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 M)

i. Define the following terms

1) Cache Hit
2) Cache Miss

(Definition – each 1M)

1. **Cache Hit**: Whenever the data needed by processor is found in cache memory it is known as **CACHE HIT.**
2. **Cache Miss**: Whenever the data needed by processor is not found in the cache it is known as **CACHE MISS** and it leads to delay in the execution because the processor checks in RAM. And if this also fails then it goes to look onto the slower storage device thus making the system slow.

ii. What is FAT? List two features of FAT 32. (1 M each)

The file system in storage devices starts with **FAT (File allocation Table).**

1. FAT refers to a data table that holds information about how and where files are stored in any partition
2. It is a kind of index used by operating system to keep track of information stored on the hard disk

FAT 32 (Any Two)

1. Introduced with Microsoft windows 95, supports drives up to 2 TB
2. Since it can space more efficiently, it uses smaller clusters(4 KB clusters for drives up to 8 GB) fetch
3. No compression or encryption available on FAT 32 file system

iii. Write any four advantages of LCD display over CRT display. (any 4 points, 2M)

1. LCD monitors consume less power. An average 19-inch LCD uses 45 watts of electricity, while a 19- inch CRT uses 100 watts.
2. LCD monitors are smaller, thinner and weigh half as much as CRTs.
3. An LCD monitor's tilt, swivel, height and orientation from horizontal to vertical can all be adjusted easily.
4. LCD monitors don't produce the flicker that CRTs do, generating less eye strain

iv. List any four advantages of Laser Printer over Dot Matrix printer. (Any 4 points, 2 Marks)

1. It is a non impact printer.
2. It is not noisy.
3. Printing speed is fast.
4. Printing quality is very good.

v. Give any four disadvantages of Ink-jet Printer. (Any 4 points, 2 Marks)

1. Inkjet printers require periodic maintenance or else the ink gets logged in the nozzle.
2. They require special paper with controlled absorbency for best results
3. Ink cartridges are costly than ribbon and don't last longer.
4. It is costly than dot matrix printer.

vi. Define the terms Blackout and Surge. (Definition – each 1M)

- **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.

- **Surges:** They are small over voltage conditions that take place over relatively long periods of few milliseconds.

vii. Give any four features of USB. (Any four features 1/2 mark each)

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

viii. List any four features of firewire. (Any 4 features, ½ mark each)

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

b) Attempt any TWO of the following: (8 M)

i. Explain conventional memory and extended memory. (2M Each)

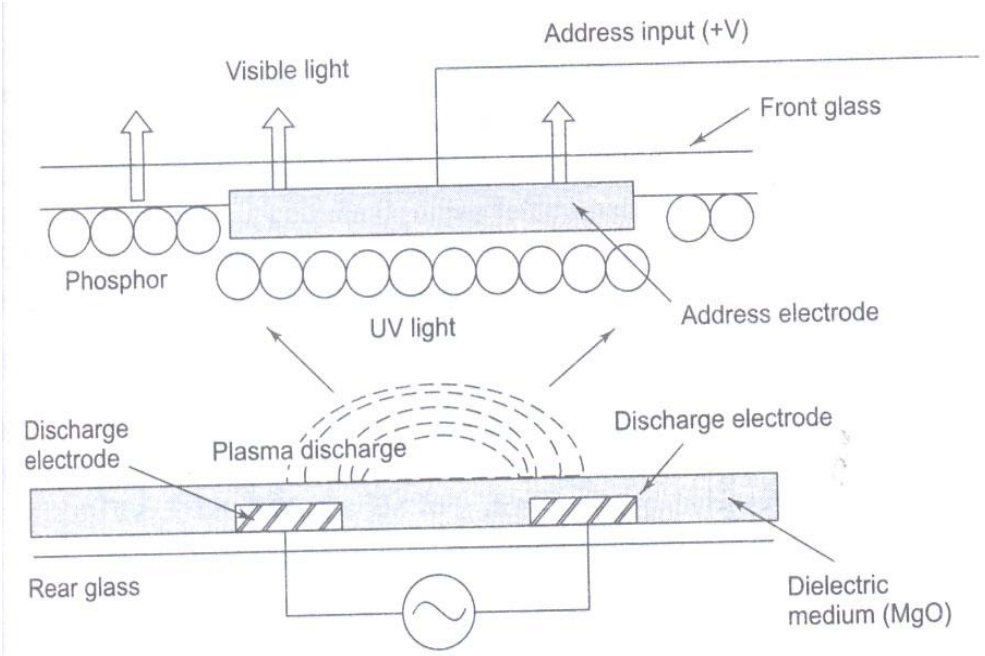
Conventional Memory

- 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.

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.

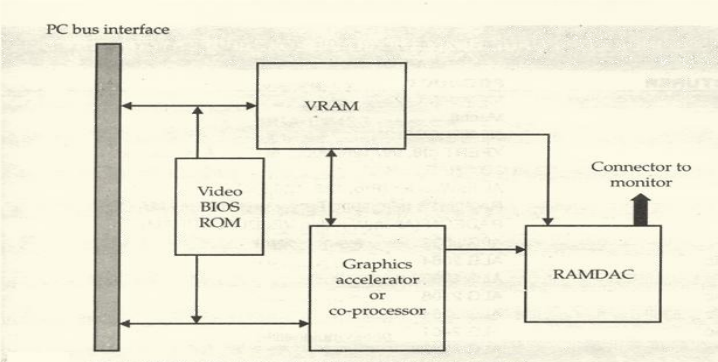
ii. With neat diagram describe working principle of plasma display.
(2 M Diagram; 2M working)



- Plasma is a slate of gas made up of free flowing ions (+ve) and electrons. Under normal conditions a gas is made up of uncharged particles.
- In plasma display xenon and neon atoms are used.
- When an electric current is passed through plasma, the electrons rush towards the positive electrode and ions rush towards the negative electrode.
- During this rush they collide with each other.
- These collisions excite the gas atoms in the plasma, causing them to release photons of energy.
- These are ultraviolet photons invisible to human eye.
- The released ultraviolet photons interact with phosphor material on the inside wall of the cell and phosphors give off colored light.
- Each phosphor has three separate cells, a red, a blue and a green phosphor.
- These colors blend together to create the overall color of the cell.
- The xenon and neon gas in plasma contain hundreds of thousands of tiny cells positioned between two plates of glass.
- Long electrodes are sandwiched between the glass plates on both the sides of the cells.
- The address electrodes are at the rear glass plate and the discharge electrodes are transparent and mounted along the front glass plate.
- Both sets of electrodes extend across the entire screen.
- To ionize the gas in a particular cell, the electrodes that intersect at that cell are charged.
- When an electric current flows through the gas in the cell, the gas atoms are stimulated sad they release ultraviolet photons.
- By varying the pulses of current flowing through the different cells intensity of each sub-pixel color can be varied to create hundreds of different combinations of red, green and blue.

iii. Draw the block diagram of Video Accelerator card and explain its working.
(2 M Diagram; 2M working)

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



Basic block diagram of a video accelerator board

Q.2. Attempt any FOUR of the following: (16 M)

a) Explain North Bridge and south Bridge Architecture with neat diagram.
(Diagram 2M; explanation 2M-Any other relevant block diagram may also be drawn)

Intel's earlier chipset were broken into multi-tired 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.

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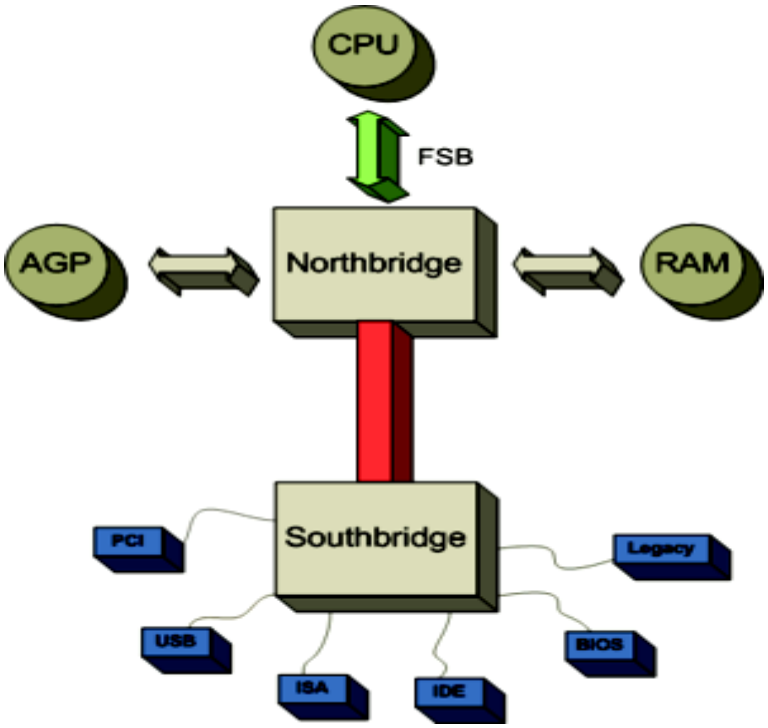
South Bridge

- 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.



b) What is formatting? Explain low level and high level formatting.

Formatting (1 M)

1. It prepares a blank hard disk for a particular OS.
2. It puts magnetic marks of tracks and sectors on the platter surface.
3. The storage capacity of formatted hard disk is always less than the capacity of unformatted disk.
4. A typical sector has 3 standard components.

a. Identification field which contains the address of the sector i.e. the track head and the sector number.

b. Data field which contains data recorded at a particular location. It also contains error detection and correction codes.

c. Number of gaps**.**

FAT and root directory are also put on the platter at the time of formatting.

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

Low Level Formatting (Physical or true formatting) (1 ½ M)

It is done at the factory level. (In low level formatting all the data stored on the disk is lost as the disk is physically formatted)

1. It magnetically divides the disk into tracks and sector.
2. Basic addressing information is written to each sector of each cylinder.
3. It checks for bad sectors and maps them out.

High Level Formatting (1 ½ M)

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

c) Describe and write pre-compensation with its use. (4Marks)

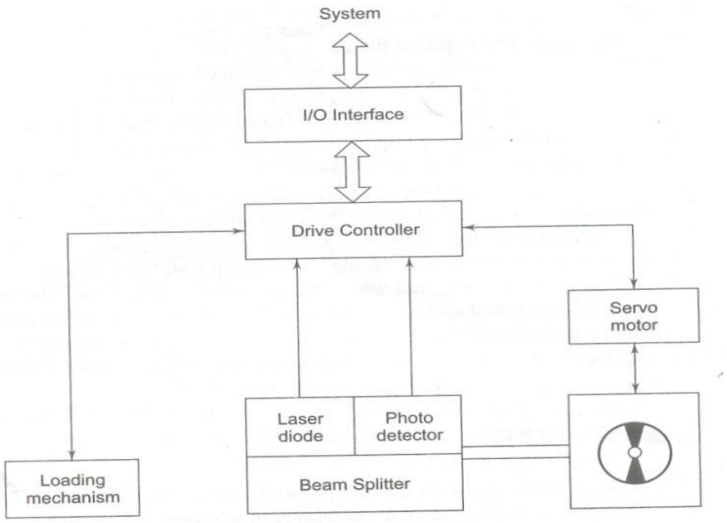
Write Pre-compensation

- It is useful for drives using standard track, sector format
- Drives using zone bit recording do not require any write pre- compensation
- The magnetic particles used to write on the disk surface have north and south poles
- Like poles repel and unlike poles attract
- In outer surface of hard disk platter, magnetic particles are far apart to be affected by the attraction and repulsion of magnetic particles
- In the inner tracks of the disk drive, the density of the magnetic are very high and adjacent particles start to attract and repel.
- This will force to change the information written on the disk
- To compensate for this shift of data particles due to attraction and repulsion, the drive can write the data apart or closer than the required position
- The particles will slowly shift to the required position because of attraction and repulsion
- This process of writing the data closer or farther to compensate for attraction or repulsion of magnetic particles is called Write pre-compensation
- The cylinder from which this pre-compensation is started is called pre-compensation cylinder. This value will be used by all the cylinders that are towards the centre of the drive.

d) Explain working of CD-ROM drive with block diagram. (2 Diagram; 2 M working)

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

from the disc surface, it is possible to focus a reflected beam onto a detector, a photodiode and pick up a signal when the beam is reflected from the disc. There will be no signal when the beam falls onto a pit. The output from the detector is the digital signal that will be amplified and then processed into an audio signal.



e) Compare Passive matrix and Active matrix LCD display. (Any four points 1M each)

	Active Matrix	**Passive Matrix**
Contrast	Good(100+)	Poor(10-20)
Viewing Scale	Wide	Limited
Gray Scale	256	16
Response time	Fast(<50ms)	Slow(100-200ms)
Multiplex ratio	>1000	480
Manufacturability	Complex	Simple
Cost	High	Moderate
Used in	Colour monitor	Monochrome monitor

f) List any four advantages of optical mouse.
(Any 4 advantages 1 mark each)
Advantages of Optical mouse:-

1) No moving parts: thus less wear & tear
2) Lower chance of failure due to dust: no interference with tracking sensors.
3) No requirement of special surface such as mouse pad.
4) More accuracy than the mechanical mouse:
5) Less maintenance, no cleaning needed.

Q.3. Attempt any FOUR of the following : (16 M)

a) List any four features of BIOS. (Any Four, Each 1M)

Features of BIOS

- **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 settings are auto as it automatically finds out the type of CPU in the computer system.

b) Differentiate between CRT and LCD displays (any four points 1M each)

Feature	CRT	LCD
Viewing Angle	180 degrees, almost all angles	150 degrees, Not all angles
Weight	Heavy	Lighter
Resolution	Better compared to LCD	Low resolution
Size	Much larger than LCD	Thinner
Glare	Since this has glass screen, it has glare	No glare
Power	On an average a 17” monitor uses 80 watts	For 19” LCD takes 17- 31 Watts
Viewable screen	The viewable area is always about 0.9 - 1.1 inch smaller than the size specified on paper.	A 15 inch LCD always has a same size of viewable area as the specifications say.
Radiation	CRTs emit electromagnetic radiation. Much of it is filtered by the lead heavy glass front	LCDs emit a very small amount of radiation compared to CRTs.

c) Explain the sequence of events in RS-232 communications with signals.
(4 Marks for Explanation)

- **Carrier Detect**: This signal gives a modem a means of signaling the data terminal that it has made a connection with the distant modem.
- **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.
- **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.

- **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.
- **Transmit Data**: The serial data leaving the port travels on Transmit data 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.
- **Receive Data**: The bits coming in from a distant serial port go through receive data line.
- **Signal Ground**: It provides the return path to all the signals used in the serial port.

d) Name any two hardware tool and software tools used for trouble shooting of PC.
(Any 2 Hardware tools -2M, Any 2 Software Tools – 2M)

Hardware tools

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

Software tools

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

e) Write Active, Passive maintenance procedures.
(Any 4 points for Active- 2M, Any 4 points for Passive- 2M)

Active preventive maintenance procedure

1. An active preventive maintenance includes several steps that promote a longer, trouble free life for your PC.
2. It includes several procedures to clean and lubricate all the major components, cleaning all boards, connectors, contacts etc.
3. It also describes similar procedures for different peripheral devices such as HDD, FDD, keyboard, printer, monitor etc.
4. It includes performing backups, antivirus and antispyware scans.
5. Cleaning a system
6. Regular and through cleaning of the system removes any layer of dust and benefits the system in the long run.
7. Dust acts as thermal insulator, which prevents proper system cooling,
8. Excessive shortens the life of system components.
9. Dust can contain conductive elements that can cause partial short circuit in the system.
10. Other elements in the dust can accelerate corrosion of electrical contacts.
11. Following cleaning tools and solutions can be used to clean the internal components, peripherals and the boards inside the system.

Passive Preventive maintenance procedures may include

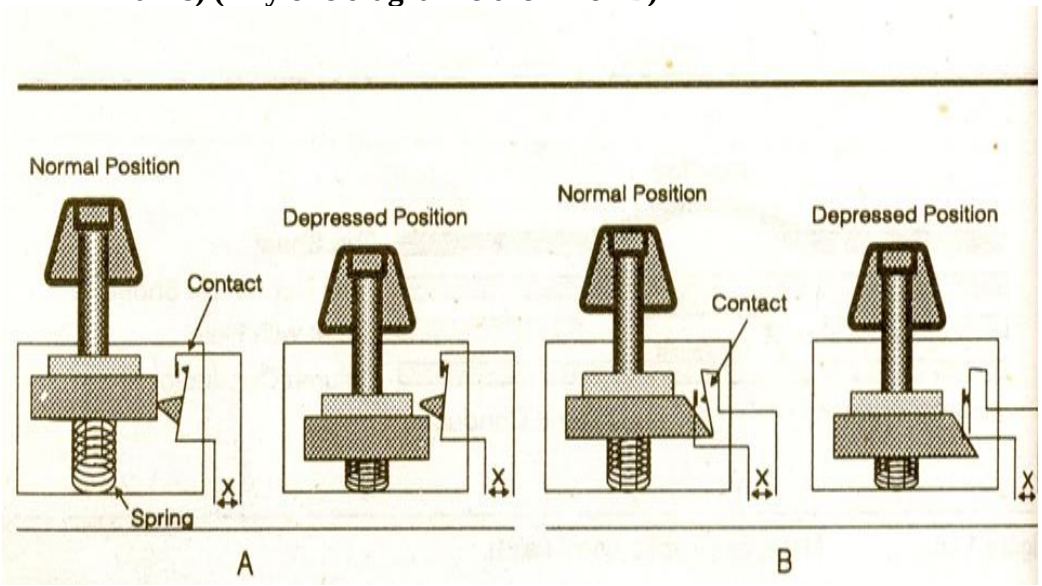
1. Examining the operating environment
2. Check Heating & cooling (controlled temperatures)
3. Make sure the PC is not switched ON and OFF many times - Power cycling
4. Precautions against Static Electricity
5. Make sure to have minimum or less Power Line Noise.
6. Keep the computer away from Radio frequency Interference
7. Take measures to guard PC against Dust & pollutants

f) Give the test sequence of post. (4Marks for correct sequence)

1. CPU test
2. BIOS ROM Checksum test
3. Timer 1 test
4. DMA controller test
5. 16 KB DRAM test
6. Interrupt controller initialization
7. Interrupt controller test
8. Timer 0 initialization
9. CRT controller test
10. DRAM after 16 KB test
11. Keyboard test
12. Disk drive test

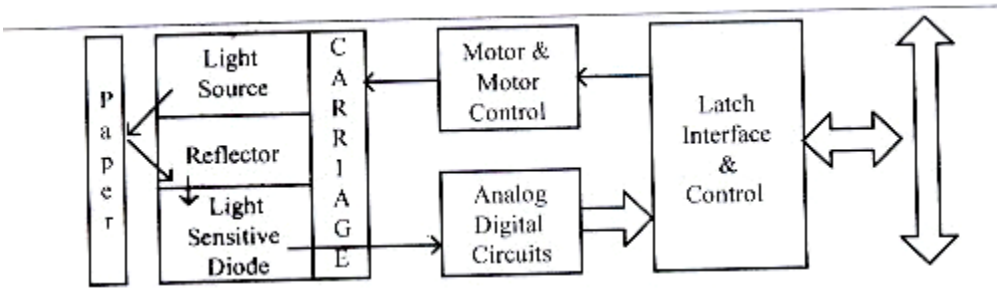
Q.4. Attempt any FOUR of the following: (16 M)

a) Write working principle of Mechanical key switch with neat diagram. (Working principle of Mechanical Key switch (Diagram 2 marks Working 2 marks) (Any one diagram either A or B)



- Two metal pieces or contacts are kept in open position and moved into closed position when switch is pressed.
- When the switch is in normal position the contact is open, when the switch is pushed the contact closes, and the closure is sensed by the keyboard interface.
- After some use contacts become oxidized or dirty and make the switch useless.
- Gold plating on these contacts is done to improve the life span of the switch.
- Normal life span of high quality switches is about 1 million keystrokes.

b) With block diagram explain the working principle of Flat Bed Scanner. (Diagram 2 M, Working 2 M)



WORKING OF FLAT BED SCANNER

- 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.
- 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.

c) Describe any four characteristics of power supply.(any four 1 M each)

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

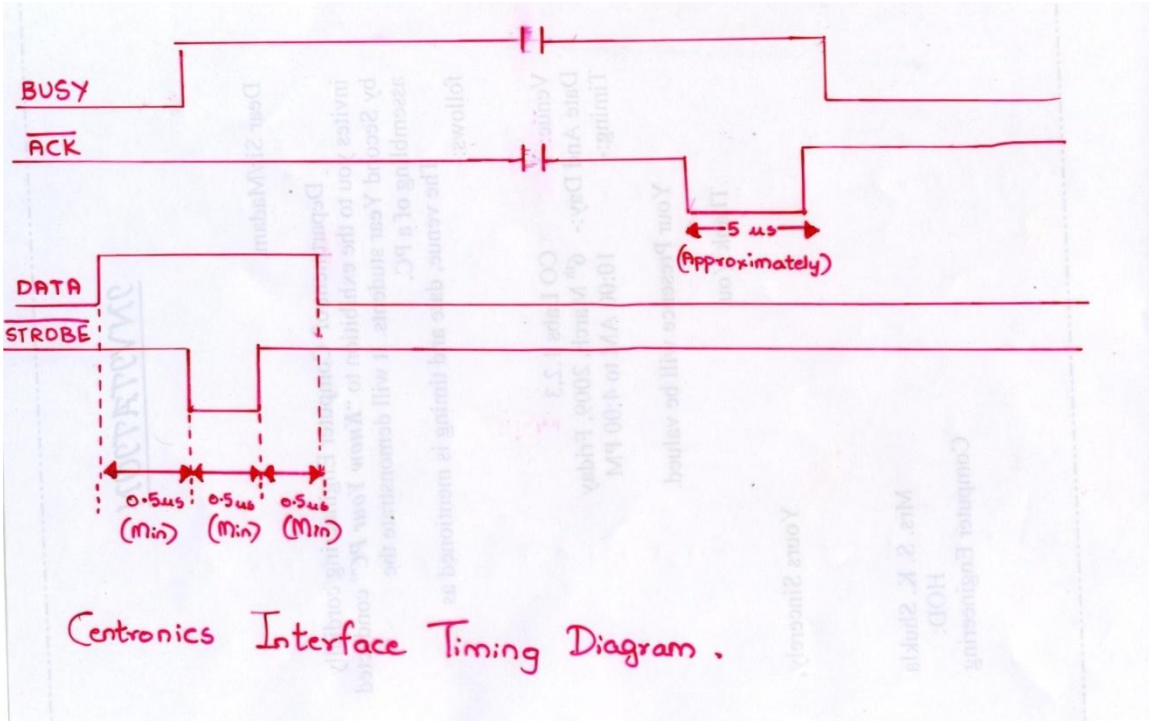
d) State any four advantages of ON-Line UPS over OFF Line UPS.
(Each point – 1M, any other advantage may be considered.)

1. Since switching is not involved, it avoids resetting of PC and spike generation.
2. On line UPS isolates AC mains from the PC whereas no such provision in Offline UPS.
3. On- Line UPS provides protection against all common power problems, since it has power conditioner, which is not available in Off-line UPS.
4. Simpler/ fewer parts/blocks in Online UPS when compared to Offline UPS.

e) Write any four advantages of Bluetooth.
(Any four points- each 1M; any other advantage may be considered.)

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
5. Bluetooth technology is available in an unprecedented range of applications from mobile phones to automobiles to medical devices for use by consumers, industrial markets, enterprises, and more.

f) Draw the interface diagram for centronics and timing waveforms.
(Diagram 2 marks, Explanation 2 marks)



- The printer controller sends data to the printer.
- After a minimum gap of 0.5 µs, it makes the strobe signal low and keeps it low for a minimum duration of 0.5 µs.

- As soon as strobe signal becomes active low the printer makes the busy line high.
- The controller should retain the data on the data lines for a minimum interval of 0.5 µs from the trailing edge of the strobe signal.
- Thus the data should be kept on the data lines for a minimum duration of 1.5 µs.
- When the printer is ready to receive the next character of data it makes the acknowledge line low.
- When the acknowledge line is made high the printer also removes the busy signal.

Q.5. Attempt any TWO of the following : (16 M)

a) State any eight features of H67 or P67 chipset.(8 features , 1M each)

(Any other relevant feature may be considered)

8 Features of H 67 Chipset:

- Support for 2nd generation Intel® Core™ processor family
- Support for HDMI, Display Port*, eDP and DVI 2
- Dual independent display expands the viewable workspace to two monitors(Multi-monitor support with Windows 7)
- Intel® Rapid Storage Technology (Intel® RST)
- Serial ATA (SATA) :, Next generation high-speed storage interface supporting up to 6 Gb/s transfer rates for optimal data access with up to 2 SATA ports.
- High-speed storage interface supporting up to 4 SATA ports (3 Gb/s)
- PCI Express 2.0 Interface -8 PCI Express 2.0 x1 ports, configurable as x2 and x4
- Provides Gigabit LAN connect

OR

8 features of p 67 Chipset

- Supports the 2nd generation Intel® Core™ processors with Intel® Turbo Boost Technology
- Intel® Rapid Storage Technology 10.0
- Intel® Rapid Recover Technology
- Intel® High Definition Audio
- USB 2.0 Rate Matching Hub
- Serial ATA (SATA) :, Next generation high-speed storage interface supporting up to 6 Gb/s transfer rates for optimal data access with up to 2 SATA ports.
- High-speed storage interface supporting up to 4 SATA ports (3 Gb/s)
- PCI Express* 2.0 Interface

b) List any eight motherboard selection criterion. (Any Eight points, 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.

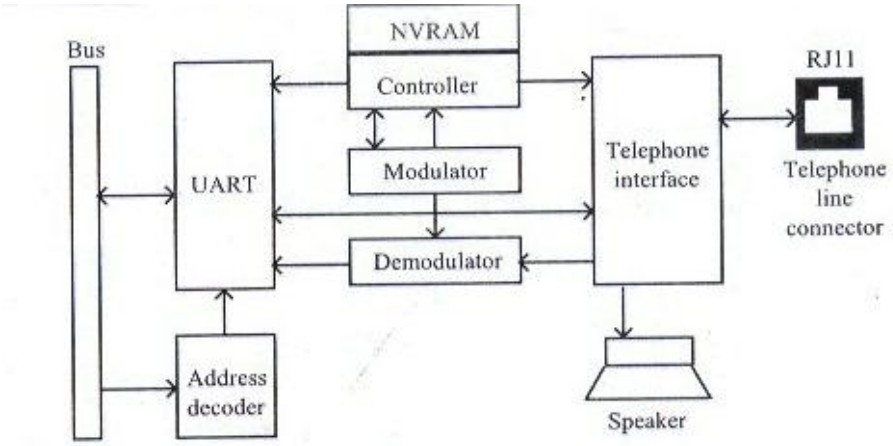
- **Cache Memory:** Use a processor with full core speed on-die L2 cache as it offers maximum in performance.
- **SIMM/DIMM/RIMM memory:** Current systems use either DDR or DDR2 DIMMs. Currently DDR and DDR2 SDRAM and RDRAM are the fastest type of memory available, with RDRAM being by far the most costly.
- **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.

c) Draw block diagram of Internal Modem and explain working of each block.

Internal Modem (diagram 4 marks, explanation 4 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.



Q.6. Attempt any TWO of the following: (16 M)

a) State any eight specifications of Blue ray disc with typical values. (Any 8, 1M each)

Specifications	Value
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	0.32µm
Shortest Pit Length	0.160/0.149/0.138µm
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

b) Describe FM and MFM method of recording with suitable example. (Each for 4 Marks)

FM Encoding Scheme:

- FM or Frequency Modulation was the original data-encoding scheme used for storing the data on the magnetic recording surface.
- This method of data encoding is also known as the "Single density recording".
- In this method, a clock signal is put with every data signal on the recording surface. This clock signal is used for synchronizing the read operation, as there will always be a clock signal, whether the data signal is there or not.

- In this FM method of data recording a 1 bit is stored as two pulses(one clock pulse and one data pulse), and a o bit is stored as a one pulse and one gap or no pulse.
- For example, a binary number 1011 will be stored as
  PP PN PP PP

MFM Encoding Scheme:

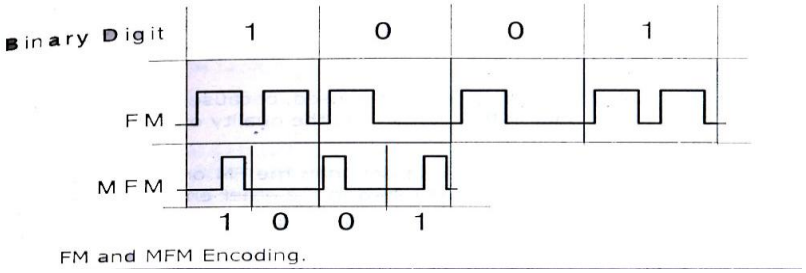
More data can be stored on the same surface or the data storage density can be increased, if the number of pulses required to store the data can be minimized.

When minimizing the pulses, one should be careful that the number of no pulses together should not be very long; otherwise the disk controller may go out of synchronization with the data.

The MFM (modified frequency modulation) method of data storage, by reducing the number of pulses, is able to store more data without any data and synchronization number of pulses, is able to store more data without any data and synchronization loss.

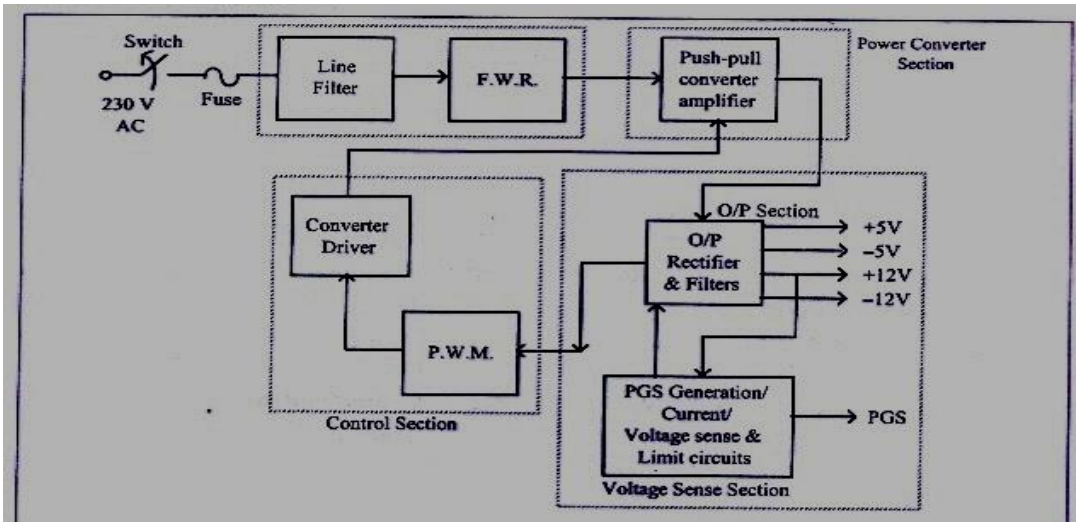
In MFM recording the 0s and 1s are encoded as given below

- 1 is always stored as no pulse, and a pulse(NP)
- 0, when preceded by another 0, is stored as a pulse, and no pulse(PN)
- 0, when preceded by a 1, is stored as two no pulses(NN)
- If you store 1001 on the disk surface using the MFM storage method, it would be stored as NP NN PN NP.



FM and MFM Encoding.

c) With block diagram describe the working of SMPS.
(4M for diagram, 4M for Explanation)
(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.