



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 1/33

**Important Instructions to examiners:**

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and Communication Skills).
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgement on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.

**Q.1) a) Attempt any SIX of the following:**

**12 Marks**

**i) Define the terms related to hard disk:**

**1) Cylinder**

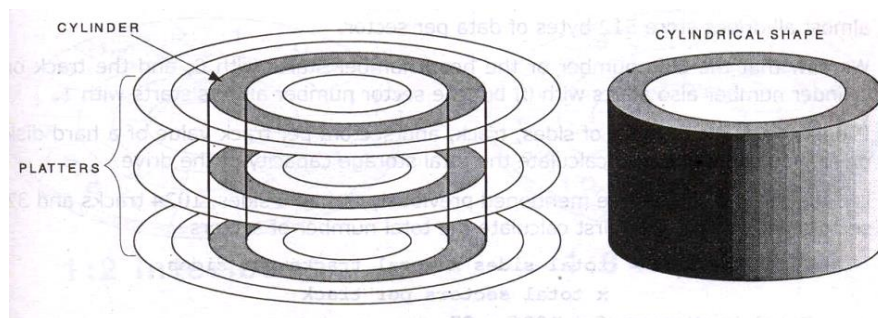
**2) Cluster**

**(Each definition 1M)**

**(Note: For Cylinder: diagram (not compulsory))**

**Ans:**

- 1) **Cylinder:** In a hard disk, same tracks of different platters form an imaginary structure called a cylinder. Data is stored in the disk 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





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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 2/33**

**2) 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.

**ii) Write any two points of difference between XT type and AT type motherboard.**

**(Any two points, each 1M) (Any other relevant point shall be considered)**

**Ans:**

	XT	AT
Processor	8088	286 onwards 80286,386,486
Coprocessor	8087	80287, 387, 487
Speed	Less	Very high
Memory	256KB-640KB	1MB Onwards
Cache Memory	Does not support	It supports
Bus	Support ISA 8 bit	Supports ISA, EISA, PCI, PCIX

**iii) What is a Bluetooth? Give its function.**

**(Definition- 1M; Any one function -1M)**

**Ans: Bluetooth:** This is a low power data transfer standard designed to interconnect various wireless devices.

**Functions:**

- Bluetooth transfers data at the rate of 1 Mbps, which is from three to eight times the average speed of parallel and serial ports, respectively.
- Bluetooth is used for secure transfer of data in that it employs several layers of data encryption and user authentication measures.
- Bluetooth technology is available in an unprecedented range of applications from mobile phones to automobiles to medical devices for use by consumers, industrial markets, enterprises, and more.



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 3/33

iv) List any two types of mouse with their features.

(List of types of mouse - 1M; Features – 1M)

Ans: Depending on the type of technology used to detect the mouse movement, it is categorized as –

**1. Mechanical mouse**

- The two rollers inside the mouse along with the wheel alignment generate electronic signals which in turn convert them into proper actions on screen.
- The contact between the encoder wheel and metallic plates is used to generate the signal.
- Vertical and horizontal rollers decide the x and y coordinates of the cursor.

**2. Opto-mechanical mouse**

- This type of mouse is combination of mechanical and optical system.
- The interruption in the light coming from LED is used to generate the signal.
- In this, combination of LED & photo detector is used to sense the distance, direction and speed traveled by the mouse along with the wheel alignment.

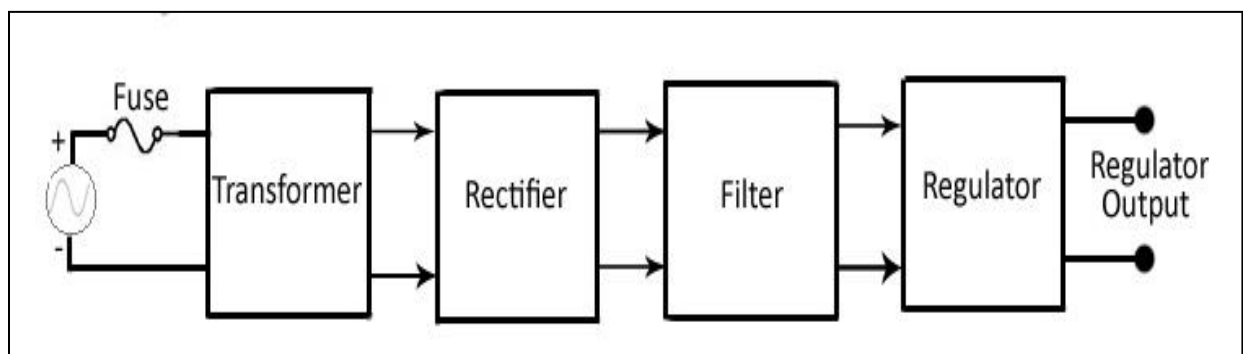
**3. Optical Mouse:**

- An optical computer mouse uses only a light source, typically a laser, and a light detector, such as an array of photodiodes, to detect movement relative to a surface.
- The reflected light is used to generate signals.

v) Draw the block diagram of linear power supply.

(Correct diagram 2M)

Ans: Block diagram showing each block of Linear Power Supply:





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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 4/33**

**vi) List any four features of firewire.**

**(Any 4 features: ½M each)**

**Ans: Features of Firewire**

It is a serial interface for different high speed peripherals.

- Hot pluggability.
- Fire wire can connect together upto 63 peripherals in an cyclic topology.
- Uses daisy chain topology
- Data Transfer Rate 400/ 800 Mbps
- Snap connection: no need for device ID, jumper, DIP switch, terminators etc.
- Dynamic reconfiguration.
- Max distance between devices: 4.5m
- Supports DMA transfers - It allows peer-to-peer device communication, such as communication between a scanner and a printer, to take place without using system memory or the CPU.
- Well suited for different devices such as Digital Camera, Scanner, HDD, printers, music systems
- It is designed to support plug and play and hot swapping.
- It uses six wire cable which is more flexible than most parallel SCSI cables and can supply upto 45 watts of power per port at upto 30 volts.

**vii) List any four types of key switches of keyboard**

**(Any 4 types: ½M each)**

**Ans: The types of key switches are:**

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



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 5/33

viii) What are the different factors to be considered while selecting the power supply?  
(Any two factors: 1M each)

**Ans:** Factors to be considered while selecting Power supply:

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

Q.1) b) Attempt any TWO of the following:

8 Marks

i) Explain the SCSI drive configuration.  
(Any 4 configuration: 1M each)

**Ans:**

- SCSI drives are complicated when compared with IDE drives while configuring. The SCSI standard controls the way the drives must be set up. Following setup has to be done while configuring SCSI drive:
- **SCSI Device ID:** Every device on a SCSI bus must be uniquely identified for addressing purposes. Narrows SCSI drives will have a set of three jumpers that can be used to assign the disk an ID number from 0 to 7.
- Wide SCSI drives will have four jumpers to enable ID numbers from 0 to 15. Some systems don't use jumpers to configure SCSI device IDs.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 6/33**

- **Termination activate:** The devices on the ends of the SCSI bus must terminate the bus for it to function properly. If the hard disk is at the end of the bus, setting this jumper will cause it to terminate the bus for proper operation.
- **Disable auto start:** When present, this jumper will tell the drive not to automatically spin up when the power is applied but instead wait for a start command over the SCSI bus. This is usually done to prevent excessive startup load on the power supply. If by default startup is disable then it is provided by an “Enable Auto Start” jumper.
- **Stagger spin:** An “enhanced version” of “Delay Auto Start”. When a system with many hard drives has this option set for each unit, the drives stagger their startup time by multiplying user-defined constant times their SCSI device ID. This ensures no two drives on the same SCSI will start up simultaneously.
- **Narrow/Wide:** Some drives have a jumper to control whether they will function in narrow or wide mode.

**ii) Define the following terms related to power problems:**

- 1) **Blackouts**
- 2) **Brownouts**
- 3) **Surges**
- 4) **Spikes**

**(Each definition 1M; Diagram – optional)**

**Ans:**

- 1) **Blackout:** Blackout is the complete no power condition. Sometimes sudden power failure can bring about wastage of time, money and resources.
- 2) **Brownout:** Brownout is the low voltage condition that can be present even for several hours. This is often created when the power demand exceeds the capacity of the power generator.
- 3) **Surges:** these are overvoltage that last for more than one cycle. Surges are caused when some heavy electrical load is suddenly switched off.
- 4) **Spikes:** Spikes are very high voltage, split second events that can disrupt the operation of electronic devices such as computers.



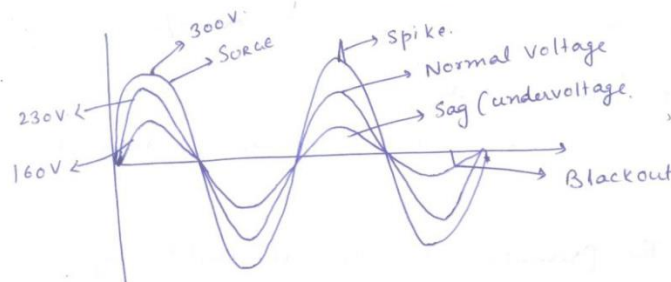
MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION  
(Autonomous)  
(ISO/IEC - 27001 - 2005 Certified)

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 7/33



iii) List with meaning any eight features of USB.

(Any 8 features: 1/2M each)

Ans: USB Features

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 upto 30 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.



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

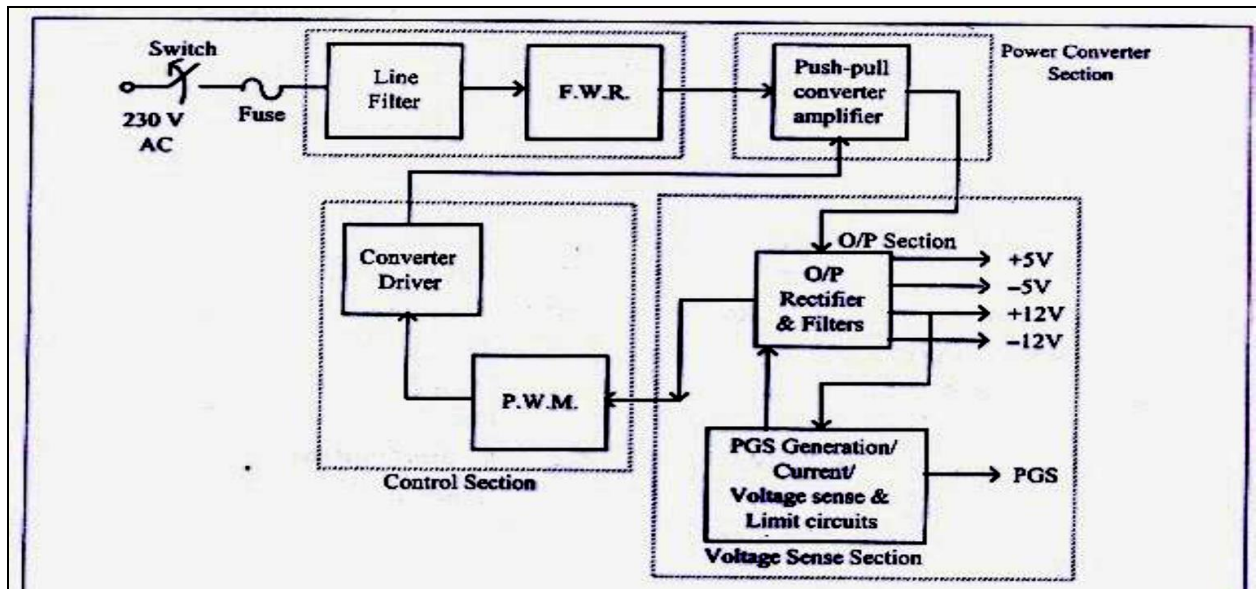
Page No: 8/33

Q.2) Attempt any **FOUR** of the following:

16 Marks

- a) Draw and explain the block diagram of SMPS.  
(Diagram -2M; Explanation- 2M)

Ans: Block diagram and description:



SMPS used in a PC has five sections

#### AC input section

Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining.

#### Power converter

It consists of push pull configuration of transistors which are driven by converter driver from the control section. Only desired quantity of power is delivered to the load.

#### Control section

It senses over voltage or over current at load.

It changes the turn on time of the transistors in the push pull amplifier so that output power can be controlled.

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

#### Output section

It rectifies and filters the power received from the power section.

It provides short circuit and overload protection to the power applied to the load.





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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 9/33**

**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.

**b) How RLL encoding is commonly used encoding scheme for hard disk storage? Also mention its encoder/decoder table.**

**(Description -2M; encoder/decoder Table -2M)**

**Ans:** 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



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 10/33**

- c) List with meaning any four specification of Dot Matrix Printer.  
(Four specification – 1M each. Any other specifications shall be considered)**

**Ans: Specification of Dot matrix Printer:**

- **Speed** of a Dot matrix Printer is defined in cps ( characters per second) for eg., 100-600 characters per second
- **Type of paper** used can be continuous paper or separate paper
- **Print quality** depends on number of print pins (from 9 to 24pins)
- **Type of interface** – is a parallel interface or serial interface (LPT or COM ports)
- **Line width** is generally 80 characters, or columns, with some dot matrix printers being capable of 132-character lines.

- d) List any four points of comparison between online UPS and offline UPS.  
(Any 4 points: Each 1M) (Any other relevant point shall be considered)**

**Ans:**

<b>Sr. No</b>	<b>Online UPS</b>	<b>Offline UPS</b>
<b>1.</b>	An on-line UPS continuously powers the protected load from its reserves (usually lead-acid batteries or stored kinetic energy), while simultaneously replenishing the reserves from the AC power.	An off-line UPS remains idle until a power failure occurs, and then switches from utility power to its own power source, almost instantaneously.
<b>2.</b>	The on-line type of UPS, in addition to providing protection against complete failure of the utility supply, provides protection against all common power problems, and for this reason it is also known as a power conditioner and a line conditioner.	The Off-line type of UPS provides no protection against common power problems
<b>3.</b>	The online UPS runs all the time. The charger now runs the inverter, as well as maintaining charge on the battery. The inverter supplies the load. Power goes from input to charger to inverter to output.	The offline UPS is in standby mode. The charger is maintaining the battery, but the inverter stage is not running. Power goes from input to output, bypassing the inverter.
<b>4.</b>	In this type of UPS isolation from mains is available.	In this type UPS isolation from mains is not available.
<b>5.</b>	In this type of UPS frequency stability is not available on the mains power.	In this type of UPS frequency stability is always available.



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

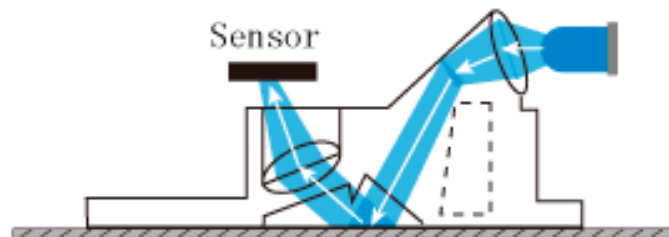
Page No: 11/33

e) Draw the block diagram of optical mouse. Also list any four advantages of optical mouse.

(Diagram 2M; 4 Advantages: each advantage -1/2M)

(Note: Any other diagram showing light beam and sensor may be considered.)

Ans:



**Advantages:**

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

f) How perpendicular recording technology is used for recording on hard disk?

(Description 3M; any related diagram -1M)

Ans: Perpendicular Recording Scheme

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.



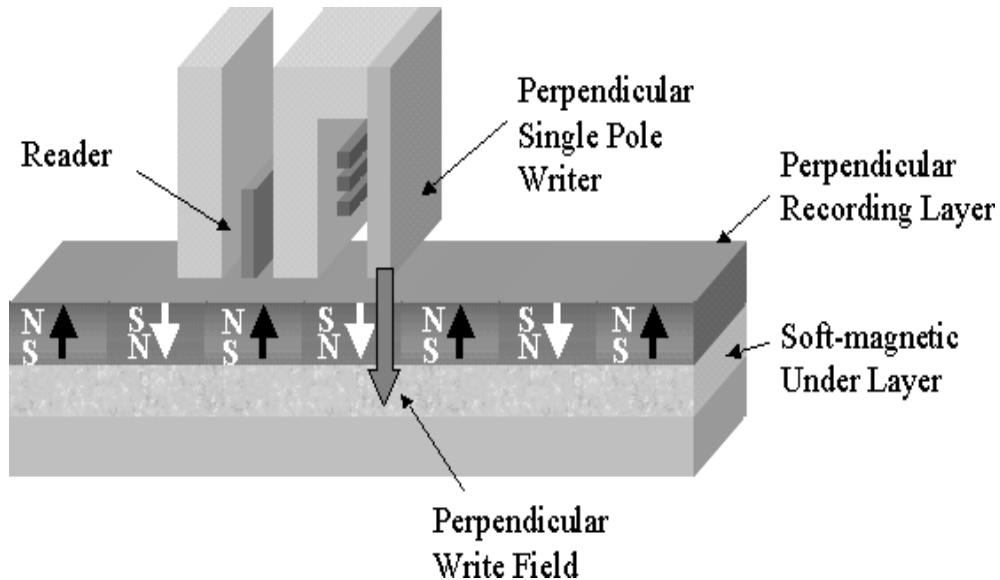
MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION  
(Autonomous)  
(ISO/IEC - 27001 - 2005 Certified)

WINTER – 2015 EXAMINATION

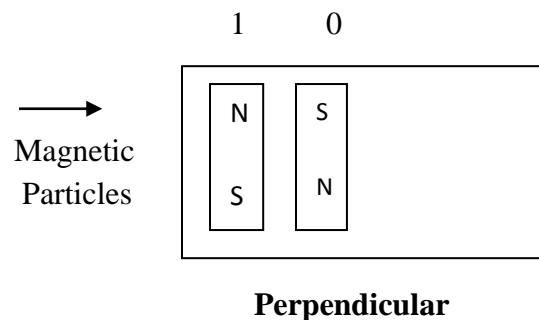
Subject Code: 17428

Model Answer

Page No: 12/33



OR



Q.3) Attempt any **FOUR** of the following:

16 Marks

a) List any four advantages and disadvantages of LCD monitor.

(2 Marks for Advantages; 2 Marks for Disadvantages; Any other advantages and Disadvantages shall be considered)

Ans. Advantages:

1. **Brightness:** Produces very bright images due to high peak intensity.
2. **Emissions:** Produce considerably lower electric, magnetic and electromagnetic fields than CRTs.
3. **Geometric Distortion:** No geometric distortion at the native resolution. Minor distortion can occur for other resolutions.
4. **Power Consumption:** Energy efficient. Consume less electricity than a CRT and produce little heat.
5. **Physical Aspects:** Take up about 40% less desk space. LCDs are thin and compact.
6. **Screen Shape:** Completely flat screen.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 13/33**

7. **Sharpness:** At the native resolution, the image is perfectly sharp. Adjustments are required at all other resolutions which can result in measurable degradation to the image.

**LCD Disadvantages**

1. **Aspect Ratio:** The aspect ratio and resolution are fixed.
2. **Black-Level:** Not proficient at producing black and very dark grays. In a "standard" configuration, not appropriate for use in dimly lit and dark conditions.
2. **Contrast:** Lower contrast than CRTs due to a poor black-level.
3. **Color and Gray-Scale Accuracy:** Color saturation is reduced at low intensity levels due to a poor black-level. Images are satisfactory, but not accurate due to problems with black-level, gray-scale and Gamma.
4. **Cost:** Considerably more expensive purchase price than comparable CRTs.
5. **Gray-Scale:** Have an irregular intensity scale and typically produce fewer than 256 discrete intensity levels. For some LCDs portions of the gray-scale may be dithered.
6. **Motion Artifacts:** Slow response times and scan rate conversion result in severe motion artifacts and image degradation for moving or rapidly changing images.
7. **Resolution:** Works best at the native resolution. The native resolution cannot be changed. Viewing Angle: Restricted viewing angles. Viewing angles affect the brightness, contrast and colors shown.
8. **White Saturation:** Saturation and compression can occur due to the bright-end of the intensity scale becoming overloaded. Contrast control must be carefully adjusted.

**b) Why BIOS is used? List any three functions of BIOS.**

**(1 Mark for BIOS usage; Any 3 functions: each 1M; Any 3 relevant functions shall be considered)**

**Ans:**

The Basic Input Output System, usually referred to as BIOS, is software stored on a small memory chip on the motherboard. BIOS instruct the computer on how to perform a number of basic functions such as booting and keyboard control. BIOS is also used to identify and configure the hardware in a computer such as the hard drive, floppy drive, optical drive, CPU, memory, etc.

**Main functions of BIOS**

1. The main function of the BIOS is to give instructions for the power-on-self-test (POST). This self-test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts.
2. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem. Error codes are typically a series of beeps heard shortly after startup.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

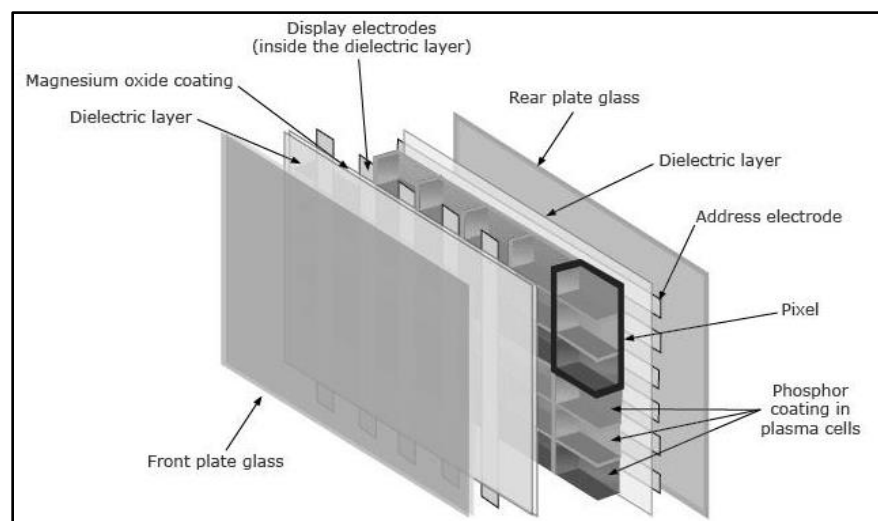
**Model Answer**

**Page No: 14/33**

3. The BIOS also works to give the computer basic information about how to interact with some critical components such as drives and memory that it will need to load the operating system.
4. Once the basic instructions have been loaded and the self-test has been passed, the computer can proceed with loading the operating system from one of the attached drives.
5. Computer users can often make certain adjustments to the BIOS through a configuration screen on the computer. The setup screen is typically accessed with a special key sequence during the first moments of the startup. This setup screen often allows users to change the order in which drives are accessed during startup and control the functionality of a number of critical devices. Features vary among individual BIOS versions.
6. Many PC manufacturers today use flash memory cards to hold BIOS information. This allows users to update the BIOS version on computers after a vendor releases an update. This system was designed to solve problems with the original BIOS or to add new functionality. Users can periodically check for updated BIOS versions, as some vendors release a dozen or more updates over the course of a products lifetime. To check for updated BIOS, users can check the website of the specific hardware vendor.

**c) Explain the working principle of plasma display technology.**  
**(Diagram 1 Mark; Description 3 Marks)**

**Ans:**



Plasma is a state of gas made up of free flowing ions (+ve) and electrons. Under normal conditions a gas is made up of uncharged particles.



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 15/33

**Construction:**

- 1) Xenon and Neon Gas
- 2) Address Electrodes
- 3) Display/Discharge Electrodes
- 4) Dielectric Medium (MgO Magnesium Oxide)
- 5) Phosphor (Red, Green and Blue Triad)

**Working:**

In plasma display xenon and neon atoms are used. When an electric current is passed through plasma, the electrons rush towards the positive electrode and ions rush towards the negative electrode. During this rush they collide with each other. These collisions excite the gas atoms in the plasma, causing them to release photons of energy. These are ultraviolet photons invisible to human eye. The released ultraviolet photons interact with phosphor material on the inside wall of the cell and phosphors give off colored light. Each phosphor has three separate cells, a red, a blue and a green phosphor. These colors blend together to create the overall color of the cell.

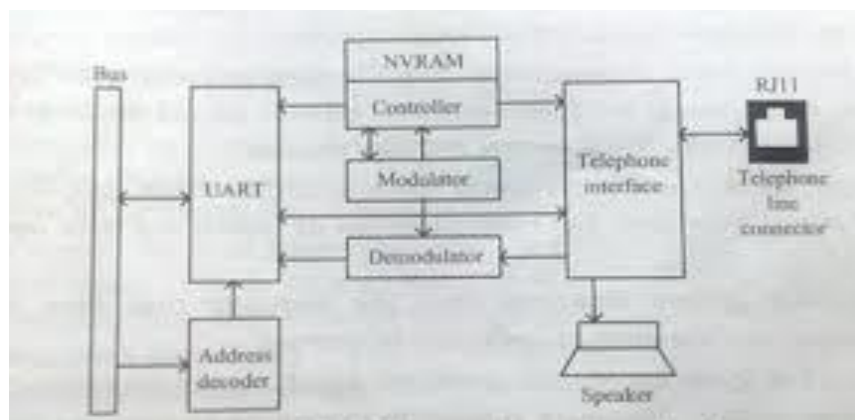
The xenon and neon gas in plasma contain hundreds of thousands of tiny cells positioned between two plates of glass. Long electrodes are sandwiched between the glass plates on both the sides of the cells. The address electrodes are at the rear glass plate and the discharge electrodes are transparent and mounted along the front glass plate.

Both sets of electrodes extend across the entire screen. To ionize the gas in a particular cell, the electrodes that intersect at that cell are charged. When an electric current flows through the gas in the cell, the gas atoms are stimulated and they release ultraviolet photons. By varying the pulses of current flowing through the different cells intensity of each subpixel color can be varied to create hundreds of different combinations of red, green and blue.

d) Draw and explain block diagram of an internal modem.

(Block Diagram 2 Marks; Description 2 Marks)

Ans:





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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 16/33**

The internal modem contains its own universal asynchronous receiver/transmitter (UART). The UART work here logically as serial port. A modulator circuit converts the serial digital data from the computer into analog signals to be transmitted over telephone line. The analog signal is then coupled to the telephone line using a circuit very similar to that used by ordinary telephone to couple voice signals. Then this analog signal passes to the telephone line through telephone jack (RJ-11 connector socket)

On the receiver side, serial signals received from telephone line. The telephone interface separate received signals and passes them to demodulator. The demodulator converts analog signals into digital form and send this serial data to UART. The UART convert serial bit data into parallel byte and placed on the system's data bus.

Besides combining and separating modulated audio data, the telephone interface generates the Dual-Tone-Multi-Frequency (DTMF) dialing signals needed to reach a remote modem.

When a remote modem dials in the telephone interface defects the incoming signals and alerts the UART to begin negotiating a connection. Finally the telephone interface drives a small speaker during find stages of modem operation.

The speaker is used to hear a dial tone, dialing signals and audio negotiation between the two modems. Once a connection is established, the speaker is usually disabled.

A controller circuit manages the overall operation of the modem. Generally it is used to manage modem between in control and data operating modes The NVRAM (Non Volatile RAM) it is used to store modem parameters.

- e) Explain the concept of zone bit recording.**  
**(Description 2 Marks; Example/Diagram 2 Marks)**

**Ans:**

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.





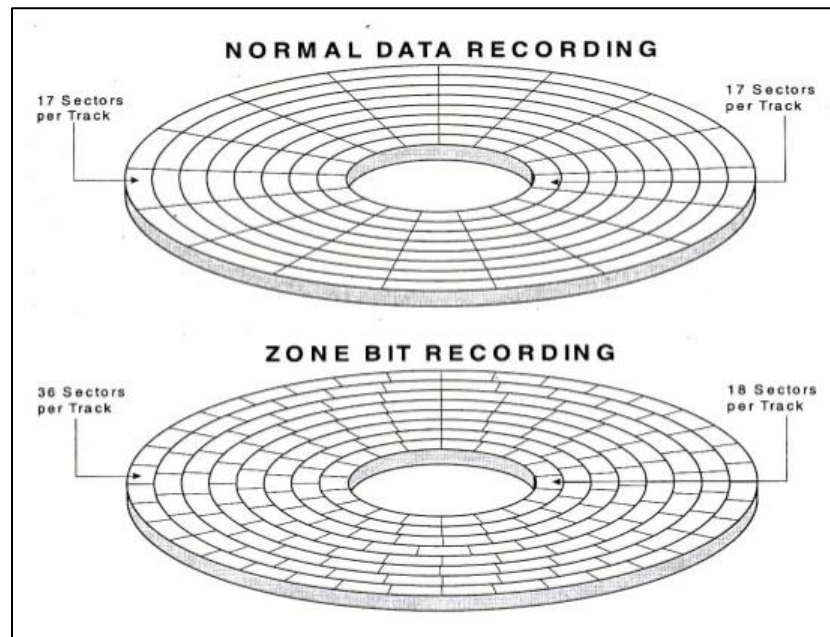
MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION  
(Autonomous)  
(ISO/IEC - 27001 - 2005 Certified)

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 17/33



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) Explain the pin signal description of RS 232.

(½ mark for each signal description; 1 mark shall be awarded if only signals are listed)

**Ans: CD (Carrier Detect or Data Carrier Detect):** It is used by computer to know that the modem connected to the serial port has made proper connection with modem on the other side.

**RxD (Receive Data):** It is used by the device connected to the serial port to send data to the computer Or data send from DCE to DTE

**TxD (Transmit Data):** It is used by the computer to send data to a device connected to the serial port Or Data sent from DTE to DCE

**DTR (Data Terminal Ready):** It is send from computer to the device connected to the serial port to inform that computer is ready for communication

**GND (Signal Ground):** This is one of the most important signal. This wire provides the necessary return path for both the data signals and the hand shaking signals.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 18/33**

**DSR (Data Set Ready):** It is send from the device connected to the serial port to the computer to inform that the device is ready for communication

**RTS (Request To Send):** One clear to send signal is received the computer send Request To Send (RTS) signal to the device connected to the serial port to inform that computer is also ready to start the data transmission

**CTS (Clear To send):** Clear to send or CTS signal is used by the device connected to the serial port to inform to the computer can start the data transmission.

**RI (Ring Indicator):** RI Signal is used by the device connected to the serial port to inform to the computer that it has detected a ringing voltage on the telephone line. This signal is used by a modem connected to the serial port to inform to the computer that someone is calling the modem.

**Q.4) Attempt any FOUR of the following:**

**16 Marks**

**a) Explain the concept of MBR.**

**(Concept of MBR 4Marks)**

**Note: Appropriate Description shall be considered**

**Ans:** Every hard disk must have a consistent "starting point" where key information is stored about the disk, such as the number of partitions and what type they are. There also must be someplace where the BIOS can load the initial boot program that starts the process of loading the operating system. The place where this information is stored is called the master boot record (MBR), also referred to as the master boot sector or even just the boot sector. Do not confuse the master boot sector with volume boot sectors, which are indeed different.

The master boot record is always located at cylinder 0, head 0, and sector 1, the first sector on the disk. This is the consistent starting point that the disk will always use. When a computer starts and the BIOS boots the machine, it will always look at this first sector for instructions and information on how to proceed with the boot process and load the operating system. The master boot record contains the following structures:

**Master Partition Table:** This small bit of code that is referred to as a table contains a complete description of the partitions that are contained on the hard disk. When the developers designed the size of this master partition table, they left just enough room for the description of four partitions, hence the four partition (four physical partitions) limit. For this reason, and no other, a hard disk may only have four true partitions, also called primary or physical partitions. Any additional partitions must be logical partitions that are linked to (or are part of) one of the primary partitions. One of these partitions is marked as active, indicating that it is the one that the computer should use to continue the boot process.

**Master Boot Code:** 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.



b) Explain the purpose of logic probe and logic analyzer for maintenance.

(Logic Probe 2 Marks; Logic Analyzer 2 Marks; Diagram- Optional)

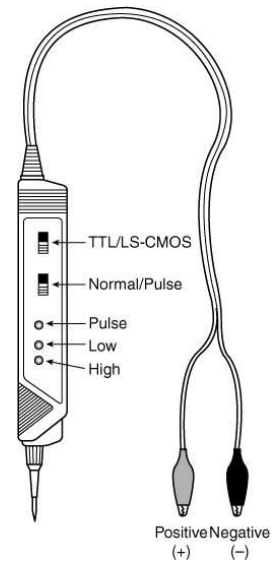
**Ans: Purpose of Logic Probe**

The Logic Probe is ideal for troubleshooting and analysis of logic circuits. It works as a level detector, a pulse detector, a pulse stretcher, and a pulse memory.

A logic probe is a low cost item of test equipment. As the name indicates, a logic probe tester is used for probing and analyzing logic circuits.

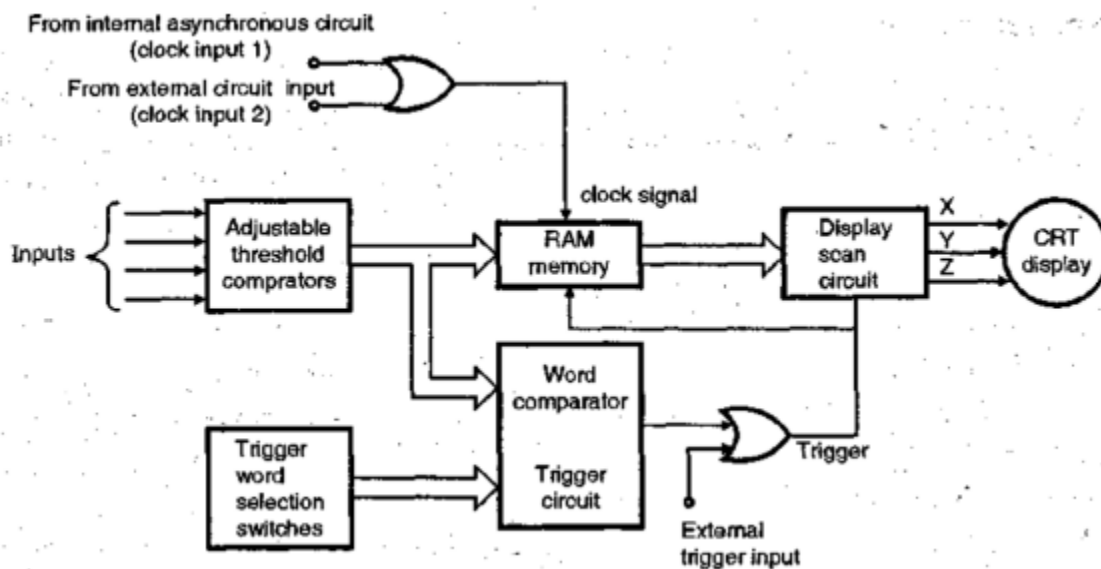
A logic probe tester is normally a small item of test equipment, typically handheld in the form of what could be thought of as a large oscilloscope probe, but without the lead.

This makes logic probes very portable and easy to use for troubleshooting and general simple maintenance work on low complexity logic circuitry.



**Purpose of Logic Analyzer**

Logic analyzers are widely used for testing complex digital or logic circuits. They appeared shortly after the first microprocessors were used because to fault find these circuits required the instrument to have access to a large number of lines, more than could be seen using a conventional oscilloscope. Since then the need for logic analyzers has grown, especially as the complexity of circuits has continued to grow.



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.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 20/33**

- c) Write any four points for comparing high level and low level formatting.  
(Any four Points of comparison; 1 mark for each comparison point)  
(Note: Any relevant point shall be considered)**

**Ans:**

<b>High Level Formatting</b>	<b>Low Level Formatting</b>
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.	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 creates the file system format within a disk partition or a logical volume.	It really creates the physical format that defines where the data is stored on the disk.
It can be done during OS installation or new partition creation.	This is intended to be the permanent foundation of the disk, and is often completed at the factory.
It takes less time and also referred to as quick formatting.	It takes more time for formatting
This can't remove virus from MBR (Master Boot Record).	It can be used to remove virus from MBR as MBR is re-written in this phase.
Anyone can perform high level formatting	To perform Low-level formatting Experts are require
It can be perform anywhere.	It is performed only by manufacturer's place.

- d) Give any four important features each of PCI and AGP buses.  
(2 Marks for any four features of PCI and 2 Marks for any four features of AGP)**

**Ans: Features of PCI**

1. High Band Width allows small form factors, reduced cost, simpler board design and reduced signal integrity issues
2. Embedded clocking scheme enables easy speed changes as compared to sync clocking
3. Throughput increases with width
4. Isochronous data transfer
5. Hot swapping and plugging capabilities
6. Advanced Power Management capabilities
7. Plug and Play
8. Data bus are **de-multiplexed**.
9. With AGP, the graphics card can receive a request for all of the information needed to render a particular image and send it out all at once.



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 21/33

10. **Sideband addressing**, the AGP issues eight additional lines on the data packet just for addressing. This puts the address on the outside of the envelope, so to speak, freeing up the total bandwidth of the data path used to transfer information back and forth. In addition, it unclugs system resources that were previously used to open the packet to read the addresses

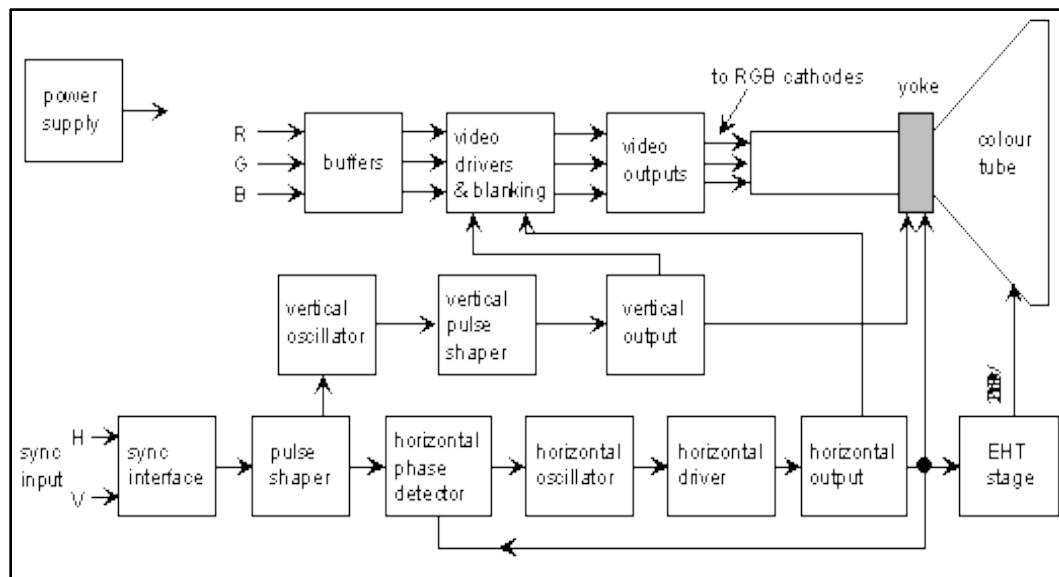
**Features of AGP**

1. **Dedicated Port** - There are no other devices connected to the AGP other than the graphics card. With a dedicated path to the CPU, thus allowing for faster communication
2. Address/data buses are **de-multiplexed**.
3. With AGP, the graphics card can receive a request for all of the information needed to render a particular image and send it out all at once.
4. **Sideband addressing**, the AGP issues eight additional lines on the data packet just for addressing. This puts the address on the outside of the envelope, so to speak, freeing up the total bandwidth of the data path used to transfer information back and forth. In addition, it unclugs system resources that were previously used to open the packet to read the addresses

e) Draw and label block diagram of CRT monitor.

(Appropriate diagram with label 4 marks)

Ans:





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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 22/33

f) List any four points of difference between Internal Cache and External Cache.  
(1 mark for each point of distinguish; any other relevant point shall be considered)

Ans:

Internal Cache	External Cache
Small in size compare to External Cache	Comparatively size is more than Internal cache
Available within CPU Chipset	Situated on Motherboard as external chip
Faster than External Cache as less memory locations need to access	Slower than Internal Cache as more memory locations need to access
Processor refers internal cache for any contents.	If contents are unavailable then External Cache is refer

Q 5) Attempt any TWO of the following:

16 Marks

a) Explain with diagram, logical memory organisation.

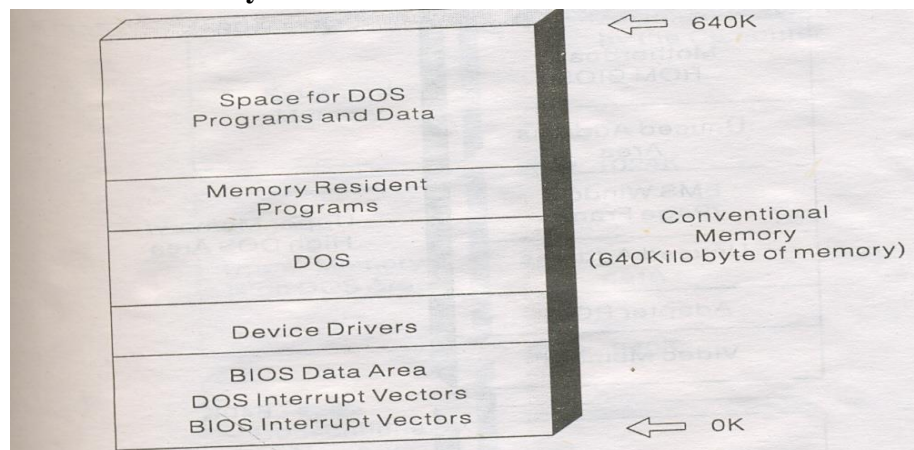
(Explanation of each category 2M)

Ans: Logical Memory Organisation

It indicates how the memory is accessed and used by the computer system. Depending on the CPU and the operating system used the main memory is divided into different categories.

1. Conventional Memory.
2. Upper Memory Area
3. Extended Memory.
4. Expanded Memory

1. Conventional Memory





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

**WINTER – 2015 EXAMINATION**

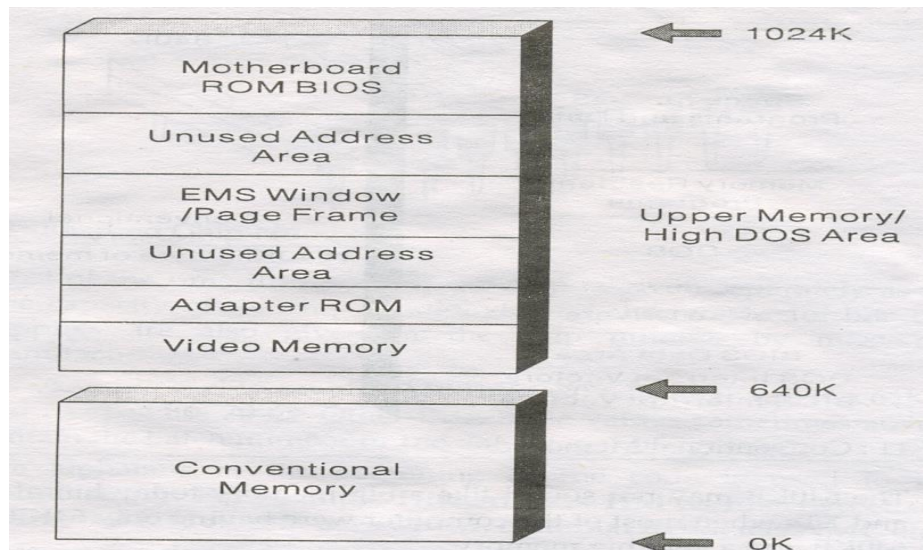
**Subject Code: 17428**

**Model Answer**

**Page No: 23/33**

- The PC and PC-XT systems used 20 address lines and hence could address only 1MB of RAM memory.
- Out of 1MB top 384KB of was reserved for use by the system.
- The remaining 640 KB of memory was called conventional memory or Base memory or DOS memory.
- This 640 KB of memory is used to store Device drivers, graphics boards, other adapters and motherboard ROM BIOS.

## 2. Upper Memory Area



- The memory area between 640 KB and 1MB is called Upper memory area or high DOS Area.
- It contains the video RAM for use by video adapters,
- Adapter BIOS that resides in ROM chips,
- Motherboard ROM BIOS (POST and Bootstrap loader)etc
- Some unused address area. The memory locations in these areas can not be used by a PC as there is no physical memory assigned to this area.
- For higher processors these empty locations can be mapped to some real memory area and use them for storing small resident programs.
- Higher processors can relocate drivers such as mouse drivers from conventional memory to upper memory area.
- Large Programs cannot be stored in here as this memory may not be available in continuous locations.





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

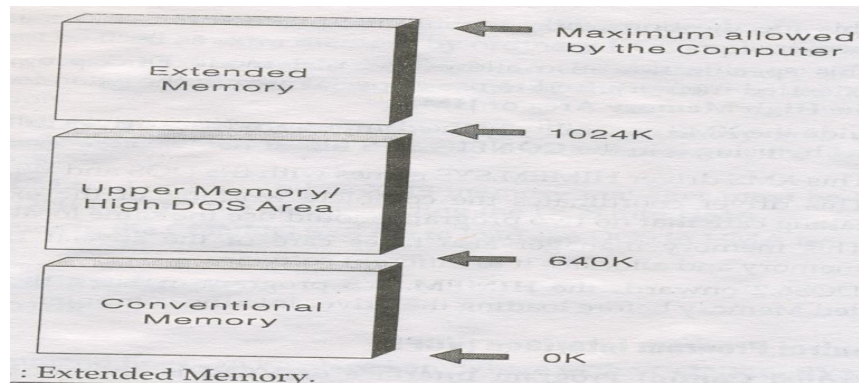
WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

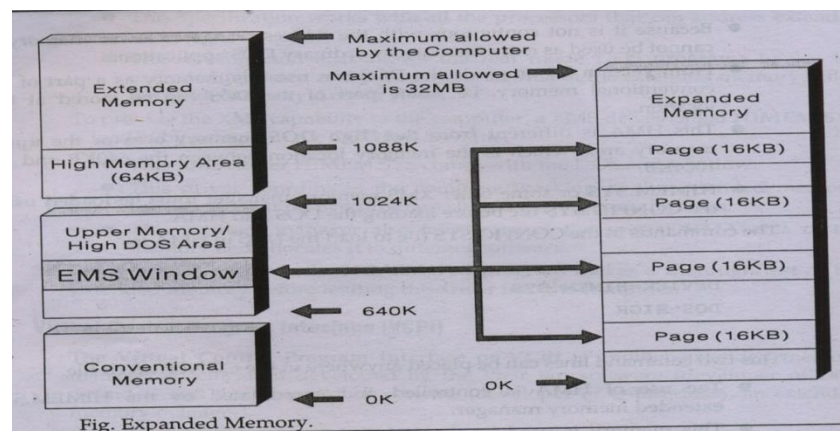
Page No: 24/33

### 3. Extended Memory



- It is the memory beyond 1 MB limit.
- Any memory available after 1 MB is called extended memory.
- It is available in 286 and later processors only.
- Extended memory is of no use for DOS users because DOS does not use this memory.
- For windows users this memory is very useful as the OS can use this extended memory by allowing multiple DOS programs to run in the extended memory in its own 640 KB memory area.

### 4. Expanded Memory



- Expanded Memory specification which defines a method to access system memory above 1 MB of RAM on PC XT and AT computers.
- This memory is accessed via 16 KB window within the first 1 MB memory.
- Expanded memory is not a part of main memory, it is separately installed into the system which can be accessed in fixed size pages using a method called 'bank switching'.
- In bank switching a small window located in the upper memory area in the main memory is used to view the contents of EMS.
- This window is located in the memory location between 640KB and 1024KB i.e. UMA.
- Expanded memory is arranged in blocks of 16KB each.





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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 25/33

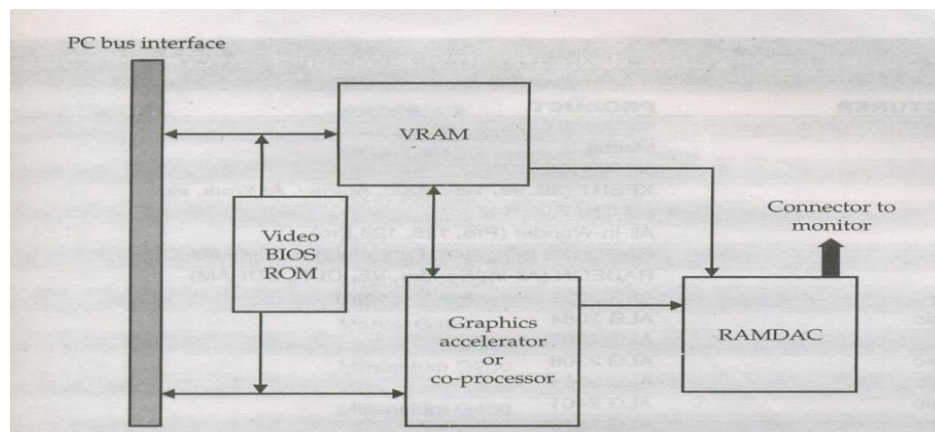
- To access this memory 1 block of EMS is copied into the window in the main memory and after processing it is copied back to the EMS memory.

b) Draw and explain block diagram of video accelerator card.

(Diagram 4 marks, Explanation 4 marks)

(Note: Any relevant diagram for video accelerator card shall be considered)

Ans: Video Accelerator Card



- For higher resolutions, the data needed to form a single screen image can be large.
- System also needs data for operations such as memory refresh, keyboard, mouse handling, drive access etc.
- This results in video data bottlenecks
- Incorporate processing power onto video board (rather than CPU) for graphics data processing.

**Explanation**

- A graphics accelerator application specific chip (ASIC) that intercepts graphics tasks and processes them without the intervention of system CPU.
- Core of the accelerator is the graphics chip which connects directly to PC expansion bus.
- Graphics instructions and data are translated into pixel data and stored in video RAM.
- VRAM offers second data bus that is routed directly to RAMDAC (Random Access Memory (video) Digital to Analog Converter).
- Graphics chip directs RAMDAC operation and ensures that VRAM data is available.
- RAMDAC translates video data into R, G and B video signals along with vertical and horizontal signals.
- Output signals generated by the RAMDAC drive the monitor.



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

**WINTER – 2015 EXAMINATION**

**Subject Code: 17428**

**Model Answer**

**Page No: 26/33**

**c) What do you understand by preventative maintenance? List different steps to be followed to carry out preventative maintenance.**

**(Preventive maintenance -2M; Procedures/steps of preventive maintenance -6M)**

**Ans: Preventive maintenance**

1. Preventive maintenance or periodic maintenance is must for obtaining long years of trouble free service from the PC.
2. It can reduce problem behavior, data loss and component failure and ensures long life for the system.
3. It can also increase your system's resale value as the system looks and runs better.
4. It can be of two types
  - a) Passive preventive maintenance
  - b) Active preventive maintenance

**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.

**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 antispymware scans.

**Active preventive maintenance Procedure:**

**Cleaning a system**

- 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.
- Following cleaning tools and solutions can be used to clean the internal components, peripherals and the boards inside the system.

**• Cleaning tools**

Contact cleaning solution

Small brush

Canned air

Foam tape

Silicon –type lubricant (WD 40)

computer vacuum cleaner

Lint-free foam cleaning swabs



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

**Subject Code: 17428**

**WINTER – 2015 EXAMINATION**  
**Model Answer**

**Page No: 27/33**

**Cleaning Solutions**

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, CO<sub>2</sub>

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.

**System backups**

The hardware in the PC can always be repaired or replaced, but the data cannot.

For this purpose following procedure can be followed.

- Take backup of any data or important files.
- Delete all temporary files.
- Empty the recycle bin.
- Install antivirus updates.
- Run defragmentation program.

Some weekly maintenance procedures

- Take backup of important data and files.
- Delete all temporary files.
- Empty the recycle bin.
- Check and install antivirus software updates.

Some monthly maintenance procedures

- Clean the system and the peripheral devices.
- Create OS startup CD.
- Install OS updates.
- Install updated drivers of video cards, modems, sound cards etc.
- Check all the system fans and power supplies etc.

**Preventive maintenance of peripherals of PC**

**Preventive maintenance of HDD**

- Take periodic backup of data and critical areas such as boot sectors, FAT and directory structure on the disk.
- Defragment the disk to maintain the disk efficiency and speed.
- Delete all the temporary files, temporary internet files etc.
- Take backup and format the HDD at least once a year and reinstall all the software to maintain disk efficiency and speed.
- Provide good surge protection.
- Format the drive in position and at temperature it will be used.
- Do not keep the CPU or the HDD near vibrating machines.
- As the HDD are completely sealed only the connector pins need periodic cleaning.



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

**Subject Code: 17428**

**WINTER – 2015 EXAMINATION**

**Model Answer**

**Page No: 28/33**

- Use safe park program to park the heads so as to avoid head crash.
- Use software based backup.
- Back up of boot sector, FAT and directory structure.
- Periodic virus scan.

**Preventive maintenance of MONITOR**

- Switch off the monitor before switching off the mains.
- Use dust cover for the monitor.
- Do not place the monitor near strong magnetic field.
- Clean the display screen.
- Do not close the monitor vents.
- Provide proper ventilation such as cooling fan for heat dissipation.

**Preventive maintenance of KEYBOARD**

- Handle the keyboard carefully.
- Press the keys gently without applying pressure.
- Do not spill liquids on the keyboard.
- Clean interior of the keyboard using vacuum cleaner or blow away the accumulated dirt.
- Use dust cover for keyboard when not in use.
- Make sure the cable is not subjected to high stress at the keyboard end.

**Preventive maintenance of PRINTER.**

- Do not place the printer near heat generating machines such as heater.
- Periodically clean out dust paper fragments, etc from inside the printer.
- Use dust cover for printer, when not in use.
- Lubricate mechanical parts.
- Clean the paper feed path, platen and the ribbon path with soft cloth.
- Clean the exterior of the printer with clean cloth.

**Passive preventive maintenance**

- 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)



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

Subject Code: 17428

**WINTER – 2015 EXAMINATION**  
Model Answer

Page No: 29/33

**Physical contributors to system failure**

**Prevention of dust and dirt**

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

**1. Excessive temperature**

**Prevention**

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

**2. Effect of Cold**

**Prevention**

Use room heater to maintain the room temperature.

**3. Corrosion**

**Prevention**

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

**4. Magnetic Effect**

**Prevention**

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

**Electrical contributors to system failure**

**1. ESD (Electro Static Discharge)**

**Prevention**

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



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

WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 30/33

**2. Power line noise**

**Prevention**

- Isolation.
- Shielding.
- Power grounding.

**3. Radio Frequency interference (RFI)**

**• Prevention**

Put all the sources which can produce RFI away from the PC.

**Q 6) Attempt any TWO of the following:**

**16 Marks**

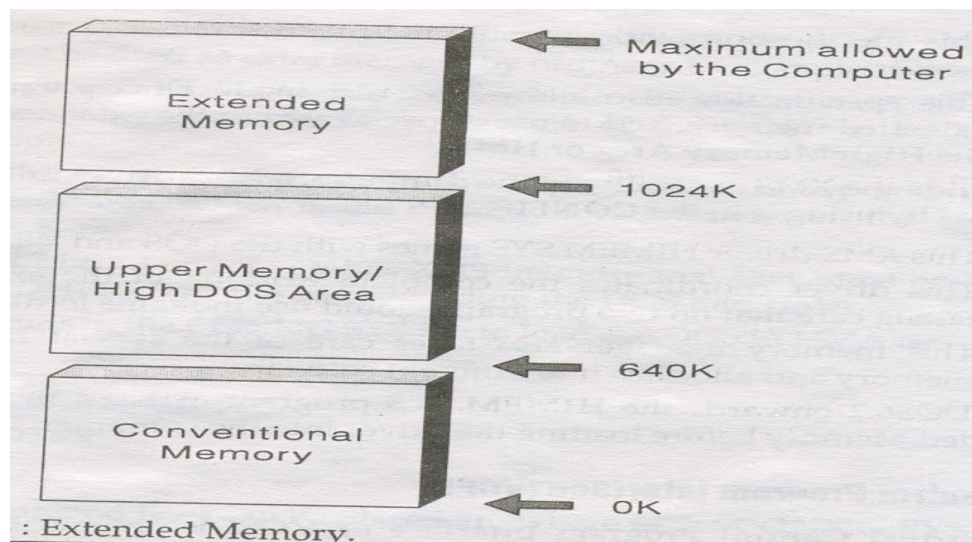
a) Explain what do you understand by:

(i) Extended Memory

(ii) Expanded Memory

(Extended Memory -4 marks, Expanded Memory -4 marks)

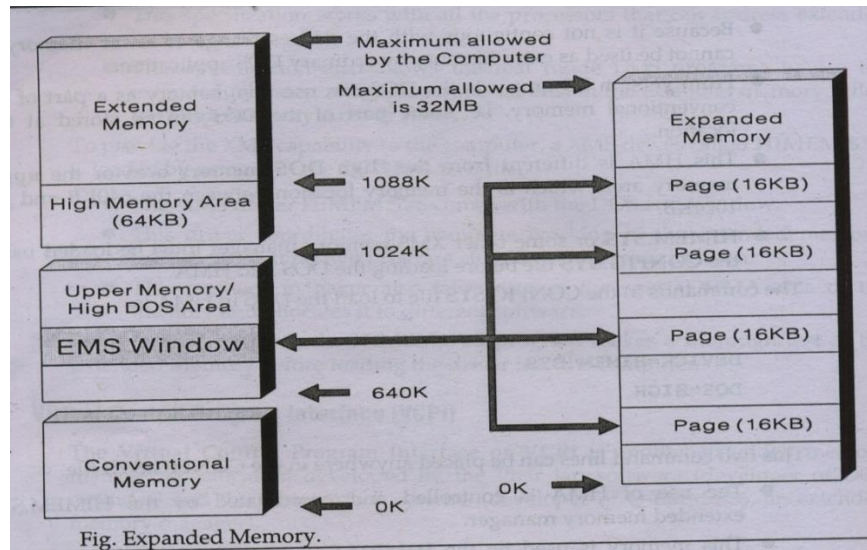
**Ans: Extended Memory**



- It is the memory beyond 1 MB limit.
- Any memory available after 1 MB is called extended memory.
- It is available in 286 and later processors only.
- Extended memory is of no use for DOS users because DOS does not use this memory.
- For windows users this memory is very useful as the OS can use this extended memory by allowing multiple DOS programs to run in the extended memory in its own 640 KB memory area.



### Expanded Memory



- Expanded Memory specification which defines a method to access system memory above 1 MB of RAM on PC XT and AT computers.
- This memory is accessed via 16 KB window within the first 1 MB memory.
- Expanded memory is not a part of main memory, it is separately installed into the system which can be accessed in fixed size pages using a method called 'bank switching'.
- In bank switching a small window located in the upper memory area in the main memory is used to view the contents of EMS.
- This window is located in the memory location between 640KB and 1024KB i.e. UMA.
- Expanded memory is arranged in blocks of 16KB each.
- To access this memory 1 block of EMS is copied into the window in the main memory and after processing it is copied back to the EMS memory.

### b) Explain the construction of DVD. How its recording is performed?

(Construction 4 marks, recording 4 marks)

**Ans: Construction of DVD:**

- A DVD is composed of several layers of plastic, totaling about 1.2 millimeters thick.
- Each layer is created by injection molding polycarbonate plastic.
- This process forms a disc that has microscopic Lands/Pits arranged as a single, continuous and extremely long spiral track of data.
- Once the clear pieces of polycarbonate are formed, a thin reflective layer is sputtered onto the disc, covering the bumps.



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

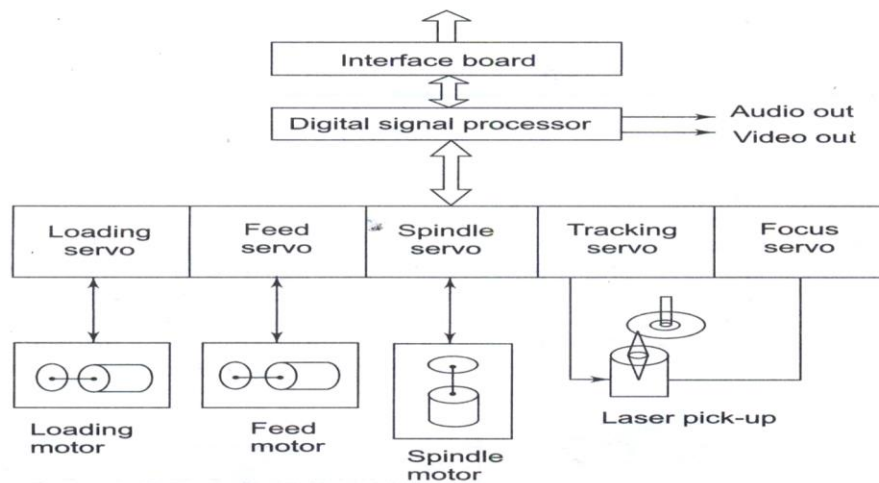
WINTER – 2015 EXAMINATION

Subject Code: 17428

Model Answer

Page No: 32/33

- Aluminum is used behind the inner layers, but a semi-reflective gold layer is used for the outer layers, allowing the laser to focus through the outer and onto the inner layers.
- After all of the layers are made, each one is coated with lacquer, squeezed together and cured under infrared light.



**DVD Disk Drive:** In a DVD player motors are employed for position control of the laser beam and for tracking the pits and lands of spiral track. The servo circuits are indispensable for proper motor control. DVD drives employ the servo controls such as Focus servo , Tracking servo, Feed Servo and Spindle servo.

**Recording:**

The signal recorded on a DVD needs to be precisely picked up. The laser beam is to be focused constantly in the middle of a pit in a track. This is achieved by moving the object lens up and down so as to focus the laser beam spot on each pit. Focus servo does the work. When the focus servo system operates so that reading laser beam is focused on to each pit, the tracking servo traces the spot on tracks. The spot vibrates extensively to the left or right during the rotation. Tracking is done by moving the object lens in the traverse direction and vibrating the reading laser beam right or left. Since the tracks/pit in DVD is recorded spirally starting from the inner periphery to the outer periphery the laser beam pick up should track them correspondingly. Feed servo moves the entire pick-up mechanism in the radial direction of the object lens and the disk. The disk rotation speed is holding precisely the relative position of the object lens and the disk.





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

WINTER – 2015 EXAMINATION

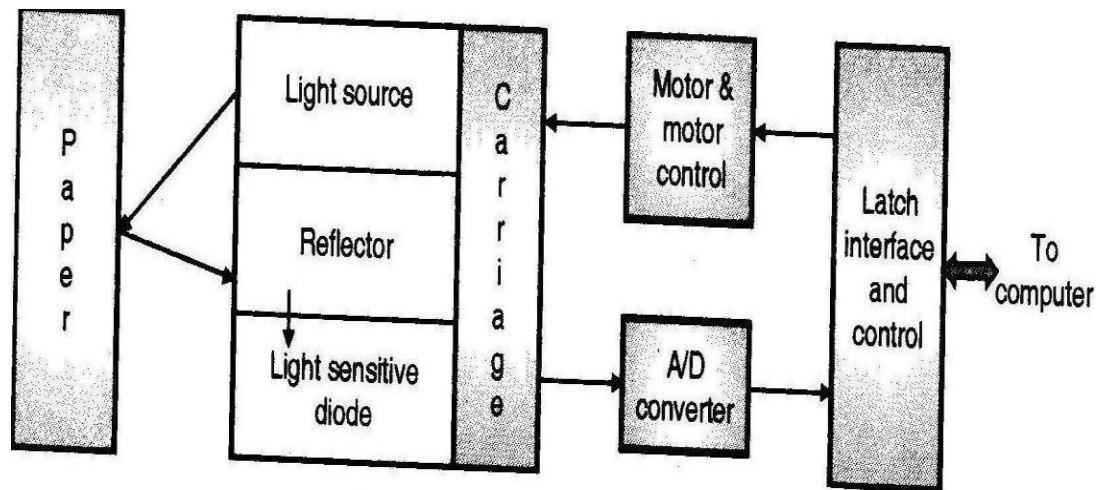
Subject Code: 17428

Model Answer

Page No: 33/33

c) Explain with block diagram the working of flat-bed scanner.  
(Diagram 4 marks, Explanation 4 marks)

Ans:



- 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.