WINTER – 2019 EXAMINATION
MODEL ANSWER

Subject: Computer Hardware & Maintenance **Subject Code: 17428**

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. No.	Sub Q.N.	Answer	Marking Scheme
1.	**a) Ans.**	**Attempt any TEN of the following:** **Define the terms Internal cache and External cache.** **Internal cache:** Internal or L1 type cache resides on the processor itself on the same chip. L1 cache is always built into the processor die and runs at full-core speed of processor internally. L1 has 90% hit ratio. The L1 cache ranges from 8 KB to 64 KB and uses the high speed SRAM. **External cache**: External or L2 cache resides on the motherboard outside the processor. This is used whenever an L1 cache miss occurs. As L2 is mounted on the motherboard it runs at the motherboard speed. L2 has a hit ratio of 90%. L2 cache ranges from 64 KB to 2 MB.	**20** **2M** ***Each definition 1M***
	b) Ans.	**List any four firewire features.** **Features of FIREWIRE:** 1. Hot Plug ability. 2. Multimedia devices up to 63. 3. Snap connection: no need for device ID, DIPswitch, termination.	**2M**

		4. Dynamic reconfiguration. 5. Higher speed: 400 MBps& 30 times higher bandwidth than USB. 6. Peer-Peer Interface: Each device on the Fire wire forms a separate node unlike USB. 7. Isochronous data transfer: Fire wire supports isochronous data transfer. The device once connected grabs an allocated portion of bandwidth so as to have timely delivery of data. The bus automatically allocates 10 MB/sec for serial command overhead and rest for the device. Once the bandwidth is exhausted then it stops recognizing the devices. 8. DMA transfer: The fire wire unlike USB and IDE supports DMA transfer. It is suited for devices like digital camera, scanner, HDD, videotapes, music systems	***Any four features ½M each***
	c) **Ans.**	**Define** **(i) Blackout** **(ii) Surge** **(i) Blackout:**A black out is a complete loss of electric power where current or voltage drops to a very low value. It is caused by a physical interruption in the local power network due to damage, which brings the equipments to a complete halt. **(ii) Surge:** Surges are small over voltage conditions that take place over relatively long periods. To regulate power to a desired level, excess energy must be switched or thrown away.	**2M** ***Each definition 1M***
	d) **Ans.**	**Write any two features of FAT 32, NTFS, File system.** **Features of FAT 32:** i. 2TB maximum partition size. ii. 4 GB maximum file size. iii. 8.3 characters maximum file name. iv. No file / folder encryption. v. No fault tolerance. **Features of NTFS:** i. Maximum Volume Size 2TB ii. Max. Files on Volume Unlimited iii. Max file size Limited by volume size 4GB iv. Max Cluster Number Unlimited v. Boot sector location 1 st and last First sector vi. Compression Yes vii. Built in security Yes viii. Recoverability Yes	**2M** ***Any 2 features of FAT 32 ½M each*** ***Any 2 features of NTFS ½M each***

		ix. Performance High on large volume Low on small volume x. Security Folder and fie access can be controlled individually	
	e) **Ans.**	**What is meant by Interlaced and Non-interlaced monitor.** **Interlaced Monitor:** The gun scans from top to bottom, left to right with each complete scan displaying a "frame." In order to avoid flickering and to get better resolution monitor uses interlaced scanning. In this the screen (raster) which is of 625 lines is divided into two frames even and odd frame each with 312.5 lines. The electron gun starts scanning and scans both the frames one after another, thus creating the image in two scan instead of one. **Non-Interlaced Monitor:** In Non-Interlaced Scanning the complete screen of 625 lines are scanned only in one pass instead of two.	**2M** ***1M each***
	f) **Ans.**	**State four features of Bluetooth.** **Features of Bluetooth:** 1. Bluetooth is a low speed, low power standard originally designed to interconnect notebook computers, PDA, cell phones and pagers for data synchronization and user authentication in public areas. 2. Bluetooth devices uses 2.4GHz frequency range that Wi-Fi/IEEE 802.11b and 802.11g devices use. 3. It is designed for adhoc networks (known as piconets) in which two devices connect only long enough to transfer data and the breaks the connection. 4. The basic data rate supported by the Bluetooth is 1Mbps but devices that support enhanced data rate (EDR) can reach a transfer rate up to 3Mbps. 5. The current version of Bluetooth version 2.1+EDR supports easier connections between devices such as phones and headsets, longer battery life and improved security. 6. Range: 10m	**2M** ***Any four features ½M each***
	g) **Ans.**	**Define terms related to hard disk.** **(i) Cluster** **(ii) Landing Zone.** **(i) 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 • To store only one byte long information on the disk it requires minimum one cluster area on the disk surface.	**2M** ***Each definitio n 1M***

		(ii) Landing Zone: Landing zone is a 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.	
	h) Ans.	**List any four features of SD-RAM.** **Features of SD-RAM:** 1. SDRAM (Synchronous DRAM) is a type of DRAM that runs in synchronization with the memory bus. 2. SDRAM is also capable of supporting up to 133 MHz. 3. SDRAM is available in 168-pin DIMM [Dual In line Memory Module]. 4. SDRAM can run at speeds from 66, 100 and 133 MHz 5. SDRAM have a transfer speed of 533, 800 and 1066 MBps.	**2M** ***Any four features ½M each***
	i) Ans.	**Write any four advantages of CRT display over LCD display.** **Advantages of CRT display over LCD display:** 1. Less expensive - Although LCD monitor prices have decreased, comparable CRT displays still cost less. 2. Better color representation - CRT displays have historically represented colors and different gradations of color more accurately than LCD displays. 3. More responsive -Displays full motion video better. 4. Handles multiple resolutions 5. More rugged - Although they are bigger and heavier than LCD displays, CRT displays are also less fragile and harder to damage. (strong glass) 6. CRT monitors have fewer problems with ghosting and blurring because they redraw screen image faster than LCD monitors. 7. CRT monitors have larger viewing angle than LCD monitors	**2M** ***Any four advantages ½M each***
	j) Ans.	**Define the terms TWAIN and OCR with reference to scanner.** **TWAIN:** TWAIN is a universal software interface drive that acts as an interpreter between the scanner and any TWAIN complaint applications, such as graphics program with a scanning capability. It supports multiple platforms and devices. The ability to acquire images directly from the scanner is a function of the TWAIN driver. **OCR:** Optical Character Recognition: It enables to convert scanned text into computer based text. User can scan a document and import it directly into a word processor as editable text, rather than as a graphics.	**2M** ***Each definition 1M***

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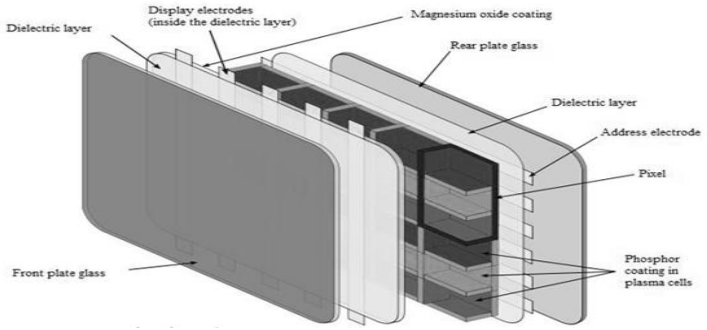
	k) **Ans.**	**Give disadvantages of Ink Jet printer.** **Disadvantages of Ink Jet printer:** 1. Ink-jet printers require periodic maintenance or else the ink gets logged in the nozzle. 2. They require special paper with controlled absorbency for best results. 3. Ink cartridges are costly than ribbon and don't last longer. 4. Not support multi-part stationary. 5. Cost is high compared to Dot Matrix printer.	**2M** ***Any two disadvantages 1M each***
	l) **Ans.**	**Give any four features of SCSI.** **Features of SCSI:** 1. The SCSI can act as a bus i.e. an organization of physical wires and termination where each wire has its own name and purpose. 2. It can act as a command set a having a limited set of instruction that allows the computer and peripherals to communication over the physical bus. 3. The SCSI is a universal parallel I/O interface for microcomputer to link multiple peripherals of different types on the single I/O bus. 4. Up to eight devices known as logical devices /units can be attached to a single SCSI interface. 5. The devices are given address from 0 to 7. The device with address seven has lowest priority and zero will have lowest priority. 6. Each device has two connector one for input cable and other for output cable. 7. The SCSI devices are terminated to reduce the effect of noise. The terminators can be either passive, which consist of resistor.	**2M** ***Any four features ½M each***
	m) **Ans.**	**State any four printer characteristics.** **Printer characteristics:** 1. Speed: Specified as CPS (Characters per second) or LPM (Lines per minute). It indicates how fast the printer works. 2. Quality: Specified as DRAFT, NLQ (Near Letter Quality) or LQP (letter quality printer). This implies how good the shape of the printed character is. 3. Character Set: Indicating the total number of data characters and control characters recognized by the printer. 4. Interface: Specifying whether the printer receives characters from the printer in parallel form or in serial form.	**2M** ***Any four characteristics ½M each***

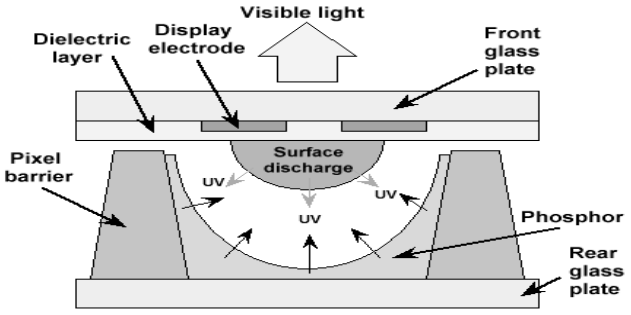
		5. Buffer Size: Indicating how many data characters can be stacked in the printer buffer memory before printing. 6. Print Mechanism: Specified as impact dot matrix, impact daisy wheel, electro sensitive dot matrix, thermal dot matrix, ink-jet, and laser. 7. Print Mode: Specified as serial or parallel. 8. Print Size: Specified as character size and number of characters per line. 9. Print Direction: Specified as unidirectional, reverse, bi-directional logic seeking.	
	n) **Ans.**	**Give four specifications of Blue Ray disk.** **Specifications of Blue Ray disk:** **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	**2M** ***Any four specifications of Blue Ray disk ½M each***
2.	**a)** **Ans.**	**Attempt any <u>TWO</u> of the following:** **Describe the construction and working of plasma display.** **Construction of Plasma Display:** Two plates of glass are taken between which millions of tiny cells containing gases like xenon and neon are filled. Electrodes are also placed inside the glass plates in such a way that they are positioned in front and behind each cell. The rear glass plate has with it the address electrodes in such a position that they sit behind the cells. The front glass plate has with it the transparent display electrodes, which are surrounded on all sides by a magnesium oxide layer and also a	**16** **8M** ***Construction 4M***

dielectric material. They are kept in front of the cell.



Working of Plasma display: When a voltage is applied, the electrodes get charged and cause the ionization of the gas resulting in plasma. This also includes the collision between the ions and electrons resulting in the emission of photon light.

The state of ionization varies in accordance to color plasma and monochrome plasma. For the latter a low voltage is applied between the electrodes. To obtain color plasma, the back of each cell has to be coated with phosphor. When the photon light is emitted they are ultraviolet in nature. These UV rays react with phosphor to give a colored light. Each pixel has three composite colored sub-pixels. When they are mixed proportionally, the correct color is obtained.



Working 4M

There are thousands of colours depending on the brightness and contrast of each. This brightness is controlled with the pulse-width modulation technique. With this technique, it controls the pulse of the current that flows through all the cells at a rate of thousands of times per seconds.

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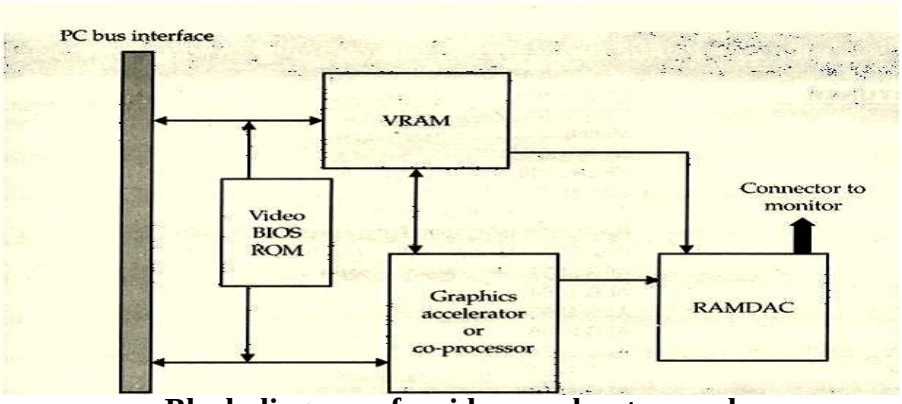
	b) Ans.	**Draw the block diagram of a video accelerator card and explain.**  **Block diagram of a video accelerator card** The core of the accelerator is the graphics chip (or Video chipset). The graphics chip connects directly with the PC expansion bus. Graphics command and data are transmitted into pixel data and stored in Video memory. It 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 Blue video signals along with horizontal and vertical synchronization signals, which are the 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.	**8M** ***Diagram 4M*** ***Explanation 4M***
	c) Ans.	**Compare DDR 2 and DDR 3 (Any four points)** **Sr. No. / Features / DDR2 / DDR3** 1 / Clock Speed [MHz] / 400, 533, 667 / 800, 1066, 1333, 1600 2 / Size / 256MB-2GB / 512 MB – 8GB 3 / Operating Voltage / 1.8V / 1.5V 4 / Prefetch / 4 bits at a time / 8 bits at a time 5 / Speed / Twice as compared to DDR / Twice as compared to DDR2	**8M** ***Any four points 2M each***

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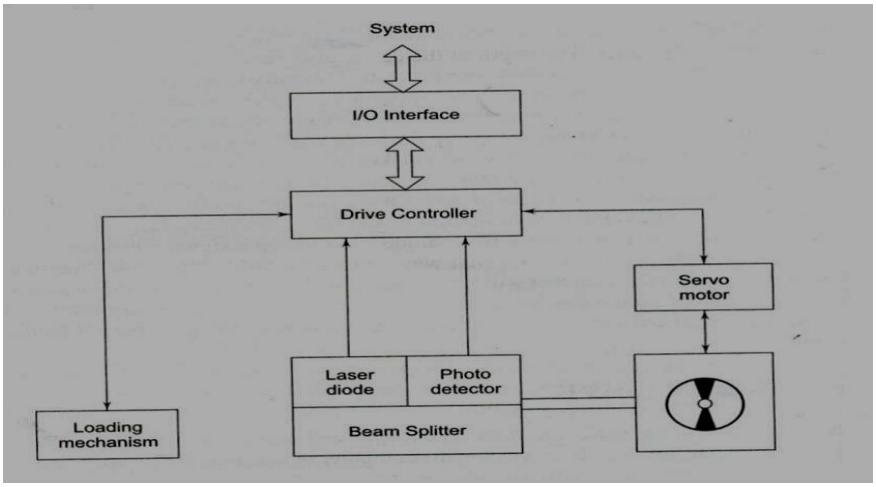
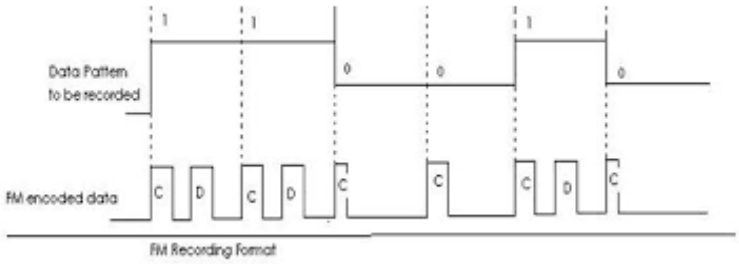
3.	**a) Ans.**	**Attempt any <u>FOUR</u> of the following:** **State any four features of P67 chipset.** **Features of P67 chipset:** a)Supports the 2nd generation Intel Coreprocessors withTurbo Boost Technology b) Rapid Storage Technology 10.0 c) Rapid Recover Technology d) High Definition Audio e) USB 2.0 Rate Matching Hub f) Serial ATA (SATA) : high-speed storageinterface supporting up to 6 Gb/s transfer rates for optimal dataaccess with up to 2 SATA ports. g) High-speed storage interface supporting up to 4 SATA ports (3 Gb/s) h) PCI Express 2.0 Interface.	**16** **4M** ***Any 4 features 1M each***
	b) Ans.	**Explain the construction of CD-ROM drive with block diagram.** The CD-ROM drive consists of the following parts as shown in the block diagram. 1. Optical head which contains laser diode, photo detector and beam splitter 2. Disk controller 3. Loading mechanism 4. Servo motor 5. I/O interface 	**4M** ***Diagram 2M***

		1. Optical head: i. Laser diode, which generates the laser beam. ii. A lens system to focus the laser beam on the disc and to directthe reflected beam on to the photo detector. iii. The beam splitter sends the reflected beam towards a differentlens for focusing. iv. Photo detector that detects the reflected light and converts it intoelectric pulses. **2. Disk controller**: Disk controller is the overall controller of the CDdrive. It controls the speed of rotation and processes the signalscoming from the optical head. **3. Loading mechanism:** The information coming from the photodetector is in the encoded from (8 to 14 Modulation) (EFM). Thedecoding of data is done by the microprocessor on the controller. **4. Servo motor:** Servo motors that control the position of laser andlenses to ensure correct tracking and focusing. **5. I/O interface:** The interface section provides for the transfer ofdata between the computer and the CD-ROM drive. Many CD-ROM drives are manufactured with the small computer systems interface (SCSI), although some proprietary interface units are available. Thedecoded data is sent to the I/O interface, which makes it available tothe system.	***Construction 2M***
	c) **Ans.**	**In a centronics interface, explain use of signals.** **(i) Strobe** **(ii) Acknowledge** **(iii) Autofeedxt** **(iv) Busy** **(i)** $\overline{\boldsymbol{STROBE}}$: The printer should take data when this signal is low. Thus, the data is valid only this signal is '0'. **(ii)** $\overline{\boldsymbol{ACK}}$:It is an acknowledgement for strobe signal from the PC. Whenactive it indicates that printer has received data sent by the PC and theprinter is ready to receive the next data byte. **(iii)** $\overline{\boldsymbol{AUTOFEEDXT}}$**:** 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.	**4M** ***Each signal 1M***

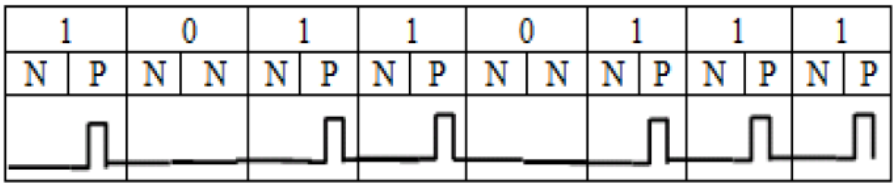
		(iv) BUSY: When the busy signal is high, it indicates that the printer isbusy and it cannot receive data.	
	d) **Ans.**	**List four recording techniques used in storage devices and Explain any one.** 1. FM (Frequency Modulation) 2. MFM(Modified Frequency Modulation) 3. RLL (Run Length Limited). 4. Perpendicular Recording **1. FM Recording:** • 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 '0' bit is stored as a one pulse and one gap or no pulse. • For example, a binary number 110010 will be stored as PP PPPN PNPP PN  FM Recording Format **2. MFM Recording Technique:** • In MFM number of pulse are reducedand able to store more data without any data and synchronizationloss. • 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	**4M** ***List 1M*** ***Explanation of any one 3M***

pulse(PN)

- 0, when preceded by a 1, is stored as two no pulses(NN)

If 1001 to be recorded on the disk surface using the MFM storage method, it would be stored as NP NN PN NP.

Example:-Given bit stream, **10110111,** the following table gives the recording using MFM:



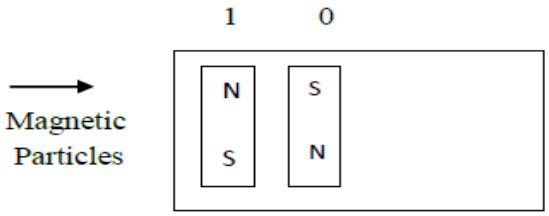
3. RLL Recording:

- The RLL encoding or the "Run Length Limited" encoding is also called as (2, 7) RLL encoding scheme because in this scheme in a series or in a running length the minimum number of Zero's next to each other is 2 and the maximum number of zero's together cannot be more than 7.
- The RLL encoding scheme can be store 50% more information than MFM encoding scheme on a given surface and it can store 3 times as much information as the FM encoding scheme.
- For the RLL encoding an encoder/decoder table is used to find the pulse signal to be used for different data bit groups.

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

4. Perpendicular recording:

- All hard disk drives (HDD) use magnetic media to record data using longitudinal recording (FM, MFM, RLL) which stores

		magnetic bit horizontally across the surface of the medium. • However, perpendicular recording which aligns magnetic signals perpendicular on media has the potential to achieve higher data density because of vertically oriented magnetic bits. • The recording head for perpendicular recording consists of a single pole inductive write head with the suitable flux return path designed for high efficiency, low stray field sensitivity and sharp field gradient capable of writing on perpendicular media. • They use less space than longitudinal space bits. With perpendicular recording technology hard disk drive storage capacity can be increased.  **Perpendicular**	
	e) Ans.	**Describe pre compensation and zone recording.** **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	**4M** ***Pre compensation 2M***

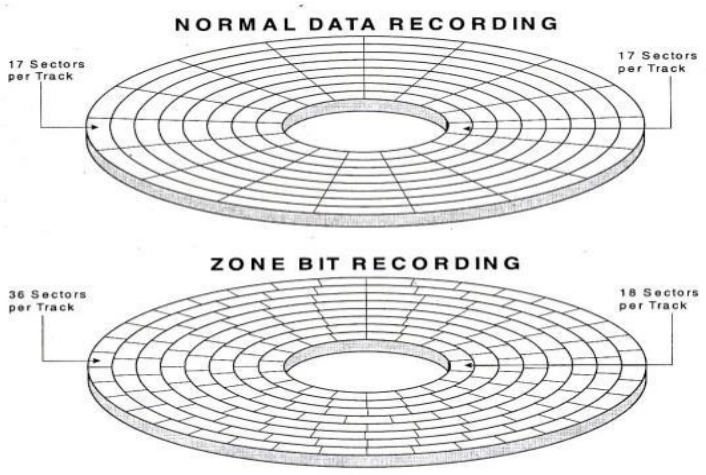
for attraction or repulsion of magnetic particles is called Write pre-compensation

- 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.

Zone Recording:

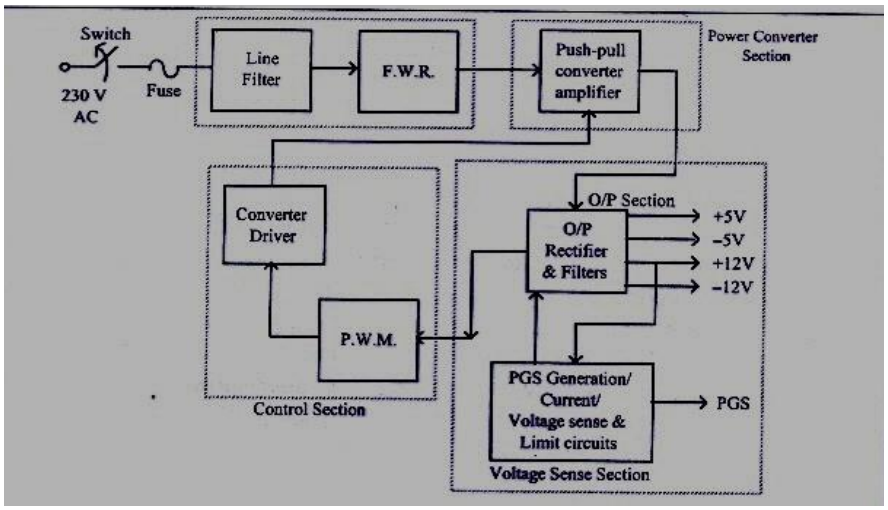
Zone-bit recording (ZBR) is a method of physically optimizing the utilization of a hard drive by placing more sectors in the outer tracks than in the inner tracks. This technique is also known as zone-bit recording, zone recording, zone-density recording, or multiple-zone recording.

All hard drives consist of several disks called platters. In each platter, the data is physically placed in concentric circles called tracks. Each track consists of several sectors. The maximum possible number of bits per sector is a constant. As the distance from the center of the platter increases, the circumference of the tracks increases in direct proportion. In early hard drives, all tracks had the same number of sectors. All tracks were arcs with identical measure in angular degrees. Thus, sectors near the edge of the platter were physically longer than those near the center, and the magnetized regions representing data bits were spaced farther apart near the edge of the platter than near the center. As a result, the medium near the outside of each platter was underutilized.



Zone Recording 2M

		In order to equalize the physical separation between magnetized regions representing bits, sectors should all have the same linear measure, not the same angular measure. In the ideal arrangement, the number of bits, and therefore the number of sectors, per track should vary in direct proportion to the track radius. Zoned-bit recording approaches this ideal by grouping the tracks into sets called zones. Tracks in the inner zones contain the fewest sectors, and tracks in the outer zones contain the most sectors. In this way, the magnetic medium of each platter is utilized as effectively near the outside as near the inside.	
	f) Ans.	**Describe the working of Optical Mouse? And list its advantages.** **Working:** The optical mouse uses a tiny camera to take 1,500 pictures every second. It has the ability to work on almost any surface. The mouse has a small, red **light-emitting diode** (LED) that bounces light off that surface onto a complementary metal-oxide semiconductor (CMOS) sensor. The CMOS sensor sends each image to a **digital signal processor (DSP)** for analysis. The DSP, operating at 18 MIPS (million instructions per second), is able to detect patterns in the images and see how those patterns have moved since the previous image. Based on the change in patterns over a sequence of images, the DSP determines how far the mouse has moved and sends the corresponding coordinates to the computer. The computer moves the cursor on the screen based on the coordinates received from the mouse. This happens hundreds of times each second, making the cursor appear to move very smoothly. **Advantages:** • No moving part means less wear and a lower chance of failure. • There's no way for dirt to get inside the mouse and interfere with the tracking sensors. • Increased tracking resolution means smoother response. • They don't require a special surface, such as a mouse pad. .	**4M** ***Description 2M*** ***Any two advantages 1M each***
	g) Ans.	**Describe SMPS with neat block diagram.**	**4M**



Block diagram 2M

SMPS 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.

Description 2M

Control section

It senses over voltage or over current at load. It changes the turn on time of the transistors in the push pull amplifier so that output power can be controlled.

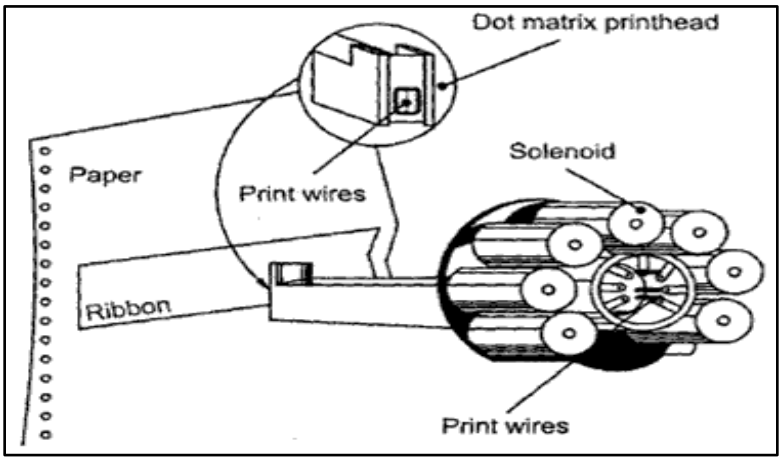
It applies Pulse Width Modulated Waveforms to converter driver circuit at 22 KHz frequency.

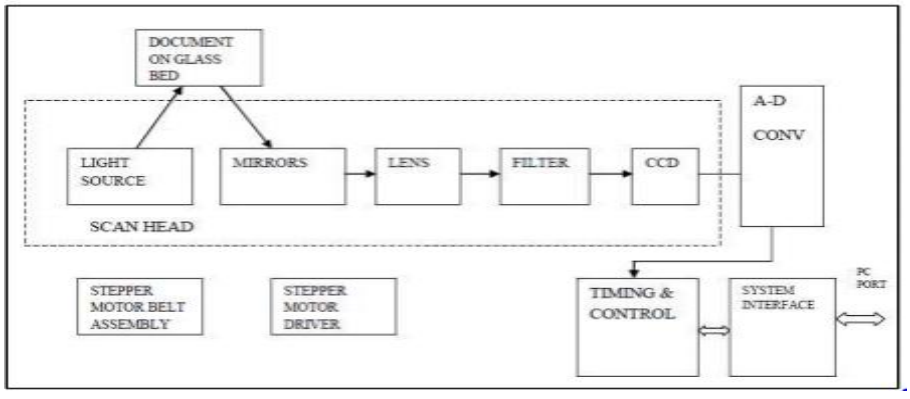
Output section

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

Voltage sense section

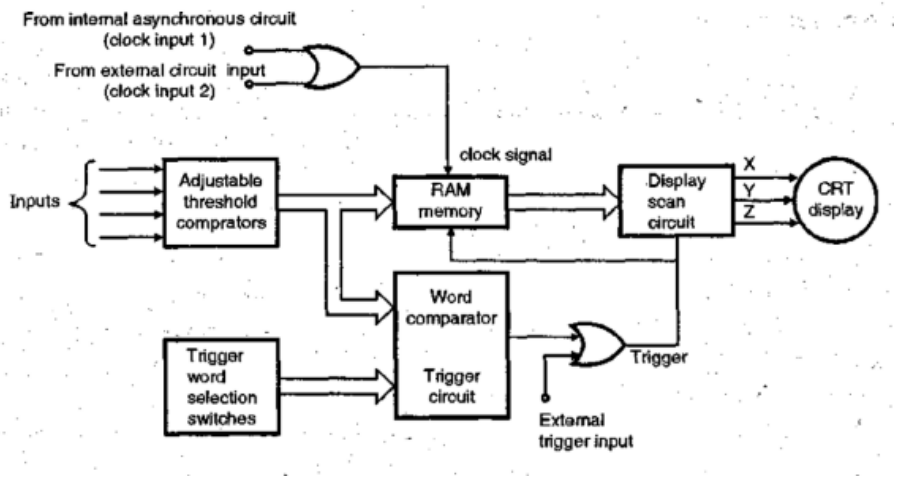
It generates Power Good Signal (PGS). When all four voltage outputs (+5V, -5V, +12V, -12V) are steady above minimum sense levels for more than 100ms, PGS is generated by this section. It checks the

		maximum load current and compares it with specified current. If the connected load exceeds the specified load, current limit circuits shut off the output section of the SMPS, thereby avoiding damage due to over current flow.	
4.	**a)** **Ans.**	**Attempt any <u>TWO</u> of the following:** **Explain the working of Dot Matrix Printer with neat diagram.** ***(Note: Any other diagram shall be considered).***  **Working of Dot Matrix Printer:** • Dot Matrix refers to the way the printer creates characters on paper. • This is done by several tiny pins, aligned in a column, striking an ink ribbon positioned between the pins and the paper, creating dots on the paper. • Characters are composed of patterns of these dots by moving the print head laterally across the page in very small increments. • The pins, contained in the print head, are about one inch long and are driven by several hammers which force each pin into contact with the ink ribbon (and paper) at a certain time. • The force on these hammers comes from the magnetic pull of small wire coils (solenoids) which are energized at a particular time, depending on the character to be printed. • Timing of the signals sent to the solenoids is programmed into the printer for each character, and translated from information sent by the computer about which characters to print. • Print head moves horizontally across the paper and the print pin strikes the paper through an inked ribbon.	**16** **8M** ***Diagram 4M*** ***Explanation 4M***

		• Pin's impact is precisely timed so that it strikes the right position in the character matrix at the right time. • Major factor determining printing speed is the time required between the successive strikes of each print pins. • The time needed to retract and reactivate each print pin puts a physical limit on how fast the pins can be fired. • PC sends series of ASCII codes that represent characters, punctuation marks etc to be printed over serial or parallel cable along with some printer movement information such as tabs, carriage return etc, to control the position of print head and print carriage. • The ASCII codes are stored in the data buffer (RAM) as the printing speed is less than the speed at which the PC sends data to the printer. • When the buffer becomes full the printer informs the PC to stop sending further characters until some of the characters in the buffer are printed. • The controller inside the printer selects a particular dot pattern for the ASCII code received from the PC. • The dot pattern is stored in the ROM. • The selected dot pattern is sent to the print head. • Based on this information the print head fires different pins on the print head. • The controller also controls the movement of print head and the paper by sensing various signals from the sensor and giving signals to the motors.	
	b) **Ans.**	**With neat diagram explain the working principle of flat bed scanner.** 	**8M** ***Diagram 4M***

		Light source illuminates piece of paper face down against glass window above the scanning mechanism. Motor moves the scan head beneath the page. The scan head captures light reflected from individual areas of the page. Reflection takes through system of mirrors. Lens focuses the reflected beam of light on light sensitive diodes. The diodes generate electric current corresponding to the amount of reflected light. White spaces reflect maximum light, which generates maximum voltage. ADC converts each analog signal of voltage to digital pixel representing the scanned area. For Monochrome Scanner 1 bit per pixel is stored-either on or off. For Color Scanner, the scan head makes three passes under the images. Reflected light on each pass is directed through red, green and blue filter before it strikes the original image. Signals from the three passes are converted into digital information and stored to represented, 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 OCR can work.	***Explanation 4M***
	c) Ans.	**State any eight mother board selection criterion.** **Motherboard Selection Criteria:** • **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.	**8M** ***Any eight criteria 1M each***

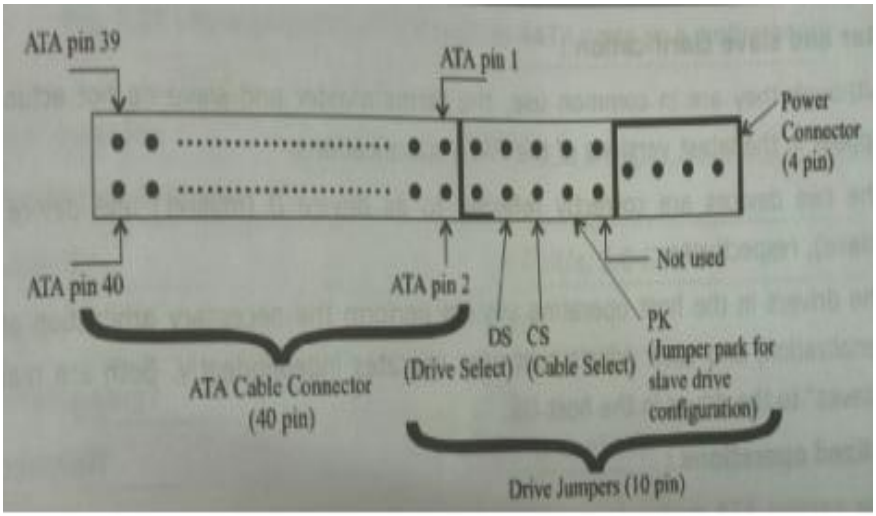
		• **Motherboard Speed:** 200MHz to 400MHz for Duron/Athlon/Athlon XP –based boards and 400MHz to 1066MHz for Pentium 4 based boards. • **Cache Memory:** Use a processor with full core speed on-die L2 cache as it offers maximum in performance. • **SIMM/DIMM/RIMM memory:** Current systems use either DDR 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 theutility programs to help you monitor the condition of your system.	
5.	**a)** **Ans.**	**Attempt any <u>FOUR</u> of the following:** **Give the test sequence of POST.** ***(Note: Partial marking can be consider for appropriate sequence)*** **POST sequence of PC:**	**16** **4M**

		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	***Correct sequence 4M***
	b) Ans.	**Describe logic Analyzer and state its two advantages.** **Logic Analyzer:** A logic analyzer is an electronic instrument that displays signals in a digital circuit that are too fast to be observed and presents it to a user so that the user can more easily check correct operation of the digital system. Fig. shows functional block diagram of logic analyzer. A logic analyzer is a device, which allows you to see the signals on 16 to 64signal lines at once. It is also called multi-trace digital oscilloscope. It captures and stores several digital signals, letting you view the signals simultaneously  	**4M** ***Description 3M***

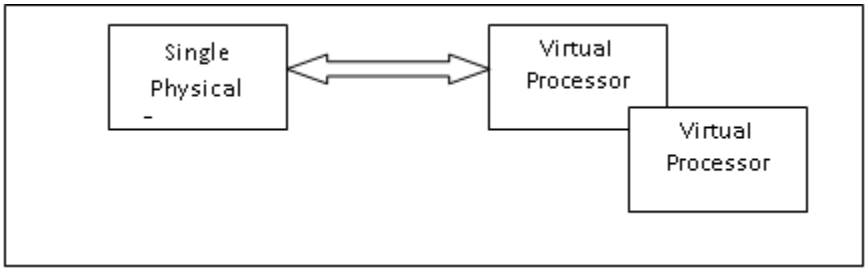
		Working: • All the input signals are applied to the adjustable threshold comparator, one for each channel. • The analyzer takes sample of each signal from the comparator and when clock pulse is applied stores it to memory. • When trigger is applied to the memory, these samples are displayed. • The analyzer can work in three modes: • Pre trigger mode (Analyzer displays 256 data samples that were taken just before the trigger). • Center trigger mode (Analyzer displays 128 data samples that were taken just before the trigger and 128 samples that were taken after the trigger). • Post trigger mode (Analyzer displays 256 data samples that were taken just after the trigger) **Advantages of Logic Analyzer:** a. It supports measurements of multiple channels commonly not supported by oscilloscope. This is very useful in debugging microprocessor or microcontroller based boards. Normally logic analyzer supports 16 or more channels. Advanced logic analyzers even support 300 channels. b. Correlate a large number of digital signals. c. Investigate the system operation. d. Detect timing violations. e. Trace embedded software operation. f. High performance. g. Lower costs • Easy to carry • Convenient to use. • Extendibility	***Any two 2 advantages 1M***
	c) **Ans.**	**Explain the term troubleshooting and name the equipments used for troubleshooting.** 1. Trouble Shooting Trouble shooting is the process of tracing and correcting faults in a mechanical or electronic system. Trouble shooting in a computer is an intelligent and sophisticated process. 2. Successful trouble shooting depends on the following four factors:	**4M** ***Explanation 3M***

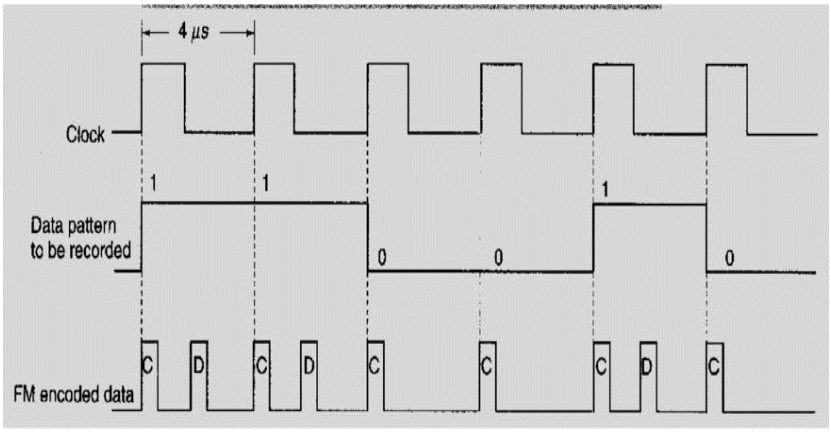
		- Problem solving approach - Techniques adopted in trouble shooting - Tools and test equipment used - Diagnostics aids in PC 3. Systematic trouble shooting is a logical approach. It is a scientific and analytical process. The systematic troubleshooting approach can be divided into the following steps - Symptoms Observation - Symptoms Analysis - Fault Diagnosis - Fault Rectification 4. Trouble Shooting Equipment's/Tools: There are 2 types of trouble shooting tools: - Nodal testers: These testers include i. Oscilloscope, ii. Multimeter, iii. logic probe, iv. logic clip, v. logic pulser, vi. current tracer, vii. Comparator. - System Testers: The system testers include i. emulators, ii. functional testers, iii. signature analyzers, iv. logic analyzers.	***Enlisting 4 equipment's names 1M***
	d) **Ans.**	**What is cache hit and cache miss?** **Describe L1, L2 and L3 cache.** **1.Cache Hit:** Whenever the data needed by processor is found in cache memory it is known as CACHE HIT. A cache hit is a state in which data requested for processing by a component or application is found in the cache memory. It is a faster means of delivering data to the processor, as the cache already contains the requested data **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	**4M** ***Explanation of Cache hit and Cache Miss 1M each***

		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. **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.L1 cache typically ranges in size from 8KB to 64KB and uses the high-speed SRAM. **L2 cache memory:** The L2 cache originally called external cache because it was external to the processor chip when it was introduced. It is present on the motherboard and runs at CPU bus speed. **L3 cache memory:** L3 cache has come into trend with advent of multi-core CPUs. Whereas these chips will have both L1 and L2 caches each has separate core. There is common fairly large L3 shared by all cores. The L3 cache has been present in high end work stations and servers such as Xeon and Itanium.	***Description of L1, L2 and L3 cache 2M***
	e) **Ans.**	**State four advantages of UPS over normal power supply.** ***(Note: Any other advantages may be considered)*** Following are the advantages of UPS over normal power supply: 1. Continuity: Experience no outages to critical equipment like computers and other appliances. 2. Consistency: Electronics within a UPS tells it when it needs to work and kicks in alternate power as needed, which eliminates glitches or surges and allows time to safely shut down main systems if and when needed. 3. Protection: Safeguards against all power supply problems such as surge, spikes, dips and failure because the UPS essentially senses those things and switches to alternate power before the irregularities cause damage.	**4M** ***Each advantage 1M***

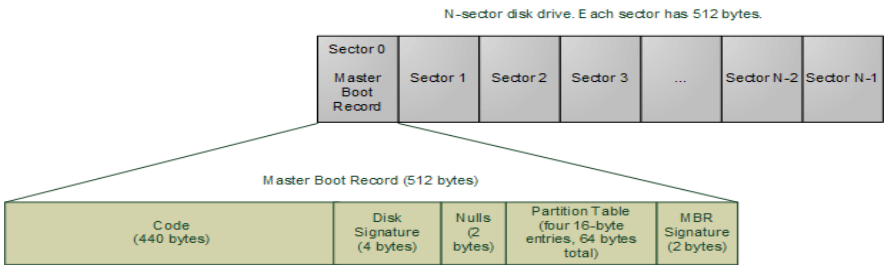
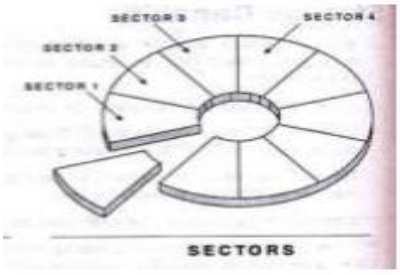
		4. Filter: An UPS acts as a kind of filter by refining the power as it comes into the UPS then adjusting its output so that internal systems receive a clean, consistent supply free of abnormalities.	
	f) **Ans.**	**Give the signal voltage for following colours of ATX connectors Red, Black, Orange and Purple.** **COLOUR** / **VOLTAGE** RED — +5 V BLACK — 0 V Ground ORANGE — +3.3 V PURPLE — +5 V Stand By	**4M** ***Each Signal Voltage 1M***
6.	**a)** **Ans.**	**Attempt any <u>FOUR</u> of the following:** **Describe use of jumper selection for HDD?** ***(Note: Partial marking can be consider for relevant answer)*** As can be seen in the picture below, ATA hard drives have jumpers with five sets of two pins. Moving a jumper between each two pins changes the drive from master drive, slave drive, or cable select.  	**16** **4M** ***Explanation of use of jumper selection for any two settings 2M each***

		The three settings work as follows: Master (MA): forces the device to be Drive 0. The master is the first or primary, hard drive. Slave (SL): forces the device to be Drive 1. The slave is the second, or secondary drive. Cable Select (CS): CS assigns drive order based on each drive's location on the IDE data cable. If the device is on the end of the cable, it will be assigned a status of Master (Drive 0). If the drive is in the middle of the cable, it will be seen as Slave (Drive 1)	
	b) Ans.	**State four features of USB.** **Features of USB:** 1. **Host:** The computer acts as a Host 2. **Multiple devices**: We can connect up to 127 devices to the host directly or by USB hubs. 3. **USB Cable length**: Individual USB cables can be as long as 5 meters; with hubs, devices can be upto30 meters, away from the host. 4. **Transfer Rate**: The initial USB 1.0 standard supported 12 Mbps transfer rate. The USB 2.0, the bus has a maximum data rate of 480 megabits per second. 5. **Ease of installation**: A USB cable has two wires for power (+5 volts and ground) and a twisted pair of wires to carry the data. 6. **Hot-swappable**: USB devices are hot swappable, meaning you can plug them into the bus and unplug them any time. 7. **Power Saving**: Many USB devices can be put to sleep by the host computer when the computer enters a power saving mode. 8. **Power allocation**: USB controller in PC detects the presence or absence of the USB devices and does allocation of electrical power. On the power wires, the computer can supply upto 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 a minimal power form the bus. Hubs can have their own power supplies to provide power to devices connected to the hub.	**4M** ***Any four features 1M each***

	c) Ans.	**What is hyper threading technology? What is its requirement?** • Hyper-threading is a technology used by advanced Intel Processors such as Pentum-4 processors, Dual Core and core-2 Processors. With Hyper threading, it become possible to make single processor to act like two separate processors to the operation system and the application programs that use it is a feature of Intels's IA- 32 processor architecture. • Having two threads of execution units to work on allows more work to be done by the processor during each clock cycle. • To the operating system, the Hyper-threading processor appears as if there are two separate processors. They are called as Virtual processors.  **Requirements of the Hyper threading operations:** The Hyper threaded processors can behave as two virtual processors accepting and executing two threads of instructions or programs simultaneously, subject to the following requirements- • The operating system should be capable of handling the Hyper threading and able to dispatch two threads simultaneously; without losing the data integrity and logic coherency of the either of the programs. • The two program threads executing simultaneously on the Hyper threaded Processor, should not have any clashing processor resources; i.e. they should not access the same Registers, ALU, Barrel Shifters and Address generation Logics at the same time. • The two program threads executing simultaneously on the Hyper threaded processor, should not access the same memory location (L1 cache, L2 cache or main memory) at the same time. • The two program threads executing simultaneously on the Hyper threaded Processor, should not lock the same I/O resources or the same OS resource simultaneously using the mechanisms such as Mutex, Semaphores or flags.	**4M** ***Description3M*** ***Requirements 1M***

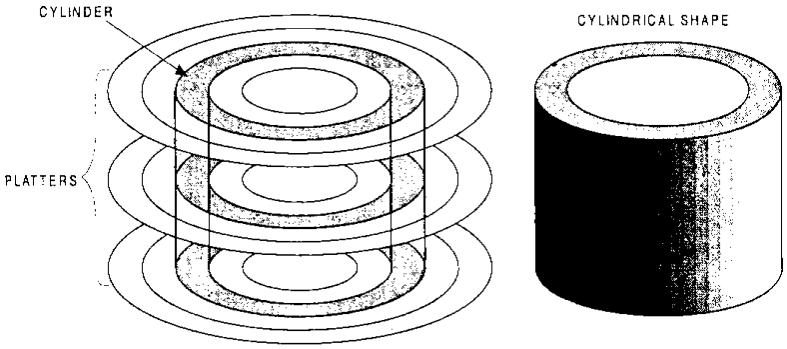
	d)	**Describe Frequence Modulation (FM) method of recording with suitable example.**	**4M**
	Ans.	**FM Encoding Method:** • FM or Frequency Modulation was the original data-encoding scheme used for storingthe data on the magnetic recording surface. • The modulation process in which the frequency of the carrier signal changes according to instantaneous value of modulating signal keeping amplitude & phase constant. • 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 bea 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 pulseand one data pulse), and a o bit is stored as a one pulse and one gap or no pulse. • A disadvantage of the above recording is that two transitions are required to represent each data-bit. • For example, a binary number 1011 will be stored as PP PN PP PP  The data 110010 can be recorded as shown wit FM recording technique	***Description 3M*** ***Example 1M***
	e)	**Explain the sequence of events in RS-232 communication with signals.**	**4M**

	Ans.	• Carrier Detect: This signal gives a modem a means of signaling the data terminal thatit 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 willprevent 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 itsreadiness by applying a positive voltage on the DSR line. • Receive Data: The bits coming in from a distant serial port go through receive dataline. • Signal Ground: It provides the return path to all the signals used in the serial port. **OR** **Sequence of events in RS-232 communication:** 1. It starts with a) RTS – Request to Send b) CTS – Clear to Send c) DTR – Data Terminal Ready 2. Then it starts with handshake. The RS232 handshake process involves four steps: a) The data terminal equipment (DTE) puts the RTS line into the "On" state. b) The data communications equipment (DCE) puts the CTS line into the "On" state. c) The DTE puts the DTR line into the "On" state. d) The DTR line remains in the "On" state while data is being transmitted. 3. After the transmission of data is completed, the DTE puts the DTR	***Explanation 4M***

		and RTS lines into the "Off" state and the DCE puts the CTS line into the "Off" state.	
	f)	**Describe the following terms related to hard disk.** **(i) MBR** **(ii) Sector** **(iii) Cylinder** **(iv) Track**	**4M**
	Ans.	**(i) MBR:** MBR is a small program to load and start the active/bootable partition from HDD It stores information about all primary partition on HDD, starting sectors, ending sectors, size etc in a partition table record, about bad area on the disk. It is created on HDD by exe FDISK.EXE and located at cylinder 0, head 0,sector 1  **(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. • 512 byte data can be stored in each sector. Sector no. starts from 1  	***Each description 1M***

(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



(iv) Track:

Each side of HDD platters 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.