



MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
(Autonomous)
(ISO/IEC - 27001 - 2005 Certified)

MODEL ANSWER

SUMMER – 2018 EXAMINATION

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) (i) Ans.	<p>Attempt any <u>SIX</u> of the following:</p> <p>What is form factor? List different form factors of motherboard.</p> <p>Form Factor: Shape and layout of motherboard is called form factor. It refers to physical dimensions (size and shape), certain connectors, screw holes, position where the board will fit. It affects individual components and shape of computer's case.</p> <p>List of Form factor:</p> <ul style="list-style-type: none">• AT• Baby AT• ATX• Mini-ATX• Micro-ATX• Flex ATX• LPX• Mini LPX• NLX.	<p>12 2M</p> <p><i>Form Factor</i> 1M</p> <p><i>List</i> 1M</p>



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		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"></td> <td style="width: 50%;">some times.</td> </tr> <tr> <td>5. Spikes not generated</td> <td>5. Spikes are generated</td> </tr> </table>		some times.	5. Spikes not generated	5. Spikes are generated	
	some times.						
5. Spikes not generated	5. Spikes are generated						
	<p>(vi) Ans.</p> <p>Explain USB features. Features of USB:</p> <ol style="list-style-type: none"> 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 overhead on the PC software increases. 	<p>2M</p> <p><i>Any 4 points ½ M each</i></p>					
	<p>(vii) Ans.</p> <p>State any four printer problems. <i>(Note: Any other problems shall be considered)</i></p> <ol style="list-style-type: none"> 1. Printing takes too long. 2. Print Garbage. 3. Paper jam. 4. Printer isn't printing. 5. Multiple sheets are drawn. 6. Print jobs stuck in queue 	<p>2M</p> <p><i>Any 4 points ½ M each</i></p>					
1.	<p>b) (i) Ans.</p> <p>Attempt any <u>TWO</u> of the following: Explain concept of cache memory with advantages and disadvantages.</p> <p>Cache is a smaller, faster memory which stores copies of the data from the most frequently used main memory locations. When the processor needs to read from or write to a location in a main memory, it first checks whether a copy of that data is in the cache. If so, the</p>	<p>8 4M</p> <p><i>Concept 2M</i></p>					

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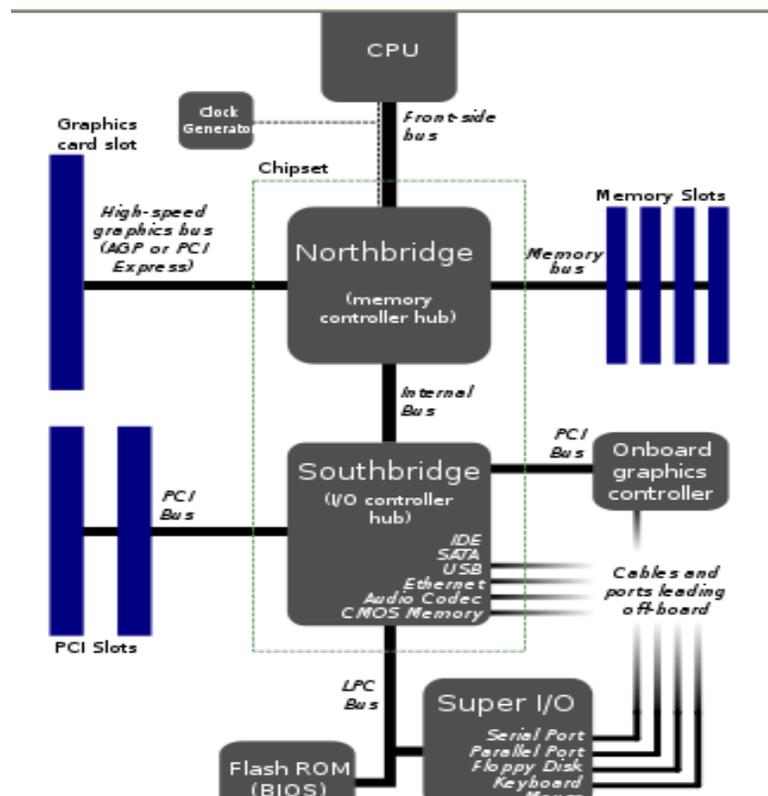
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It handles communication between CPU, RAM, AGP or PCI Express and the Southbridge.

South bridge 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 commonly used peripheral items all combined in a single chip.



*Diagram
m 2M*

	<p>b)</p> <p>Ans.</p>	<p>Explain hard disk drive construction. <i>(Note: Diagram is optional)</i></p>	<p>4M</p>
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A hard disk drive is a sealed unit that a PC uses for nonvolatile data storage. Nonvolatile, or semi-permanent, storage means that the storage device retains the data even when no power is supplied to the computer.

A hard disk drive contains rigid, disk-shaped platters, usually constructed of aluminum or glass.

Hard Disk Drive Components:

- 1- Disk platter
- 2- Read/Write head
- 3- Head arm/Head slider
- 4- Head actuator mechanism
- 5- Spindle motor
- 6- Logic board
- 7- Air filter
- 8- Bezel
- 9- Cables & Connectors

1. Platters: A hard disk drive has one or more flat circular disk called platters. Platters are made of an aluminum alloy, which provides both strength and light weight. These platters are coated with magnetizable media coating which can store information magnetically.

2. Read /Write Head: A hard disk drive usually has one read/write

*List of
components IM*



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		<p>head for each platter surface, meaning that each platter has two sets of read/write heads - one for the top side and one for the bottom side. These heads are connected, to a single movement mechanism so that all read write heads move together.</p> <p>3. Head Actuator Mechanism: This mechanism moves the heads across the disk and positions them accurately above the desired cylinder.</p> <p>4. Head Arm/Head Slider: The arm on which the Read/Write head is located, It is made in catamaran sailboat shape. Lower weight allows for faster acceleration and deceleration</p> <p>5. Spindle Motors: The motor that spins the platters is called the spindle motor, because it is connected to the spindle around which the platters revolve. Spindle motors in hard disk drives are always connected directly; no belts or gears are involved. The spindle motor also must be precisely controlled for speed.</p> <p>6. Logic Boards: It controls all these different parts of HDD. It contains the electronic components that control various sections of the HDD. It also acts as an interface between the hard disk drive and the computer.</p> <p>7. Air Filters: Nearly all hard disk drives have two air filters. One filter is called the recirculation filter, and the other is called breather filter. The recirculating air filter is used to filter any particles dislodged from inside the drive such as scarp of the disk media</p> <p>8. Bezel: Front faceplate provided on the HDD.</p> <p>9. Most drives have at least these three types of connectors: -Interface connector(s) -Power connector -Optional ground connector (tab)</p>	<p><i>Explanation 3M</i></p>
<p>c) Ans.</p>	<p>Explain characteristic of CRT monitor. Characteristic of CRT monitor:</p> <p>1) Frame Rate : This is used to show the number of times a screen full of information is produced per second or the number of times a frame is shown (in one second) on the monitor. OR Frequency at which whole screen is redrawn.</p> <p>2) Resolution: Resolution describes the number of potential pixels the monitor is capable of displaying. Resolution = Total Horizontal Pixels x Total vertical pixels.</p> <p>3) 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</p> <p>4) Video bandwidth: It is the highest input frequency a monitor can</p>	<p>4M</p> <p style="text-align: right;"><i>Any 4 characteristic of CRT monitor 1M each</i></p>	



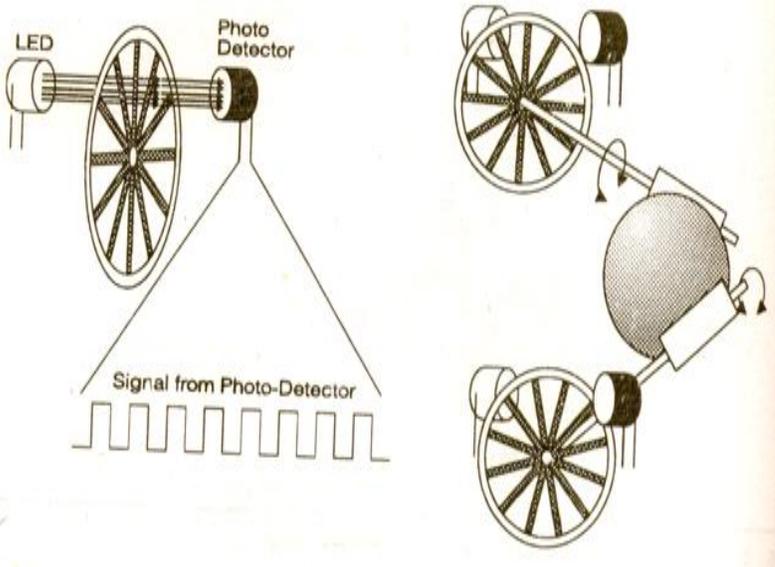
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	<p>handle and helps in determining the resolution capabilities of the monitor, bandwidth is measured in MHz. Higher the video bandwidth, better the image quality.</p> <p>5) Horizontal scanning: Scanning of the electron beam on the screen of the monitor is called raster scanning. The tracing of the horizontal lines in synchronism with H – Sync pulse is called Horizontal Scanning</p> <p>6) Vertical Scanning Frequency: The frequencies at which the monitor repaints the whole screen, It is also called as vertical scanning frequency. Unit: Hz (no. of cycles per second)</p>	
<p>d) Ans.</p>	<p>With neat diagram explain working of opto mechanical mouse.</p> <p>Opto mechanical mouse:</p>  <ul style="list-style-type: none">• A combination of LED and photo detector is used to sense the distance traveled by the mouse.• When mouse is moved across a flat surface, the ball protruding from the underside of the mouse and touching the surface starts to rotate in the direction of the movement.• Rotating ball touches and turns two rollers inside the mouse. These rollers are mounted at 90 degree angles to each other.• One roller is used for vertical movement and the other roller is used for horizontal movement of cursor on the screen.	<p>4M</p> <p><i>Any suitable diagram 1M</i></p> <p><i>Working 3M</i></p>



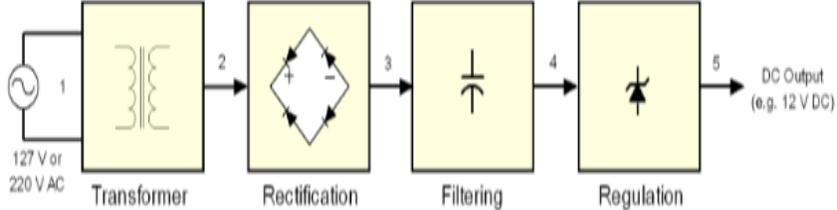
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		<ul style="list-style-type: none"> Each roller is connected to a wheel, which rotates with movement of rollers. As the wheel rotates, a pair of photo detector detects the number of openings on the wheel passing between them. Each opening on the wheel allows light from the LED to fall on the photo detector and generate electrical signal. The direction in which the mouse is moving can be found out by finding the number of signals from vertical and horizontal rollers. These signals are sent serially to the PC over the mouse cable. The mouse driver software converts these signals into distance direction and speed necessary to move the cursor on the screen. Pressing a button on the mouse sends a signal to the PC. Based on which button is pressed, how many times it is pressed and the position of the cursor at the time of pressing the button, the mouse driver performs the task. 	
e) Ans.	<p>Draw and explain linear power supply.</p> <p>Linear Power Supply:</p>  <p>Linear Power supply converts AC to DC voltages.</p> <p>Transformer: Transformers Power supplies contain two main circuits: a primary side and a secondary side. The primary side connects to the power source, and the secondary side connects to the load. Transformer used to convert the voltage from mains to a different, usually lower voltage. The incoming AC voltage is stepped down to a lower AC voltage.</p> <p>Rectifier: Then rectification is done by a set of diodes, transforming this AC voltage into pulsating voltage DC (Full-wave bridge rectifier)</p> <p>Filter: The next step is filtering, which is done by an capacitor, transforming this pulsating voltage into almost DC, A filter capacitor is used to maintain a constant dc level with minimum ripple.</p> <p>Regulator: Voltage regulating stage is necessary, done by a zener</p>		<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Linear power supply Diagram 2M</i></p> <p style="text-align: center;"><i>Explanation 2M</i></p>



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	<p>Master Boot Record (MBR): The master boot record is the small bit of computer code that the BIOS loads and executes to start the boot process. This code, when fully executed, transfers control to the boot program stored on the boot (active) partition to load the operating system.</p>	
<p>b) Ans.</p>	<p>Draw and explain block diagram of CRT colour monitor. Block diagram of CRT color Monitor:</p> <p>The diagram illustrates the internal components of a CRT color monitor. It features three parallel video channels for Red, Green, and Blue. Each channel starts with a 'Video in' signal that passes through a 'Video Amplifier' and then a 'Video Driver' before reaching the CRT. A 'Vsync' signal goes through a 'Video Amplifier' to a 'Vertical Driver', which also feeds into the CRT. A 'Hsync' signal goes through a 'Horizontal Oscillator' to a 'Horizontal Driver', which feeds into the CRT and an 'FBT' (Flyback Transformer). A 'Power Supply' block takes 'AC in' and provides 'DC out' to the 'Vertical Driver', 'Horizontal Driver', and 'FBT'. The CRT tube itself is shown with an 'Anode' and 'High Voltage' connection.</p> <p>CRT Color Monitor has three sub sections, namely, Video drive circuits, Vertical drive circuits and horizontal drive circuits. Power circuit: This is a synchronous type switching power circuit, which consists of Line filter, rectifier, PWM regulator and SMPS converting transformer. This is used provide different DC voltages required in the monitor. Video drive circuits: It contains circuits for displaying the video information as dots on the CRT screen. It receives video signal from the PC and displays it on</p>	<p>4M</p> <p><i>Block diagram 2M</i></p> <p><i>Explanation 2M</i></p>



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		<p>the monitor. Three video drive circuits are needed, one for each primary color (RGB). Video signals are represented as analog signals which allow the intensity of each color to be varied. The CRT is designed to provide three electron beams which are directed at corresponding color phosphors. By varying the intensity of each electron beam, virtually any color can be produced.</p> <p>Vertical Drive Circuit: They contain the vertical oscillator circuit and a multiplexer. The V SYNC signal is applied to the vertical oscillator IC.</p> <p>Horizontal Drive Circuit: H-sync is applied to the horizontal drive IC. Horizontal oscillator frequency is controlled by H1, H2 inputs. FBT (FLY BACK TRANSFORMER) is used to provide various voltages to different circuits such as focusing circuit, circuit for changing contrast and brightness etc; It also generates voltages for electron beam retrace.</p>	
<p>c) Ans.</p>	<p>Explain working of flat bed scanner with the help of block diagram. Flat Bed Scanner:</p> <div style="text-align: center;"> <pre> graph TD Doc[DOCUMENT ON GLASSBED] --> LS[LIGHT SOURCE] Doc --> Mir[MIRRORS] LS --> Mir Mir --> Len[LENS] Len --> Fil[FILTER] Fil --> CCD[CCD] CCD --> ADC[ADC] ADC --> TC[TIMING & CONTROL] TC --> SMD[STEPPER MOTOR DRIVER] SMD --> SMTA[STEPPER MOTOR BELT ASSEMBLY] TC --> SI[SYSTEM INTERFACE] SI <--> PC[PC PORT] </pre> </div> <ul style="list-style-type: none"> • 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. 	<p style="text-align: right;">4M</p> <p style="text-align: right;"><i>Diagram 2M</i></p> <p style="text-align: right;"><i>Explanation 2M</i></p>	



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	<ul style="list-style-type: none">• 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.	
d)	<p>Explain following terms related to power supply problem:</p> <p>(i) Blackouts (ii) Brownouts (iii) Surge (iv) Spikes (Note: Diagram is optional)</p> <p>Ans. (i) Blackouts: It is the complete loss of electrical power where voltage and current drop to a very low value (typically zero).</p> <div data-bbox="673 1402 941 1648" data-label="Figure"></div> <p>(ii) Brownouts: It is the under voltage condition caused by faulty electrical wiring or excessive electrical load on an AC circuit.</p>	4M Each term 1M



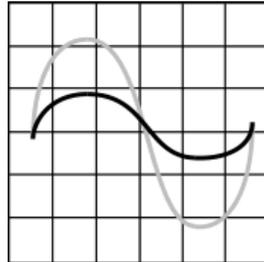
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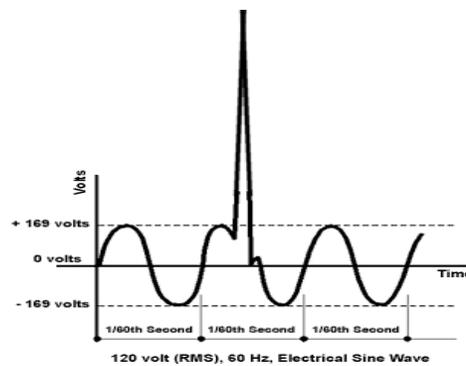
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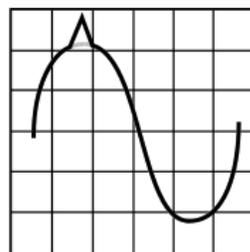
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(iii) **Surge:** It is overvoltage that last for more than one cycle. Surges are caused when some heavy electrical load is suddenly switched off. They are voltage conditions that take place over relatively long periods of few milliseconds.



(iv) **Spikes:** Spikes are very high voltage, split second events that can disrupt the operation of electronic devices such as computers. OR It is a large over voltage condition that occurs over short duration of few microseconds.



	e) Ans.	Explain RS32 interface basics. (Note: Any other relevant explanation shall be considered) RS 232 Basics: <ul style="list-style-type: none">Serial port RS232C supports asynchronous Full duplex serial data	4M
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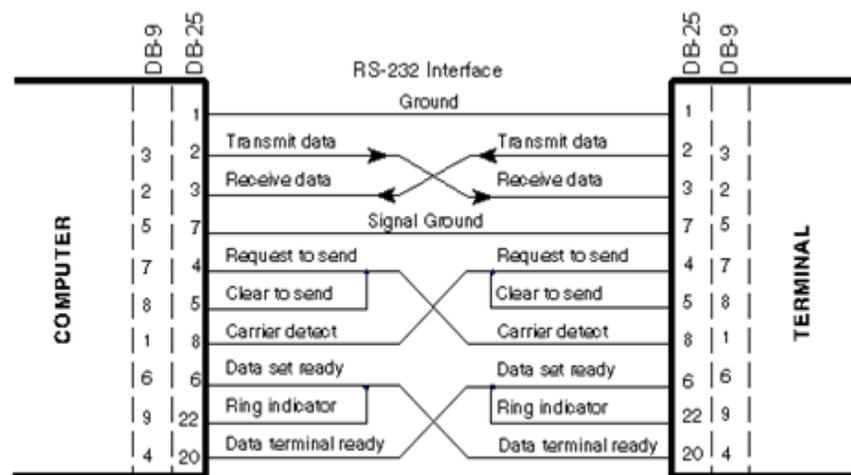
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communication

- RS stands for **Recommended Standard**
- It can be 25 pin D type interface or 9 pin D type interface.

The communication takes place between a computer and a serial device/terminal as given in the following diagram.

The following signals are used in the RS 232 communication



*Suitable
 explanation 4M*

CD (Carrier detect)	Modem connected to serial port has made proper connection with modem on other side.
RXD (Receive data)	Data send from DCE to DTE and vice versa
TXD (Transmit data)	It is used by computer to sends data to the device to serial port connect
DTR (Data terminal ready)	Computer is ready for communication
GND (Signal ground)	Provide necessary return path.
DSR (Data set ready)	Device is ready for communication.
RTS (request to Send)	Once clear to send is received, device connected to serial port inform that computer send



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		<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 40%;"></td> <td style="width: 60%;">request to send.</td> </tr> <tr> <td>CTS (Clear to send)</td> <td>Used by device connected to the serial port to inform to the computer that computer can start data transmission.</td> </tr> <tr> <td>RI (Ring indicator)</td> <td>To call /communicate modem by other device not computer To inform computer someone calling. Computer detected ringing voltage on telephone line</td> </tr> </table>		request to send.	CTS (Clear to send)	Used by device connected to the serial port to inform to the computer that computer can start data transmission.	RI (Ring indicator)	To call /communicate modem by other device not computer To inform computer someone calling. Computer detected ringing voltage on telephone line	
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f) Ans.	<p>Explain any two types of maintenance of PC.</p> <p>Maintenance of PCs: Preventive Maintenance can be of two types: a) Passive preventive maintenance b) Active preventive maintenance</p> <p>Passive preventive maintenance procedure It includes periodic care of external factor which affect working of the PC i.e. Mainly providing the best possible physical and electrical environment for the PC to operate.</p> <p>Active preventive maintenance procedure 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.</p> <p>Active preventive maintenance Procedure: Cleaning a system</p> <ul style="list-style-type: none"> ➤ Regular and through cleaning of the system removes any layer of dust and benefits the system in the long run. ➤ Dust acts as thermal insulator, which prevents proper system cooling, ➤ Excessive shortens the life of system components. ➤ Dust can contain conductive elements that can cause partial short circuit in the system. ➤ Other elements in the dust can accelerate corrosion of electrical contacts. 		4M						
			<i>Any 2 Active Maintenance 1M each</i>						



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	<p>➤ Following cleaning tools and solutions can be used to clean the internal components, peripherals and the boards inside the system.</p> <p>Cleaning tools</p> <ul style="list-style-type: none">➤ Contact cleaning solution Silicon –type lubricant (WD 40)➤ Small brush computer vacuum cleaner➤ Canned air Lint-free foam cleaning swabs➤ Foam tape <p>Cleaning Solutions</p> <ul style="list-style-type: none">➤ Standard cleaners➤ Trichloroethane, Isopropyl alcohol, acetone, Freon.➤ Contact cleaners/ lubricants➤ Stabilant 22, WD 40.➤ Dusters (Compressed gas to blow away dust)➤ HFCs such as difluoroethane, CO₂➤ Similar cleaning tools and solutions can be used with peripheral devices such as keyboard, mouse etc and the gold contacts of slot connectors, power supply connectors and all other connectors. <p>System backups</p> <p>The hardware in the PC can always be repaired or replaced, but the data cannot.</p> <p>For this purpose following procedure can be followed.</p> <ul style="list-style-type: none">➤ Take backup of any data or important files.➤ Delete all temporary files.➤ Empty the recycle bin.➤ Install antivirus updates.➤ Run defragmentation program. <p>Some weekly maintenance procedures</p> <ul style="list-style-type: none">➤ Take backup of important data and files.➤ Delete all temporary files.➤ Empty the recycle bin.➤ Check and install antivirus software updates. <p>Some monthly maintenance procedures</p> <ul style="list-style-type: none">➤ Clean the system and the peripheral devices.➤ Create OS startup CD.➤ Install OS updates.➤ Install updated drivers of video cards, modems, sound cards etc.	
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		<p>➤ Check all the system fans and power supplies etc.</p> <p>Passive preventive maintenance</p> <ul style="list-style-type: none">➤ 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) <p>Physical contributors to system failure</p> <p>1) Prevention of dust and dirt</p> <ul style="list-style-type: none">➤ 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. <p>2) Excessive temperature</p> <p>Prevention</p> <ul style="list-style-type: none">➤ 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. <p>3) Effect of Cold</p> <p>Prevention</p> <ul style="list-style-type: none">➤ Use room heater to maintain the room temperature. <p>4) Corrosion</p> <p>Prevention</p> <ul style="list-style-type: none">➤ Periodic cleaning.➤ Clean the pins of ICs and connectors.➤ Use organic solvent for cleaning the oxide layer and corroded contacts. <p>5) Magnetic Effect</p> <p>Prevention</p> <ul style="list-style-type: none">➤ To avoid data loss due to magnetism, keep disks and information cables away from the magnets. <p>6) Electrical contributors to system failure</p>	<p><i>Any 2 Passive Maintenance 1M each</i></p>
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		<p>ESD (Electro Static Discharge) Prevention</p> <ul style="list-style-type: none"> ➤ 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. <p>7) Power line noise : Prevention</p> <ul style="list-style-type: none"> ➤ Isolation. ➤ Shielding. ➤ Power grounding. <p>8) Radio Frequency interference (RFI): Prevention Put all the sources which can produce RFI away from the PC.</p>	
4.	a) Ans.	<p>Attempt any <u>FOUR</u> of the following: List and explain processor modes. Processor Modes: 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 processor modes are</p> <ol style="list-style-type: none"> 1. Real mode 2. Protected mode 3. Virtual real mode. <p>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. It has 20-bit segmented memory. In this mode, direct access to BIOS routines & peripherals are available. There is no memory protection and no multitasking at hardware level. Only one program can run at a time. No built in protection exists to keep one program from overwriting another program or even the operating system in the memory.</p> <p>2. Protected Mode: It was introduced with 386 processor which was</p>	<p>16 4M</p> <p><i>List 1M</i></p> <p><i>Explanation 1M each</i></p>



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		<p>the first 32 bit processor and it could run entirely on 32 bit instruction set. This new 32 bit mode was called protected mode because software programs running in this mode are protected from being overwritten in the memory. Such protection makes the system more crash proof. There is no 1 MB limit in protected mode. This mode has ability to multitask, meaning having the operating system manage the execution of multiple programs simultaneously. It supports virtual memory, which allows the system to use the hard disk to emulate additional system memory when needed.</p> <p>3. Virtual Real Mode: This emulates real mode from within protected mode, allowing DOS programs to run. A protected mode operating system such as Windows can in fact create multiple virtual real mode machines, each of which appear to the software running them as if they are the only software running on the machine</p>	
b) Ans.	<p>Explain formatting in detail. <u>Formatting</u></p> <ul style="list-style-type: none"> • Hard Disk drive requires a low level formatting and a high level formatting to make it useful for data storage • Low level formatting magnetically divides the disk into tracks and sectors • High level formatting is done on hard disk to make the disk DOS compatible by writing DBR, FATs and empty root directory information on the drive <p>➤ <u>Low level formatting</u></p> <ul style="list-style-type: none"> • It is called physical formatting. • Low-level formatting is the process of outlining the positions of the tracks and sectors on the hard disk, and writing the control structures that define where the tracks and sectors are. • It really creates the physical format that defines where the data is stored on the disk. • Low level formatting is done in the factory itself. <p>➤ <u>Functions of low level formatting</u></p> <ul style="list-style-type: none"> • Dividing the disk surface into tracks and sectors. • Establishing interleave factor. • Marking identification information on each track and sector. • Marking defective sectors. 	<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Low level formatting 2M</i></p>	



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		<p>➤ High level formatting</p> <ul style="list-style-type: none"> • High-level formatting is the process of setting up an empty file system on a disk partition or logical volume and, for PCs, installing a boot sector. • After low level formatting and partitioning, final step for preparing the hard disk drive for use is high level format the drive • High level format program need to only create File Allocation Table, directory system etc. so that the operating system can use the HDD for storage purpose. • It creates the file system format within a disk partition or a logical volume. • It can be done during OS installation or new partition creation. 	<p><i>High level formatting</i> 2M</p>
<p>c) Ans.</p>	<p>Explain LCD matrix types.</p> <p>1) Active matrix:</p> <ul style="list-style-type: none"> ➤ A transistor and a storage capacitor are integrated at each cross point of electrodes. ➤ To address a particular pixel, proper row is switched on and the change is sent down the correct column. ➤ Only the capacitor at the designated pixel receives the charge. ➤ Capacitor holds the charge until the next refresh cycle. <div style="text-align: center;"> </div> <p>2) Passive Matrix:</p> <ul style="list-style-type: none"> ➤ Consists of a grid of vertical and horizontal wires to display an image on the screen. ➤ Each pixel is controlled by an intersection of two wires in the 	<p style="text-align: center;">4M</p> <p style="text-align: center;"><i>Active matrix</i> 2M</p>	<p style="text-align: center;"><i>Passive matrix</i> 2M</p>



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		<p>grid.</p> <p>➤ By alluring the e-cal charge at a given intersection, the colour and brightness of the corresponding pixel can be charged.</p> <div style="text-align: center;"> <p style="text-align: center;">Data Lines</p> </div>	
<p>d)</p> <p>Ans.</p>	<p>Describe different stages of the process of printing a document on laser printer.</p> <p>Laser Printer Printing Process:</p> <p>Image Formation system</p> <p>Image formation process revolves around a photo sensitive drum, called organic Photo conductive (OPC) drum. This drum is located inside the Electro photographic cartridge inside the laser printer. Image formation process consists of following six steps</p> <ol style="list-style-type: none"> 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. <p>1. Cleaning of the OPC drum</p> <p>Before transferring any image to the OPC drums surface, the surface needs to be cleaned and prepared to hold the image being transferred. The drums 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 drums surface from the last printing.</p> <p>2. Conditioning of the OPC drum</p> <p>In this process, a uniform charge of -600V is applied to the complete</p>	<p style="text-align: right;">4M</p> <p style="text-align: right;"><i>Process list 1M</i></p> <p style="text-align: right;"><i>Correct Process explanation 3M</i></p>	



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	<p>surface of the OPC drum.</p> <p>3. 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 1/300th of an inch, so that the beam can write the next line.</p> <p>4. 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.</p> <p>5. 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</p>	
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	<p>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.</p> <p>6. 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.</p>	
<p>e)</p> <p>Ans.</p>	<p>Draw and explain block diagram of general UPS. <i>(Note: Diagram and explanation of On Line or Offline UPS shall be considered)</i></p> <p>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.</p> <p>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.</p> <p>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.</p>	<p>4M</p> <p><i>Explanation 2M</i></p>



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	<p>Static Switch / contactor</p> <p>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.</p> <p>It also has synchronization circuits for smooth change-over from mains to inverter ac avoid waveform distortion.</p> <div style="text-align: center;"> <p style="text-align: center;">Block Diagram of General UPS</p> </div>	<p><i>Diagram m 2M</i></p>															
<p>f)</p> <p>Ans.</p>	<p>What is POST? Enlist different error codes and respective meaning provided by POST.</p> <p>POST (Power On Self Test):</p> <p>The PC has built – in test programs which do their jobs as soon as the PC is powered on. This Power OnSelf 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.</p> <p>The POST is a series of simple programs designed to test and catch faults in different hardware components and circuits.</p> <p>If any hardware error is noticed, the POST indicates the fault to the user through the following error codes:</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse; text-align: center;"> <thead> <tr> <th style="padding: 5px;">Sr. No.</th> <th style="padding: 5px;">Error Code</th> <th style="padding: 5px;">Meaning</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">1</td> <td style="padding: 5px;">1XX</td> <td style="padding: 5px;">System Board Error</td> </tr> <tr> <td style="padding: 5px;">2</td> <td style="padding: 5px;">2XX</td> <td style="padding: 5px;">Memory (RAM errors)</td> </tr> <tr> <td style="padding: 5px;">3</td> <td style="padding: 5px;">3XX</td> <td style="padding: 5px;">Keyboard Errors</td> </tr> <tr> <td style="padding: 5px;">4</td> <td style="padding: 5px;">5XX</td> <td style="padding: 5px;">Color Graphics Adapter Errors</td> </tr> </tbody> </table>	Sr. No.	Error Code	Meaning	1	1XX	System Board Error	2	2XX	Memory (RAM errors)	3	3XX	Keyboard Errors	4	5XX	Color Graphics Adapter Errors	<p>4M</p> <p><i>Definiti on 1M</i></p> <p><i>Any 3 error codes with meanin g 3M</i></p>
Sr. No.	Error Code	Meaning															
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			5	29XX	Color Printer Errors		
			6	48XX	Internal Modem Errors		
			7	104XX	IDE fixed disk or adapter errors		
			8	215XX	SCSI CD ROM drive errors		
5.	a) Ans.	<p>Attempt any <u>TWO</u> of the following: Explain AGP with it's types. Write advantages of AGP over PCI. It is a high speed bus for graphics and video support. Features of AGP:</p> <ul style="list-style-type: none"> • It allows the video board to use system memory (RAM), as video memory. • It is 4 to 8 times faster than PCI bus. <p>AGP is a high speed connection and runs at a base frequency of 66.66MHz, which is double the standard PCI. In the basic AGP mode called 1x, single transfer is in every cycle. As AGP bus is 32 bits (4 bytes) wide. $66 \times 4 = 266\text{MBps}$ In AGP 2x, two transfers are performed per cycle, giving 533MBps. Because AGP is independent of PCI, using an AGP video card frees up the PCI bus for I/O communications. AGP allows the video card to a high speed connection to the system RAM.</p> <p><u>Types of AGP:</u> In power, AGP video cards come in three flavors: 0.8v (newer) - 8X 1.5v (older) - 4X 3.3v (oldest) - 2X</p> <p>2X and 4X AGP Older 2X AGP cards do not use the right voltage to function properly in the newer 1.5V AGP slots. If forced into a 1.5V AGP slot, a non-1.5V compliant video card will damage the motherboard. On the other hand a 1.5V AGP card is usually backwards compatible with older 2X AGP slots.</p> <p>8X AGP Motherboards supporting 8x AGP support both 1.5V AGP 2.0 compliant cards (AGP 4x) and newer .8V AGP 3.0 compliant cards (AGP 8x). The keying for AGP 3.0 cards is identical to that of AGP 2.0 cards to retain backward compatibility.</p>					16 8M
						3M Explanation	
						1M Type	



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		<p><u>Advantages over PCI:</u></p> <ul style="list-style-type: none"> • It provides a dedicated pathway between the slot and the processor rather than sharing the PCI bus. • The direct connection allows for higher clock speeds. • Pipelining – Multiple packets of data can be received or sent in a single request. • Sideband addressing - AGP issues eight additional lines on the data packet just for addressing. 	<p>4M For Advanta ge of AGP</p>																	
<p>b) Ans.</p>	<p>Describe FAT and explain FAT types compare FAT and NTFS. 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</p> <p>FAT 16 - Hard drives use a 16-bit number termed as FAT16 to each cluster. Here the configuration files of every sector are expressed by 16 bytes.</p> <p>FAT 32 – It uses 32-bit values for the FAT entries. By assigning each cluster its own number, it is possible to store files in any available clusters throughout the drive without having to think about the actual file’s size. As files are erased, these clusters become available for re-use.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="text-align: left;">Criteria</th> <th style="text-align: center;">NTFS</th> <th style="text-align: center;">FAT 32</th> </tr> </thead> <tbody> <tr> <td>OS</td> <td>Windows 2000, XP, 2003 server</td> <td>DOS V7, Win 2000,98,XP</td> </tr> <tr> <td>Maximum Volume Size</td> <td>2TB</td> <td>32GB</td> </tr> <tr> <td>Max. Files on Volume</td> <td>Unlimited</td> <td>4194304</td> </tr> <tr> <td>Max file size</td> <td>Limited by volume size</td> <td>4GB</td> </tr> <tr> <td>Max Cluster Number</td> <td>Unlimited</td> <td>4177918</td> </tr> </tbody> </table>	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	<p>8M</p> <p>2M for FAT</p> <p>2M for type</p> <p>4M for any 4 points for compari son between FAT and NTFS</p>
Criteria	NTFS	FAT 32																		
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		<table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 20%;">Boot sector location</td> <td style="width: 30%;">1st and last</td> <td style="width: 50%;">First sector and copy in sector No 6</td> </tr> <tr> <td>Compression</td> <td>Yes</td> <td>NO</td> </tr> <tr> <td>Built in security</td> <td>Yes</td> <td>NO</td> </tr> <tr> <td>Recoverability</td> <td>Yes</td> <td>NO</td> </tr> <tr> <td>performance</td> <td>High on large volume Low on small volume</td> <td>Good on small volume, Low on large</td> </tr> <tr> <td>Security</td> <td>Folder and file access can be controlled individually</td> <td>Very little</td> </tr> <tr> <td>Compatibility</td> <td>Not compatible with window 95/98/Me</td> <td>Compatible with all OS (32 bit)</td> </tr> <tr> <td>Space efficiency</td> <td>Supports disk quotas to control amount of disk space per user</td> <td>Does not support disk quota</td> </tr> </tbody> </table>	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		
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<p>c) Ans.</p>	<p>Explain working of Inkjet printer with neat block diagram.</p> <div style="text-align: center;"> </div>			<p>8M</p> <p style="text-align: center;"><i>4M for diagram</i></p>																								
		Functional Block Diagram																										



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		<p>Working of Inkjet Printer:</p> <ul style="list-style-type: none">• In Inkjet Printer, we use an ink cartridge with nozzles.• These printers eject ink drops on to the papers through nozzles to form the characters. The ink cartridge has an ink reservoir and a set of nozzles.• It also has a firing chamber.• To start the ink is drawn into the firing chamber.• The thin film resistor at the bottom of the ink drop heats the ink up to 900 degree Fahrenheit for a millionth of a second.• This produces an ink bubble and it rejects the ink out of the firing chamber through nozzle.• The ejected ink drop is deposited on the paper to form a dot.	<p><i>4M for explanation</i></p>
6.	a) Ans.	<p>Attempt any <u>FOUR</u> of the following: Explain PCI-X bus of Pentium IV mother board. PCI-X bus of Pentium IV mother board:</p> <ol style="list-style-type: none">1. PCI –Express bus operates on hub architecture.2. Each one of the PCI-Express device connects to the hub over dedicated link3. The data communication in serial is X1 to X16 full duplex links4. Data transfer rates from 500 Mbytes/s to 8 Gbytes/s5. PCI express uses switching network star topology and doesn't require bus arbitration.6. It transfers 64 bits at a speed of 133MHz.7. It uses high speed serial signaling.8. It works as a switched design for point to point communication between the devices. Each device gets the full band width of the system during transfers.9. It does not use any control signals such as interrupts instead it uses packet based system to exchange both data and command. In the initial implementation PCI –X uses 4 wire interconnection systems, 2 for sending and 2 for receiving. <p style="text-align: center;">OR</p> <p><u>PCI-X</u></p> <ul style="list-style-type: none">➤ Peripheral Component Interconnect Extended➤ Supersede of PCI➤ Faster version of PCI with twice speed➤ Similar in physical implementation & basic design like PCI➤ Developed jointly by IBM, HP & Compaq.➤ Clock speed 66MHz to 133MHz	<p>16 4M</p> <p><i>Any 4 features 1M each</i></p>



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		<ul style="list-style-type: none"> ➤ Data exchange between the processor & peripherals is of 1.06 GB/s ➤ Supports backward compatibility with previous versions. Improves the fault tolerance 	
b)	Ans.	<p>State meaning of cluster? How it is rectified. <i>(Note: Any one method how it can be rectified)</i></p> <p>Cluster: Whenever any information is stored on floppy or hard disk, it doesn't allocate the space sector-wise, instead it uses unit of storage termed as "Clusters" Clusters are minimum space allocated by OS when saving any information on disk. A cluster can be made of 1 or more than 1 sectors. If OS specifies that, 1 cluster can store only 512 bytes of information, then to store 513 bytes, 2 clusters shall be used. Using clusters as allocation units reduces the size of FAT that OS uses to keep track of used and empty disk space. Clusters are used to allocate the storage area for data area only. FAT and directory area are not allocated according to cluster size. The cylinder or track number always starts from 0. The 1 sector number is always -1 and 1st cluster number begins with 2.</p> <p><i>(Note: Any one of the following shall be considered)</i></p> <p>For Windows 10/8 users: Open This PC > Right-click on System drive and choose Properties. Go to Tools > Click Check. Under Error-checking, click on Check. Review the scan result > Click Scan and repair drive. Choose when to repair the file system. Wait for Windows 10/8 scan and repair the hard drive bad sectors.</p> <p>Fix bad sector in Windows 7: Open Computer > Right-click the hard drive you want to check for bad sectors and select Properties. In Properties window, click Tools > Check now in the Error-checking section. Click Scan for and attempt recovery of bad sectors > Click Start. Review the check disk report.</p> <p>How to Repair a Bad Sector in Windows XP?</p>	<p>4M</p> <p><i>Meaning of cluster</i> 2M</p> <p><i>2M for explanation of rectified</i></p>



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Close all programs and files > Open My Computer;
Choose a hard drive and right-click on it > Select Properties;
Click Tools under Properties > Click Check Now in Error-checking section;
Choose Check Disk options to check and repair bad sectors:
Automatically fix file system errors and click Start;
If an error message pops up, asking you if you'd like to schedule the disk check when you restart the computer, click Yes to restart the computer and repair bad sectors;
Review the check disk report: 0 means no errors were found, 1 means that errors were found and fixed.

OR

(Note: Any one of the following shall be considered)

1 Change cluster size in Windows File Explorer

Format Partition to Change Cluster Size: There are two ways to format partition and change cluster size: **Windows Explorer** and **command prompt diskpart**

1. press Win+E to run Windows Explorer, right click on the partition you want to format, take partition G: for example

NOTE: You can copy volume to backup data if you want to change cluster size without data loss.

2. click **Allocation Unit Size** (Cluster Size), select **64 kilobytes**, select **Quick Format > Start**

3. Format warning message shows up, click **YES** to continue.

4. After a while, format complete.

2. Change cluster size in command prompt diskpart

1. Type cmd in Start menu, run command prompt as administrator and type the following command in order

2. diskpart

3. list disk

4. select disk 2

5. list partition

6. select partition 2



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	<p>7. format fs=ntfs quick unit=64k 8. exit</p> <p>3. Format Partition to change cluster size in Partition Expert In Partition Expert, there are two ways to change cluster size: format partition and create new partition to change cluster size</p> <p>1. Run Partition Expert, click on the Partition you want to change cluster size and Choose Format Volume ; 2. Select 64k in Cluster size column > select Quick Format, (or just leave it as default setting) 3. Click OK to close this format window, and in the main interface, we click Commit so that we can have a 64K cluster sized partition.</p> <p>4. Create Partition to define cluster size in Partition Expert Create Partition in Partition Expert is another way of making 64k cluster size, when you have a new disk installed, disk space is unallocated, you can create partition and define cluster size as 64k at the same time.</p> <p>1. Run Partition Expert, click on unallocated space and click Create Volume 2. In the popup window, define Volume Label, assign drive letter; define file system; choose cluster size; define volume type 3. Click OK, > Commit.</p>	
<p>c) Ans.</p>	<p>Explain block diagram of video accelerator card. Need:</p> <p>1. For higher resolutions, the data needed to form a single screen image can be large. 2. System also needs data for operations such as memory refresh, keyboard, mouse handling, drive access etc. 3. This results in video data bottlenecks.</p> <p>Solution:</p> <p>1. Incorporate processing power onto video board (rather than CPU) for graphics data processing. 2. A graphics accelerator application specific chip (ASIC) that intercepts graphics tasks and processes them without the</p>	<p>4M</p> <p>2M for explanation</p>



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		<p>intervention of system CPU.</p> <ol style="list-style-type: none"> 3. Core of the accelerator is the graphics chip which connects directly to PC expansion bus. 4. Graphics instructions and data are translated into pixel data and stored in video RAM. 5. VRAM offers second data bus that is routed directly to RAMDAC (Random Access Memory Video to Analog Converter). 6. Graphics chip directs RAMDAC operation and ensures that VRAM data is available. 7. RAMDAC translates video data into R, G, and B video signals along with vertical and horizontal signals. 8. Output signals generated by the RAMDAC drive the monitor. <div style="text-align: center;"> <p style="font-size: small;">Basic block diagram of a video accelerator board</p> </div>	<p><i>2M for block diagram</i></p>
	<p>d) Ans.</p>	<p>Explain use of output voltage of SMPS.</p> <p>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.</p> <p>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.</p> <p>For ATX</p>	<p>4M</p>



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		Wire colour	DC Voltage	DC Voltage	
		Red	+5 V	All logic families	<i>Any 4 voltage 4M</i>
		Yellow	+12V	Drive Motors	
		Black	Ground		
		Blue	-12V	For serial port	
		Grey	Power Good		
		Green	Power On		
		Purple	+5V StandBy		
		Orange	+3.3V	Latest Processor	
		Brown/Orange	+3.3V Sense		
		White	-5V (optional)	Vcc for DRAM refreshing	
	<p>e) Ans.</p>	<p>What is centronics? Explain modes of operations of centronics interface.</p> <p>The Centronics interface is a standard input/output (I/O) interface designed in the 1970s for connecting printers and other devices. This standard specifies five modes of operation, each mode providing data transfer in either the forward direction (computer to peripheral), backward direction (peripheral to computer), or bi-directional (one direction at a time).</p> <ul style="list-style-type: none"> • Compatibility mode is the original Centronics parallel interface and intended for use with dot matrix printers and older laser printers. • Nibble mode allows data transfer back to the computer. The nibble mode uses the status lines to send 2 nibbles (4-bit units) of data to the computer in two data transfer cycles. This mode is best used with printers. • Byte mode: One byte of data is transferred instead of the two data cycles required by the nibble mode. • ECP mode (Enhanced Capability Port mode) is an advanced bi-directional mode for use with printers and scanners. It allows data compression for images, FIFO (first in, first out) for items in queues, and high-speed, bi-directional communication. Data transfer occurs at two to four megabytes per second. An advanced feature of ECP is channel addressing. This is used for 			



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MODEL ANSWER

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		<p>multifunction devices such as printer/fax/modem devices. For example, if a printer/fax/modem device needs to print and send data over the modem at the same time, the channel address software driver of the ECP mode assigns a new channel to the modem so that both devices can work simultaneously.</p> <ul style="list-style-type: none">• EPP mode (Enhanced Parallel Port mode) was designed by Intel, Xircom, and Zenith Data Systems to provide a high-performance parallel interface that could also be used with the standard interface. The EPP mode uses data cycles that transfer data between the computer and the peripheral and address cycles that assign address, channel, or command information.	<p><i>2M for explaining the mode of operation</i></p>
f) Ans.	<p>Explain any one software tool for debugging PC. Software tools Microsoft diagnostics DOS MSD command:</p> <ul style="list-style-type: none">• Norton utilities.• CHECKIT.• Quick analysis (QA+).• ATDIAGS• POST• Power on Self Test <p>(POST) Give the test sequence of post:</p> <ol style="list-style-type: none">1. CPU test2. BIOS ROM Checksum test3. Timer 1 test4. DMA controller test5. 16 KB DRAM test6. Interrupt controller initialization7. Interrupt controller test8. Timer 0 initialization9. CRT controller test10. DRAM after 16 KB test11. Keyboard test12. Disk drive test	<p>4M</p> <p><i>1M for listing all the tool</i></p> <p><i>3M for explaining any one tool</i></p>	