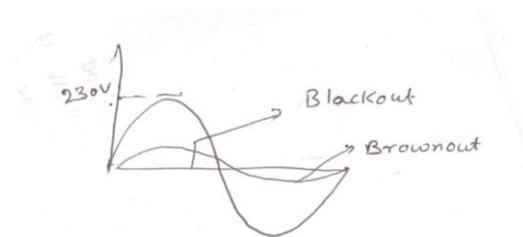
Advantages: (1/2 M each, any two point)

1. Its uses photo detector and LED for finding movement of mouse.
2. It requires less Maintenance.
3. It has few mechanical parts so life of mouse is less compare to Mechanical Mouse.

Disadvantages: (1/2 M each, any two point)

1. Its require cleaning of mouse.
2. They required special surface such as mouse pad.

vi. State the meaning of black out and brown out problem in power supply.
(1M each)



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



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vii. Write any four important features of USB port. (Any four, 2M)

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. 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. The CPU/software initiates every transaction on the USB bus. Hence the over head on the PC software increases.

viii. Write two advantages and two disadvantages of Bluetooth.

Advantages: (1/2 M each, any two)

1. Bluetooth does not require a clear line of sight between the synced devices.
2. Bluetooth transfers data at the rate of 1 Mbps, which is from three to eight times the average speed of parallel and serial ports, respectively.
3. Bluetooth technology is designed to have very low power consumption
4. Bluetooth is extremely secure in that it employs several layers of data encryption and user authentication measures

Disadvantages: (1/2 M each, any two)

1. The real-time data transfer usually not possible above 100m range.
2. Bluetooth only connect 8 devices simultaneously.

b) Attempt any TWO of the following:

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i. Explain the terms extended memory and expanded memory with suitable example. (Diagram 2M, Explanation 2M)

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 not use 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.

Expanded Memory

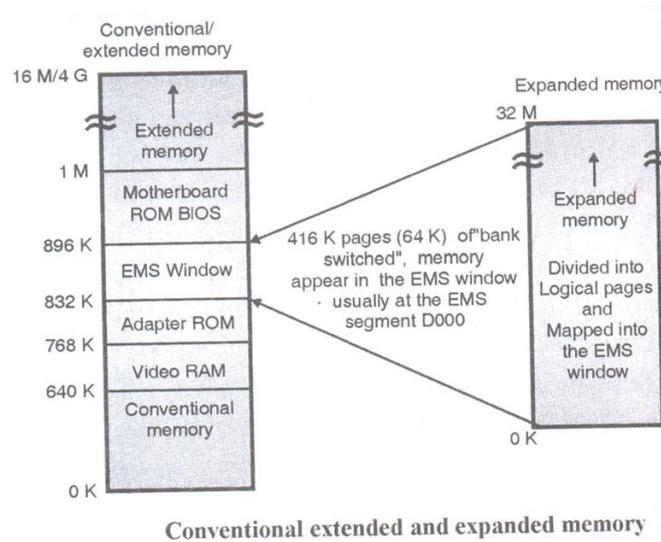
It is a specification which defines a method to access system memory above 1 MB of RAM on PC XT and AT computers. This memory is accessed via 16 KB window with in the first 1 MB. Expanded memory is not a part of main memory, it is separately installed into the system which can be accessed in fixed size pages using a method called 'bank switching' In this method a small window located in the upper memory area in the main memory is used to view the contents of EMS(*Expanded Memory Specification*).

The EMS is arranged in the blocks of 16KB each. To access this memory one block is copied in the window in main memory and after processing it is copied back to the EMS memory.

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ii. Explain the following

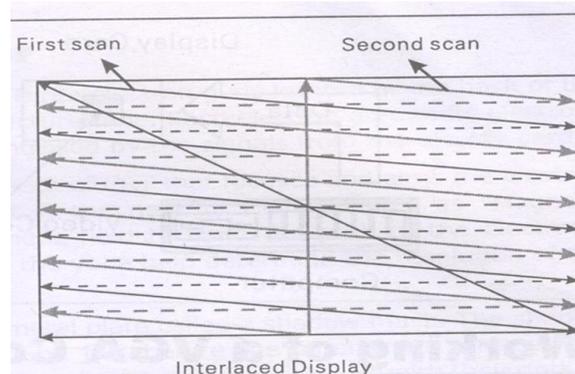
1) Interlaced scanning

2) Non interlaced scanning

(2M each scanning, 1M for Diagram, 1M explanation)

1) Interlaced scanning:

- A interlace displays draws an image as two passes. Once the first pass is complete a second pass fills in the rest of the image.
- In order to avoid a flickering image, some adapters force the monitor to create an interlaced image.
- Instead of the electron gun scanning from top to bottom in a continuous manner, on the first pass it will skip every next line.
- On the second pass, it will scan the lines that it skipped during the first pass, thus creating full image in two scans instead of one.
- The odd raster starts at the top left edge and the even raster at the middle of the CRT.
- This scanning process skips every next line, results in a maximum of 525 vertical lines. Screen flicker is much more noticeable.
- Also the effective refresh is less.



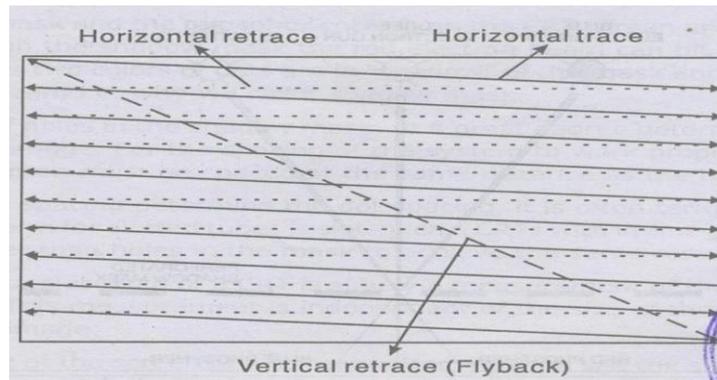
2) Non interlaced scanning:

- A non interlaced monitor draws all of the lines that compose an image in one pass
- The entire image is first refreshed at the vertical scanning frequency.
- The effective image refresh rate is only half the stated vertical scanning rate.

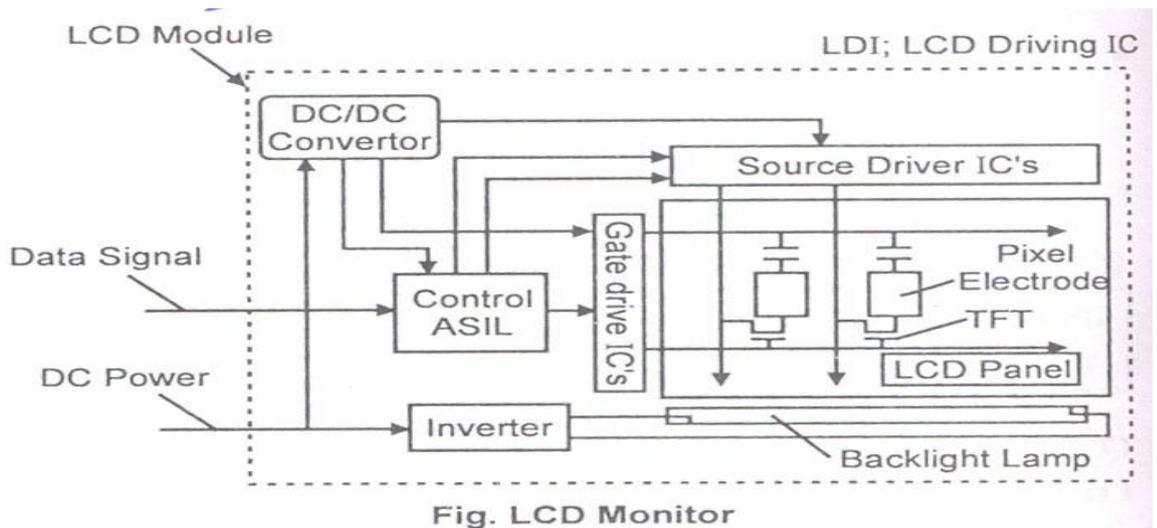
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- iii. Draw functional block diagram of LCD monitor.
(Diagram 4M)



Q.2. Attempt any FOUR of the following:

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- a) Write any important function of BIOS.

(Any Four function, 1M each)

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.

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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.

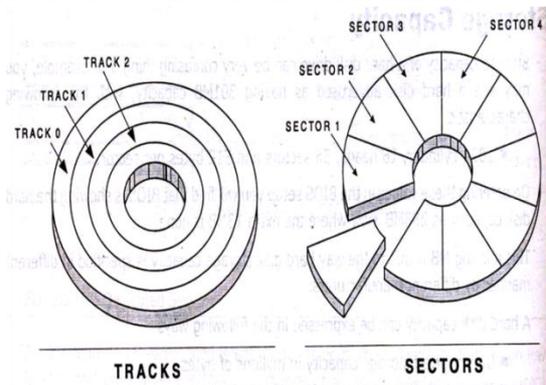
b) Explain the following with the help of neat diagram:

- i. Track
- ii. Sector
- iii. Cylinder
- iv. Cluster

(Explanation 1M each)

i. Track

- 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



ii. Sector:

- 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

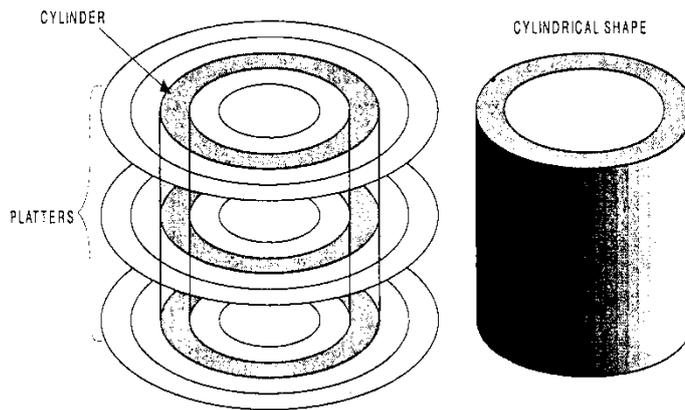
iii. Cylinder

- 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

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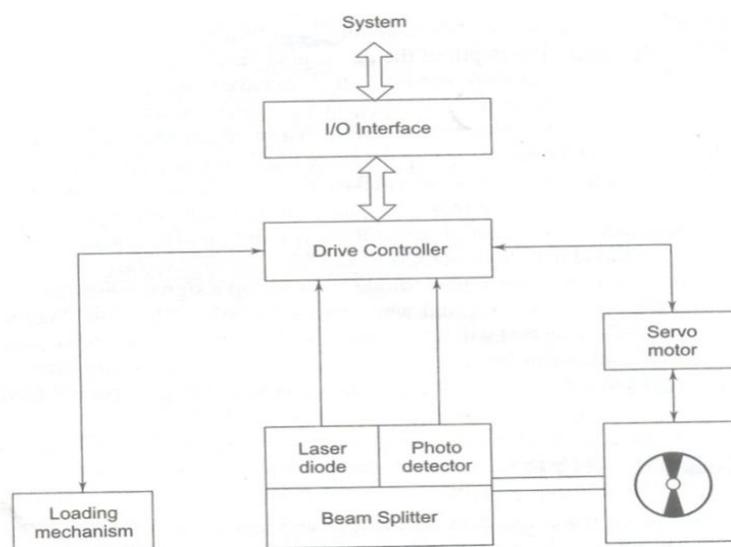
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iv. **Cluster**

- 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
- Even to store only one byte long information on the disk requires minimum one cluster area on the disk surface
- A cluster can be made up of one or more sectors; it depends on disk type being used.
- This reduces the size of FAT that DOS uses to keep track of the used and the empty disk space
- First cluster no. is taken as 2
- Clusters are used to allocate the storage area for data area only, FAT and directory areas are not allocated according to the cluster size

c) **Draw and explain block diagram of CD drive.**
(2-marks for Diagram, 2-marks for Explanation)



A CD drive consists of

1. Optical head which contains laser diode, photo detector and beam splitter
2. Drive controller



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3. Loading mechanism
4. Servo motor
5. I/O interface

Construction:

- **The optical head contains:**
 1. Laser diode, which generates the laser beam
 2. A lens system to focus the laser beam on the disc and to direct the reflected beam on to the photo detector. The beam splitter sends the reflected beam towards a different lens for focusing.
 3. Servo motors that control the position of laser and lenses to ensure correct tracking and focusing.
 4. Photo detector that detects the reflected light and converts it into electric pulses.
- Drive controller is the overall controller of the CD drive. It controls the speed of rotation and processes the signals coming from the optical head.
- The information coming from the photo detector is in the encoded form (8 to 14 Modulation) (EFM). The decoding of data is done by the microprocessor on the controller.
- The decoded data is sent to the I/O interface, which makes it available to the system.

d) Distinguished between FAT-32 and NTFS.(Any 8 Points, ½ M each)

Criteria	NTFS	FAT 32
OS	Windows 2000, XP, 2003 server	DOS V7, Win 2000,98,XP
Maximum Volume Size	2TB	32GB
Max. Files on Volume	Unlimited	4194304
Max file size	Limited by volume size	4GB
Max Cluster number	Unlimited	4177918
Boot sector location	1 st and last	First sector and copy in sector No 6
Compression	Yes	NO
Built in security	Yes	NO
Recoverability	Yes	NO
performance	High on large volume Low on small volume	Good on small volume, Low on large
Security	Folder and file access can be controlled individually	Very little
Compatibility	Not compatible with window 95/98/Me	Compatible with all OS (32 bit)
Space efficiency	Supports disk quotas to control amount of disk space per user	Does not support disk quota

e) Write any four important characteristics of colour CRT monitor.

(Any Four; Explanation 1M each)

Dot pitch: It is the distance between each group (triad) of red, blue and green phosphors. A smaller dot pitch helps produce sharper and clearer image

Resolution: Resolution describes the number of potential pixels the monitor is capable of displaying.

$$\text{Resolution} = \text{Total Horizontal Pixels} \times \text{Total vertical pixels}$$

Video bandwidth:

- It is the highest input frequency a monitor can handle and helps in determining the resolution capabilities of the monitor.
- The video bandwidth is measured in MHz.
- Higher the video bandwidth, better the image quality.
- Video Bandwidth = Horizontal. Pixel X Vertical. Pixel X Frame rate

Horizontal scanning:

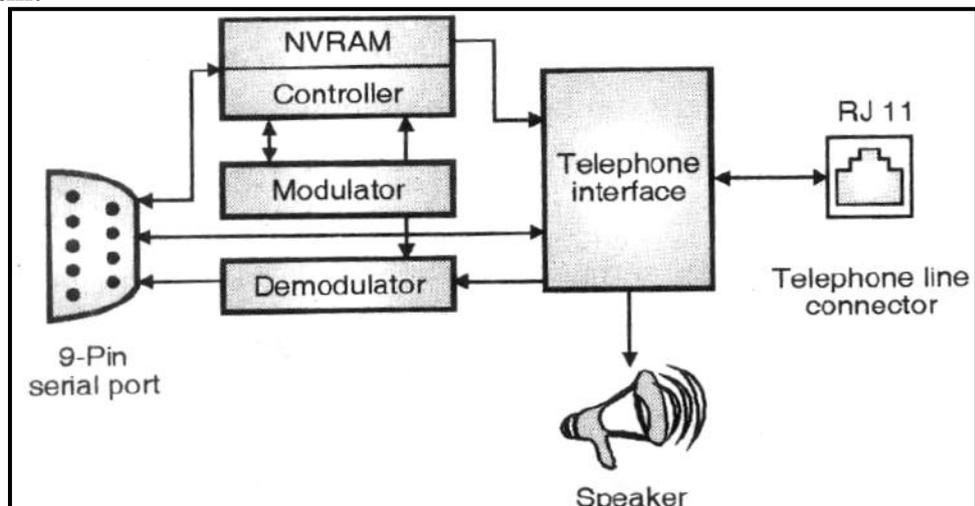
Scanning of the electron beam on the screen of the monitor is called raster scanning. The tracing of the horizontal lines in synchronism with H – Sync pulse is called Horizontal Scanning

f) Draw and explain the block diagram of external modem.

(Definition – ½ Marks Diagram – 2 Marks, Explanation- 1½ Marks)

Definition: Modem is a device used to convert the analog signals to digital and digital signals to analog.

Diagram:



Explanation:

- The external modem does not include built in UART. It uses existing serial port already configured in the PC.
- A **9 pin (DB9)** or 25 pin serial cables connects the PC serial port to the modem. Thus CPU need not be opened during modem installation.
- A **modulator** circuit converts serial data into audio signal.
- The modulated audio signal is coupled to the Telephone lines by **telephone interface**.



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- Audio signal is passing through **RJ 11** type connector at the rear of the modem to the telephone lines where signal receives from the telephone lines must be translated back into serial data.
- The signal receives from telephone lines are converted into digital information using **demodulator**.
- The **controller** circuit manages the overall operation of the modem by switching the modem between its control and data operating mode.
- During power loss or reset condition default modem parameters can be loaded from NV RAM. Permanent changes to modem parameters are stored in **NVRAM**.
- External modems avoid hardware conflicts such as (conflict of I/O address lines and that of interrupt lines) the external modem setup is faster and easier than internal modems.
- In the external modem the status of serial communication can be checked from the signal status LEDs.

Q.3. Attempt any FOUR of the following:

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a) Describe the CMOS setup. State any two importance of CMOS setup.

(Description – 3M; Importance – 1M)

During booting by pressing a function key F2 or del key CMOS (Complementary Metal Oxide Semiconductor) Set up utility is used in a PC to set up the basic properties of a computer as given below.

- **Standard CMOS Setup:** It is used to set time date, hard disk type, type of floppy drive, type of monitor and keyboard.
- **Advanced CMOS Setup:** It is used to set typematic rate and delay, above 1 MB memory test, memory test tick sound, Hil < Del > message display, system boot up sequence etc.
- **Advanced Chipset Setup:** It is used to set features of chipset.
- **Power Management Setup:** It is used to control power conservation options.
- **PCI/Plug and Play Setup:** It is used to set options of PCI bus and that of plug and play devices.
- **Peripherals Setup:** It is used to control options related to I/O controllers.
- **CPU Configuration Setup:** This setup is used to select the types of CPU installed in the motherboard. In AMI BIOS, the setting automatically finds out the type of CPU in the computer system.

Importance:

1. Used to set date and time, which in turn can be helpful to keep the system up-to-date.
2. Setting up various peripheral automatically or manually.
3. Enable or disable the devices used in the system.
4. Stores information that is updated

b) State the difference between touch screen monitor and normal LCD monitor.

(Any four difference – each 1M ; Any other suitable difference may be considered.)

- Touch screen monitors are capable of reading signals and transport it to processing unit, whereas LCD monitors are used to display the images.
- Types of Touch screens depend upon the material used for the sensitivity of the screen, whereas LCD monitors are classified based on which technology is used for the display

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- In the construction of Touch screen, more number of layers are present on the LCD layer, when compared to LCD Monitor.
- Touch Screens are interactive and hence more expensive than the normal LCD screens used only as output device.

**c) Draw and explain the RS232.
(Diagram - 2M; Explanation - 2M)**

Transmit Data (TXD): The serial data leaving the port travels on Transmit data line

Receive Data (RXD): The bits coming in from a distant serial port go through receive data line.

Data Terminal Ready (DTR): when the data terminal is able to participate in communications, it signals its readiness by applying a positive voltage on the DTR line.

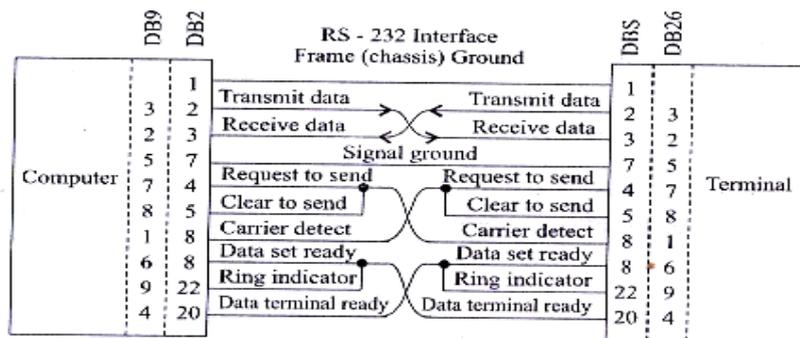
Data Set Ready (DSR): When the data terminal is ready to receive data, it signals its readiness by applying a positive voltage on the DSR line.

Request To send (RTS): 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 (CTS): 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 (CD): This signal gives a modem a means of signaling the data terminal that it has made a connection with the distant modem.

Signal Ground (GND): It provides the return path to all the signals used in the serial port.



: RS232 interface signal connections between computer and terminal device

**d) What is POST? Write applications of POST in trouble-shooting.
(POST definition-1M; Any 3 applications – 3M)**

The PC has built – in test programs which do their jobs as soon as the PC is powered on. This Power On Self Test (POST) firmware is stored in ROM on the motherboard. This ROM occupies the place (address) from where the microprocessor starts instruction processing, after a power on reset or hardware manual reset.

Applications:

The POST is a series of simple programs designed to test and catch faults in different hardware components and circuits.

It tests the microprocessor, programmable LSIs like timer, interrupt controller, PPI, DMA controller, ROM, RAM, peripheral controllers etc. If the tests are successful, the POST arranges for loading the operating system from a diskette.

If any hardware error is noticed, the POST indicates the fault to the user in four different ways:

Checkpoint: The POST outputs a number on the PPI port A.



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Beep method: The POST causes different tones (Long & Short) at the speaker.

Error Code: An error code is displayed on the CRT.

Error Message: The POST displays a detailed error message which identifies the problem area.

e) **Explain active and passive maintenance with suitable example.**

(Explanation of AM and PM each 1M; Example 1M)

Two Type of Maintenance Active and Passive

It describes several procedures to clean and lubricate all the major components, cleaning all boards, connectors, contacts etc. It also describes similar procedures for different peripheral devices such as HDD, FDD, keyboard, printer, monitor etc. It includes performing backups, antivirus and antispyware scans.

Active preventive maintenance includes

- i) Regular cleaning of the system using cleaning tools & cleaning solutions
- ii) Preventive maintenance of the system, which are either weekly or monthly.

Weekly maintenance includes

- Backup of important data
- Deleting temporary files
- Empty recycle bin
- Check for antivirus software updates
- Run defragmentation program

Monthly maintenance includes,

- Create a startup disk
- Check for updated drivers
- O.S. updates
- Cleaning the drivers

Passive preventive maintenance (1 mark)

- It involves taking care of the system from physical environment and electrical problems.
- Physical conditions such as temperature, thermal stress, dust and smoke contamination and shock and vibration.
- Electrical issues such as ESD (Electro Static Discharge), power line noise and RFI (Radio frequency interference)

Physical contributors to system failure (Any three 1 mark each)

1. Dust and pollutants

The power supply fan carries air borne particles through your system and they collect inside the system.

Prevention of dust and dirt

- Use dust covers when not in use.
- Use curtains on windows
- Use air conditioners for computer room.
- Avoid shoes into computer room.
- Avoid smoking near a PC.
- Use vacuum cleaner to clean the surrounding area of the PC frequently.



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2. Excessive temperature

Thermal expansion and contraction from excessive temperature changes places thermal stress on the system. To avoid this temperature in the room must remain relatively constant. There are two conditions of excessive temperature: Heat and Cold

Excessive heat leads to

- Breaking of solder joints.
- Damage of solid state components.
- Accelerated corrosion of contacts in the system
- Cracking of circuit boards.
- Problems with hard disk as the metallic components expand.

Prevention

- Keep the cooling vents clear.
- Keep the system dust free from inside and outside.
- Keep the disks in cool dry location.
- Install air conditioners to maintain the room temperature.

Effect of Cold

- Due to cold the resistance of electronic components decreases and the component will take very large current when the system is switched on.
- Low temperatures affect the mechanical components of the FDD.
- The floppy disk becomes brittle.

Prevention

Use room heater to maintain the room temperature.

3. Corrosion

It is a chemical process in which metal coating of pins and sockets is gradually oxidized.

Corrosion Effects

Types

Direct oxidation: In this a film of oxide is formed on the metal surface. The metal film acts as an insulator and creates contact problems.

Atmospheric corrosion: It causes rusting and reduces the electrical contact between the components.

Galvanic corrosion: Moisture borne electrolyte enters through a tiny crack or hole in the metal plating and causes corrosion.

Prevention

- Periodic cleaning.
- Clean the pins of ICs and connectors.
- Use organic solvent for cleaning the oxide layer and corroded contacts.

4. Magnetic Effect

- Magnets both permanent and electromagnetic type can cause permanent loss of data on the hard disk.
- In office electromagnetism can be produced by electric motors.
- The voltages used in monitor and television receiver are sources of strong magnetic fields.
- Other sources of magnetism:
- Paper clip holder with a magnet, stereo speakers, Magnetic screw extractor, metal detectors etc

Prevention

To avoid data loss due to magnetism, keep disks and information cables away from the magnets.



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Electrical contributors to system failure

1. ESD (Electro Static Discharge)

This problem usually arises in winter when the humidity is low. Our body can accumulate static charges up to 25,000V. When we touch any component in the PC the accumulated static charge will discharge to ground. This can damage the component.

Prevention

- Before touching any component we must discharge any accumulated potential to ground. This can be done by touching the ground area of the system.
- Use ground strap attached around your wrist. The other end of the strap is connected to the system ground.
- Use anti static mat
- Do not wear synthetic clothes.
- The system should have good power line grounding.

2. Power line noise

- A computer system should have steady supply of noise free power.
- The circuit should be checked for good low resistance ground, proper line voltage, free from interference and brownouts.
- Three pin socket is a must.
- Power line noise problem increases with wire size and length.

Prevention

Isolation, Shielding, Power grounding.

3. 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.

f) State and interpret the meaning of beep codes.

(Any four beep codes and interpretation – each 1M.)

Any other 4 beep codes such as for AWARD may also be considered.

For IBM PCs

Beep Code	Description
No Beeps	No Power, Loose Card, or Short.
1 Short Beep	Normal POST, computer is ok.
2 Short Beep	POST error, review screen for error code.
Continuous Beep	No Power, Loose Card, or Short.
Repeating Short Beep	No Power, Loose Card, or Short.
One Long and one Short Beep	Motherboard issue.
One Long and Two Short Beeps	Video (Mono/CGA Display Circuitry) issue.
One Long and Three Short Beeps.	Video (EGA) Display Circuitry.
Three Long Beeps	Keyboard or Keyboard card error.
One Beep, Blank or Incorrect Display	Video Display Circuitry.

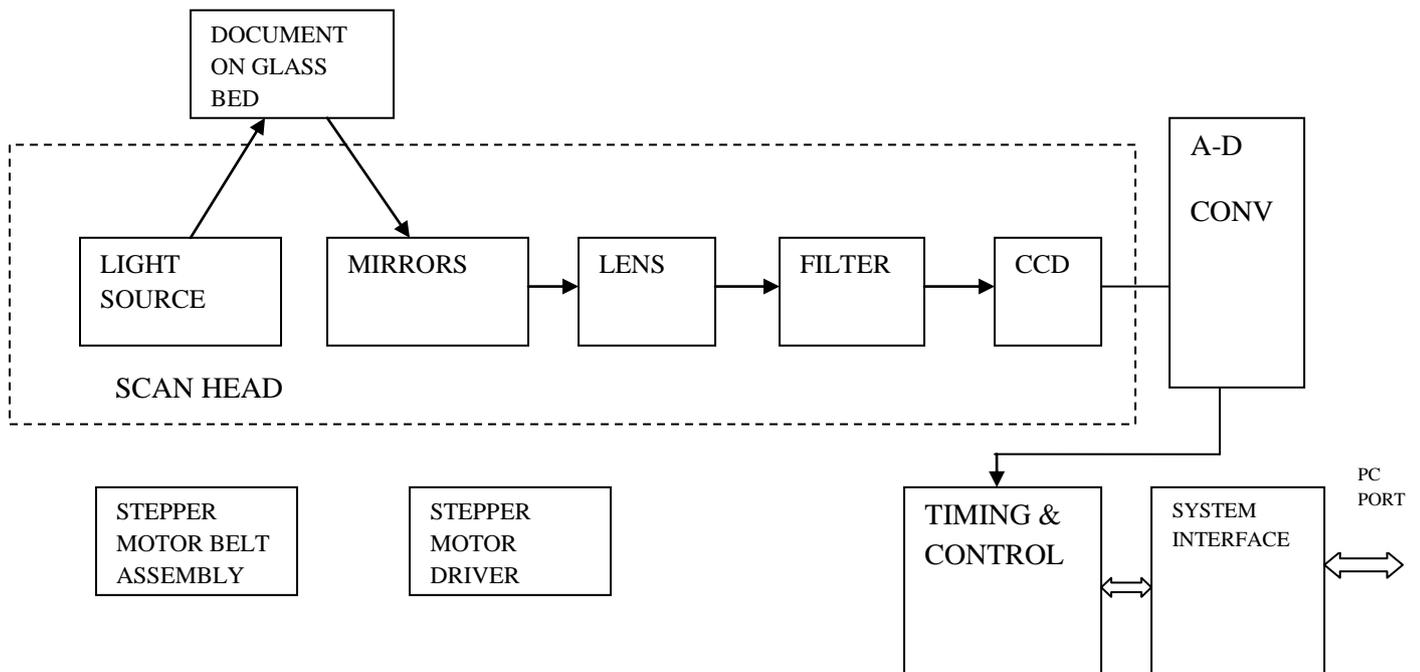
For AMIBIOS

Beep Code	Descriptions
1 short	DRAM refresh failure
2 short	Parity circuit failure
3 short	Base 64K RAM failure
4 short	System timer failure
5 short	Process failure
6 short	Keyboard controller Gate A20 error
1 long, 3 short	Conventional/Extended memory failure
1 long, 8 short	Display/Retrace test failed
two-tone siren	Low CPU Fan speed, Voltage Level issue

Q.4. Attempt any FOUR of the following:

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a) Draw and explain the Block diagram flat bed scanner.
(Diagram - 2M; Explanation – 2 M)



- Light Source illuminates a piece of paper placed face down on the glass window above the scanning mechanism.
- Motor moves the scan head beneath the page. As it moves the scan head captures light reflected from individual areas of the page. Reflection takes place through a system of mirrors.



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- A lens focuses the beams of light on to light sensitive diodes that translate the amount of light into electrical current.
- The more the reflected light, the more is the voltage of the signal. White spaces reflect more light than black or colored images.
- ADC converts each analog signal of voltage into digital pixel representing the scanned area.
- For monochrome scanner 1 bit per pixel is stored either on or off representing black or white.
- For color scanner, the scan head makes three passes under the images and the light on each pass is directed through a red, green or blue filter before it strikes the original image. Signals from three passes are converted into digital information and stored to represent red, green, or blue color value of the scanned area on the page.
- This digital information is sent to the software in the PC, where data is stored in a format on which a graphics program or OCR can work.

**b) Write any four important characteristics of Dot Matrix Printers.
(Each Characteristics 1M)**

Dot Matrix characteristics:

- It is an impact printer, where printer head touches the paper with an inked ribbon
- The quality of the image is determined by the dots per inch.
- Its speed is measured with respect to characters per second(cps)
- It's quality of printing is not as good as other non impact printers
- The Mechanical movements are more when compared to other printer and also noisy.
- Most of the Dot Matrix printers are with parallel ports (Centronics)

c) Draw the pin out diagram of ATX connector. (Correct Diagram 4M)

Color	Signal	Pin14	Pin	Signal	Color
Orange	+3.3V	11	1	+3.3V	Orange
Blue	-12V	12	2	+3.3V	Orange
Black	GROUND	13	3	GROUND	Black
Green	PS_On	14	4	+5V	Red
Black	GROUND	15	5	GROUND	Black
Black	GROUND	16	6	+5V	Red
Black	GROUND	17	7	GROUND	Black
White	-5V	18	8	Power_Good	Red
Red	+5V	19	9	+5V (Standby)	Purple
Red	+5V	20	10	+12V	Yellow

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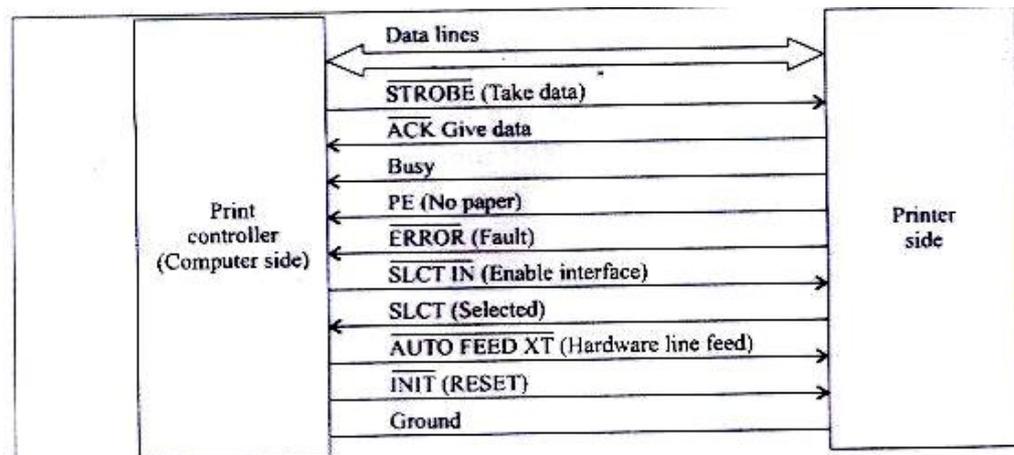
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d) **What are the symptoms of power supply problem?**
(Any four symptoms – each 1M)

Following are some of the situations that suggest power problems.

- The lights tend to flicker or periodically vary in intensity.
- The PC stalls, crashes or reboots for no apparent reason.
- Chronic or frequent hard drive failure or file access problems.
- The CMOS RAM or modem NVRAM periodically loses its contents or becomes corrupted.
- The modem regularly loses its connection or fails data transfers.
- The monitor display flickers or waves.
- Frequent errors while writing data to the disk.

e) **Draw and explain centronics interface diagram.**
(Diagram 2 Marks; Explanation – 2 Marks)



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:

—————>: The printer should take data when this signal is low.

STROBE

—————>: When it is low the printer resets the electronics logic and clears the printer buffer.

INIT

—————>: It is an interface unable signal. When it is low the printer responds to the signals from the controller.

SLCT IN

—————>: 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.

AUTO FEED XT

—————>: 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.

ACK

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.

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

SLCT

—————>: When the busy signal is high, it indicates that the printer is busy and it cannot receive data

BUSY

—————>: It indicates that there is some error condition in the printer.

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f) Write any four firewire features.

Firewire is a serial interface for different high speed peripherals.

1. Hot pluggability.
2. Multiple devices up to 63.
3. Uses daisy chain topology
4. Data Transfer Rate 400/ 800 Mbps
5. Snap connection: no need for device ID, jumper, DIP switch, terminators etc.
6. Power sourcing.
7. Dynamic reconfiguration.
8. Max distance between devices: 4.5m
9. Supports DMA transfers
10. Well suited for different devices such as Digital Camera, Scanner, HDD, printers, music systems

Q.5. Attempt any TWO of the following:

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a) Write two important features of the following:

- i. SDRAM
- ii. DDR
- iii. Cache
- iv. DDR2

(Any two features 2 marks each)

(i) **SDRAM:**

1. **Synchronous dynamic random access memory (SDRAM)** is dynamic random access memory (DRAM) that is synchronized with the system bus.
2. It waits for a clock signal before responding to control inputs and is therefore synchronized with the computer's system bus.
3. Any byte of memory can be accessed without touching the preceding bytes.
4. SDRAM is volatile, meaning that they lose their contents when the power is turned off.

(ii) **DDR:**

1. DDR memory's primary advantage is the ability to fetch data on both the rising and falling edge of a clock cycle, doubling the data rate for a given clock frequency.
2. Data Bus: 64 bits
3. Data Rate: 200/266/333/400MHz
4. Voltage: 2.5V
5. DRAM Frequency: 100/133/166/200Mhz.

(iii) **Cache:**

1. Runs at the same speed as the CPU/main memory. Typically runs at 66, 100,133 MHz.
2. Available in Sizes 8KB, 16 KB, 32KB, 64KB etc.

(iv) **DDR2:**

1. Data Bus: 64 bits

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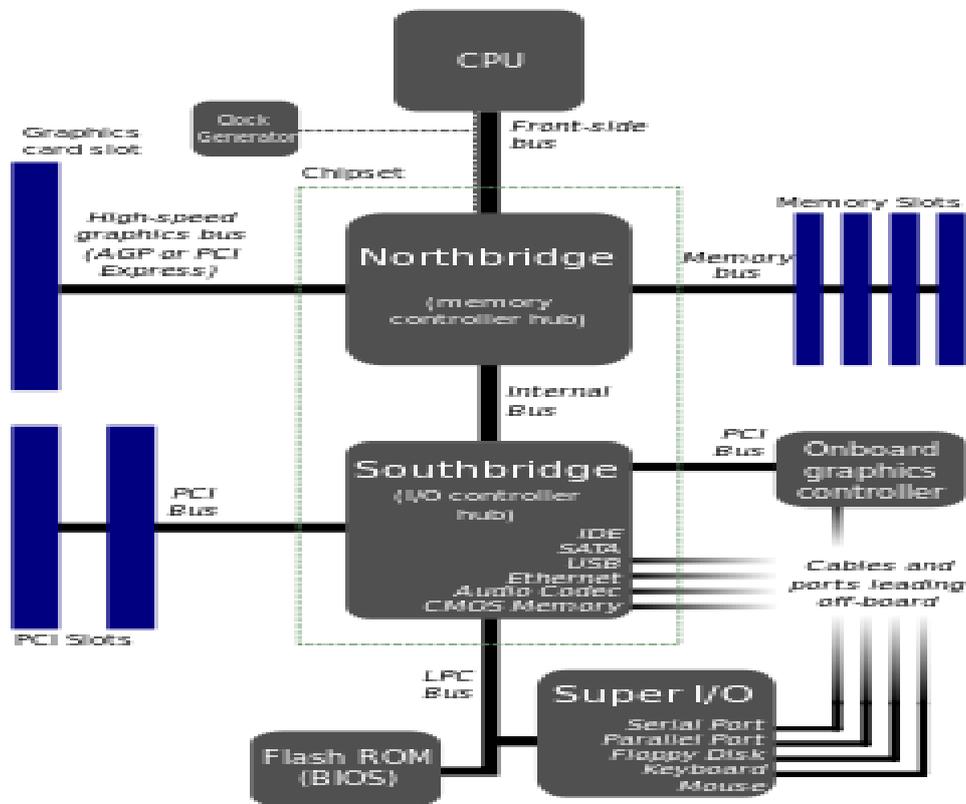
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2. Data Rate: 400/533/677Mhz
3. Voltage: 1.8V
4. DRAM Frequency: 200/266/333Mhz

b) Draw and explain the north and south bridge chipset architecture.
(Diagram 4 Marks, Explanation 4 Marks)



Intel's earlier chipset were broken into multi-tiered architecture known as North Bridge and South Bridge components as well as Super I/O chip. North Bridge: it is the connection between the high speed processor bus and the slower AGP & PCI buses. South Bridge: it is the bridge between PCI bus and even slower ISA bus. Super I/O chip: contains commonly used peripheral items all combined in single chip.

North Bridge

Northbridge is also referred to as PAC (PCI-AGP) controller is the main component of the motherboard and only motherboard circuit (besides the processor) that runs at the full motherboard speed. It serves as the four way connection between CPU, Memory, Video card and south bridge.

South Bridge

The Southbridge is the lower speed component of the chipset. The south bridge connects to the 33MHz PC and contains the interface to ISA bus. It also contains dual ATA/IDE hard disk controller interfaces, one or more USB interfaces, CMOS RAM, real time clock functions, interrupt controller, DMA controller.

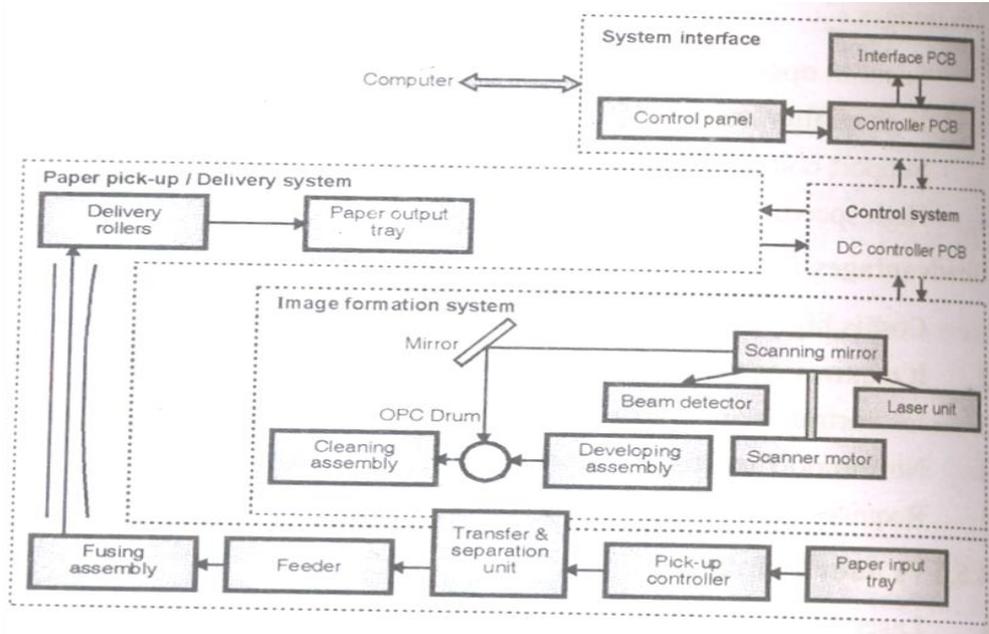
Super I/O chip contains serial port, floppy controller, keyboard & mouse interface.

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- c) Draw and explain the Laser Printer block diagram and mention any two important specifications.
(Diagram 3M; Explanation 3M; 2 specification 1M each)



Functional blocks of laser printer

1. Image formation system
2. Paper pickup/delivery system
3. Machine control system
4. Interface system

1. Image Formation system

- Image formation process revolves around a photo sensitive drum, called organic Photo conductive (OPC) drum. This drum is located inside the Electrophotographic cartridge inside the laser printer.
- Image formation process consists of following six steps
 1. Cleaning of the OPC drum.
 2. Conditioning of the OPC drum.
 3. Electrostatically writing the image onto the OPC drum
 4. Developing the image on the OPC drum.
 5. Transferring of the image from OPC drum to the paper.
 6. Fusing the image on the paper.
- The OPC drum is an Al cylinder which is coated with a non-toxic layer of organic photoconductive material. The Al base of the cylinder is electrically connected to the ground potential.
- The OPC material has a property that when it is exposed to light, it becomes electrically conductive.
- When exposed to light, any charges that are deposited on the surface of the drum, conduct to the Aluminum base of the drum. Areas of the drum not exposed to light remain nonconductive and retain the charge applied.



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Cleaning of the OPC drum

- Before transferring any image to the OPC drum's surface, the surface needs to be cleaned and prepared to hold the image being transferred.
- The drum's surface is cleaned physically to remove any trace of the old toner particles from the previous printing operation and is cleaned electro statically to remove any charge present on the drum's surface from the last printing.

Conditioning of the OPC drum

- In this process, a uniform charge of -600V is applied to the complete surface of the OPC drum.

Writing the image on the OPC drum

- After the conditioning process its surface has a uniform -600V potential.
- To write any information on this drum laser beam is focused on the selected areas of the drum. The area where laser strikes discharges to ground and the area where laser does not strike remains at -600V.
- Later this beam is focused and sent to the scanning mirror, the scanning mirror sweeps the beam across the entire width of the OPC drum.
- Once one dot line of image is drawn on the OPC drum, the drum is rotated by $1/300^{\text{th}}$ of an inch, so that the beam can write the next line.

Developing the image on the OPC drum

- When the image is completely written onto the drum, the latent image is ready.
- To transfer the latent image into a visible image the toner is transferred to the discharged areas of the drum
- The toner is a black plastic resin, powdery substance bound to iron particles. It is also available in colors other than black.
- The developer section consists of a rotating metallic cylinder, a permanent magnet inside the cylinder, a toner cavity and a toner height control blade.
- The iron in the toner causes it to be attracted to the magnet inside the developing cylinder. As the cylinder rotates, the height control blade limits the amount of toner on the cylinder to a uniform thickness
- The developing cylinder is connected to a negative power supply. Hence the toner particles receive a negative charge from the cylinder.
- This negative electrostatic charge causes the toner to be attracted to the areas of the OPC drum which has been exposed to the laser beam or those areas that contain the image to be printed.

Transfer of the image to paper

- Once the image is developed on the OPC drum, using the corona wire positive charge is given to the paper. The positive charge applied to the paper is stronger than the charge on the OPC drum. This pulls the negatively charged toner particles away from the drum to the paper.
- As the paper and the drum move, the stiffness and the small radius of the drum makes the paper move away from the OPC drum.
- This process of paper separation is assisted by a static charge eliminator which weakens the attractive force between the drum and the paper.

Fusing the image to the paper

- It consists of a non stick roller, covered with Teflon type coating. The roller is heated from inside using very high intensity quartz lamp.
- The heated roller melts the toner and fuses it on the printing media.

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2. Paper pickup/delivery system

- This system is responsible for picking the paper from the input tray, delivering the paper to the image formation system at the right time, feeding it to the fusing station and finally delivering it to the output tray

3. Machine Control System

- This system is responsible for coordinating all the activities of the printer, required for the printing process.

4. Interface System

This system takes care of the communication between the PC and the printer.

Specifications: (Any two -1 mark each)

Print speed: Upto 19PPM

Print technology: Laser

Print quality: 1200 x 1200 DPI (B/W)

Memory: 8 MB

Interface USB

Power consumption: 320W when operational

Graphics Resolution: 300 to 2400 DPI

Media supported: Paper, Envelopes, and Transparencies

Q.6. Attempt any TWO of the following:

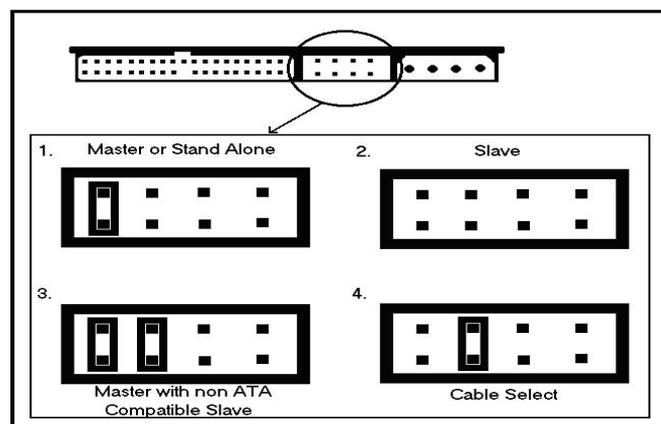
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a) Write two features of each of the following:

- Jumper**
- Blue Ray Disc**
- SCSI**
- IDE**

(Any two features of each 2 marks)

(i) Jumper: (Diagram optional)



- Since there can be two drives (master and slave) on the same IDE channel, as jumper is used to tell each drive if it should function as a master or a slave
- For a single drive channel the manufacturers have a separate setting as opposed to a master on a channel with a slave.



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- For some drives an additional jumper is used to tell a drive configured as a master and there is also a slave drive on the ATA channel.
- Some configurations use a special cable to determine which drive is master and which is slave.

(ii) **Blue Ray Disc Features**

Capacity (Single Layer)	23.3GB/25GB/27GB
Capacity (Dual Layer)	46.6GB/50Gb/54Gb
Laser wavelength	405nm (blue-violet)
Lens Numerical Aperture	0.85
Cartridge dimensions	Approx 129X131X7mm
Disc Diameter	120mm
Disc Thickness	1.2mm
Optical Protection Layer	0.1mm
Tracking Pitch	0.32 μ m
Shortest Pit Length	0.160/0.149/0.138 μ m
Recording Density	16.8/18.0/19.5 Gb/Sq. In
Data transfer rate	36Mbps
Recording Format	Phase Change Recording
Tracking Format	Groove Recording
Video Format	MPEG2

(iii) **SCSI (Any two features of SCSI should be considered)**

Features

There are three SCSI standards: SCSI 1, SCSI 2, SCSI 3. Any other standard may also be considered.

SCSI

- It supports different types of I/O devices on one interface.
- This is achieved by isolating the nature of I/O devices from the CPU.
- Up to 8 devices can be attached to single SCSI interface.
- Host adapter is one of the eight devices
- A 3 bit address is used by the SCSI so that devices are assigned addresses from 0 to 7.
- Device with address 7 has the highest priority.
- External switch is used to setup the address.
- SCSI-1 is 8 bit parallel interface between host adapter and the device.
- It runs at 5 MHz and is capable of transferring 8 million bytes per second.

(iv) **IDE**

Features

- It is also referred to as ATA (Advanced Technology Attachment)
- It is the primary interface used to connect a hard disk drive to.
- IDE refers to the fact that the interface electronics or controller is built into the drive and is not a separate board.
- The primary purpose of the hard disk controller, or interface, is to transmit and receive data to and from the drive.
- Two main versions (Parallel ATA and Serial ATA)



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b) Mention differences between following:

- i. IDE and SCSI
- ii. IDE and SATA

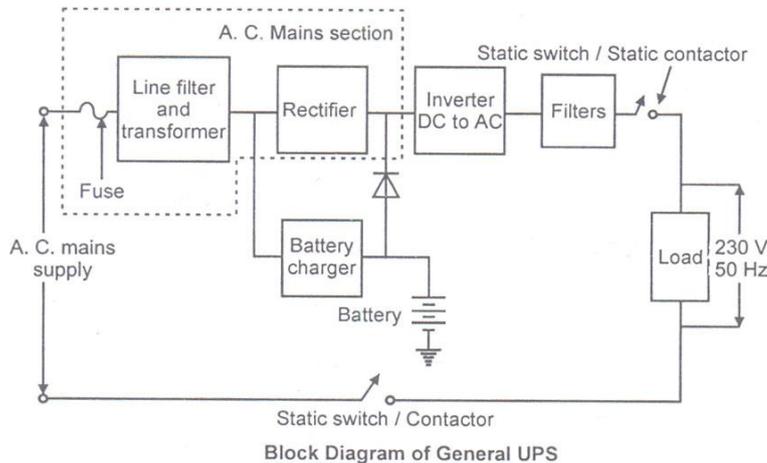
(Any four differences -1mark each)

Sr.No	IDE	SCSI
1.	IDE stands for Integrated Drive Electronics	SCSI stands for Small Computer System Interface
2.	IDE allows only two devices per channel	SCSI is capable of supporting 7 or 15 devices
3.	IDE is much easier to setup.	Configuring SCSI is difficult for most users
4.	All motherboards today have IDE interface and unless additional devices are needed no additional resource is required.	SCSI requires an interface expansion card. Hence additional system resource is required
5.	IDE is cheaper than SCSI	SCSI is more expensive than IDE

(Any four differences -1mark each)

Sr. No	IDE	SATA
1.	IDE stands for Integrated Drive Electronics	Serial Advanced Technology Attachment.
2.	IDE interface does not support hot plugging	SATA interface supports hot plugging
3.	Data Cable is ribbon-like, wide, can be up to 18 inches long	Data Cable is narrow, can be up to a meter (roughly 3ft) long. Power and data split into two connections.
4.	In a computer system, it's possible to have more than one hard drive. To connect multiple IDE drives, you need to chain the ribbon cables from one to the next. The computer system has no idea which is the main drive, from which to load the OS.	SATA drives don't use jumpers. Each drive connects directly to the motherboard. To set the primary drive, you can access the settings from the computers BIOS (special software that runs when you start the computer).

- c) Draw and explain the functional block diagram of UPS.
(2-marks for Diagram, 2-marks for Explanation)



Uninterrupted Power Supply

Total loss of power can be avoided with battery based power system.

The UPS delivers uninterrupted power to the ac load and it consists of following functional blocks

- AC mains section contains filter, transformer and rectifier.
- Battery charger with circuit and battery.
- Static switch / contactor.

AC mains section

- It receives ac supply, filters it with the help of line filters and rectifies it to the desired level of the load.
- This section can withstand ac input fluctuations from 170V to 250V. Thus despite of ac fluctuations UPS can deliver 230V 50Hz output to the load.
- When ac supply is available it charges the battery through the battery charger circuit.

Battery charger with circuit and battery

- It converts the ac supply to the desired dc levels and charges the battery.
- It has special protection to prevent overcharging of batteries.
- The battery charger is SCR controlled converter that charges the battery with constant current supply.
- The Battery specifications decide the time and amount of power delivered to the load. The batteries are usually specified using AH (Ampere Hour) as the unit.

Static Switch / contactor

- In the event of power failure the inverter is connected to the load with the help of switch. The inverter changes from the battery to ac of constant frequency and amplitude.
- It also has synchronization circuits for smooth change-over from mains to inverter ac avoid waveform distortion.