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

WINTER – 2016 EXAMINATION
Model Answer **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.

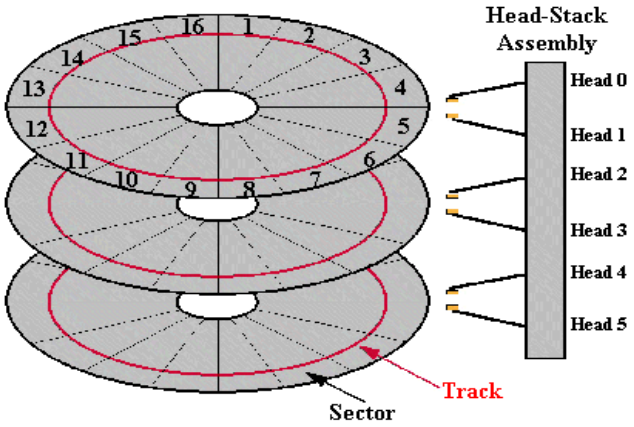
Q. No.	Sub Q.N.	Answer	Marking Scheme
1	a) (i) Ans.	**Attempt any SIX of the following:** **Define line regulation and load regulation.** **Line Regulation**: **Line regulation** is a measure of the ability of the power supply to maintain its output voltage given changes in the input **line** voltage. **Load Regulation**: **Load regulation** is the capability to maintain a constant voltage (or current) level on the output of a power supply even if there are changes in the supply's **load** (such as a change in resistance value connected across the supply output).	**12** ***2M*** ***Each definition 1M***
	(ii) Ans.	**List any four fire wire features.** **Fire Wire:** It is a serial interface for different high speed peripherals. **Features:** • Fire wire can connect together up to 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.	***2M*** ***Any four - Each feature ½ M***

		• Dynamic reconfiguration. • Max distance between devices: 4.5m • Hot pluggability. • 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 up to 45 watts of power per port at up to 30 volts.	
	(iii) Ans.	**List any four components of motherboard.** **Components of motherboard**: •CPU socket with processor • Chipsets •Co-processor • RAM slots • CMOS battery • BIOS ROM •Expansion slots –PCI/PCI express • IDE, SATA, SCSI connectors • Front panel connectors • Power supply connector • Connectors for peripherals • Accelerated Graphics Port •Heat Sink/ fan	***2M*** ***Any four - Each component ½M***
	(iv) Ans.	**Define terms related to CRT monitor.** **1) Frame rate** **2) Resolution** **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. **2) Resolution**: Resolution describes the number of potential pixels the monitor is capable of displaying. Resolution = Total Horizontal Pixels x Total vertical pixels.	***2M*** ***Each term 1M***
	(v) Ans.	**State any two motherboard selection criteria.** **Motherboard selection criteria:** • **Motherboard Chipset**: Motherboard should use a high performance chipset that supports DDR or DDR2 SDRAM DIMMs. It should also support PCI- Express X16 video support and Serial ATA or faster hard drive support.	***2M*** ***Any two –each 1M***

		• **Processor**: A modern system should use a socket based processor with on-die L2 cache. The processor should have highest speed CPU bus (Front Side Bus: FSB). • **Processor Sockets**: For maximum upgradability and performance, a socket based system should be used. The main sockets used are Socket A(Socket 426) for Athlon XP and Socket 775 for Pentium 4. • **Motherboard Speed:** 200MHz to 400MHz for Duron/Athlon/Athlon XP –based boards and 400MHz to 1066MHz for Pentium 4 based boards. • **Cache Memory:** Use a processor with full core speed on-die L2 cache as it offers maximum in performance. • **SIMM/DIMM/RIMM memory:** Current systems use either DDR or DDR2 DIMMs. Currently DDR and DDR2 SDRAM and RDRAM are the fastest type of memory available, with RDRAM being by far the most costly. • **Bus Type:** Current systems offer PCI as well as PCI Express slots. PCI slots should confirm with PCI 2.1 or later revision. Systems without on-board video should also feature PCI Express X 16 slot. • **Basic Input Output System (BIOS):** The motherboard should use industry standard BIOS such as those from AMI, Phoenix or Award. The BIOS should be of a flash ROM or EEPROM design for easy updating. • **Form Factor:** For maximum flexibility, performance, reliability and ease of use, motherboard with ATX form factor should be used. • **Built-in Interfaces:** The motherboard should contain as many built-in standard controllers and interfaces as possible. • **On-board IDE interfaces:** It should be included on the motherboard. • **Power Management:** The motherboard should support the latest standard for power management which is ACPI. • **Documentation:** Good technical documentation is essential. It should include information on all jumpers and switches found on the board, connector pin out for all connectors, specifications for other plug-in components etc. • **Technical Support:** Good online technical support goes beyond documentation. It includes driver and BIOS updates, FAQs, updated tables of processor and memory compatibility, and the utility programs to help you monitor the condition of your system.	
	(vi)	**Define terms related to hard disk.** **1) Cluster** **2) Landing zone**	**2M**

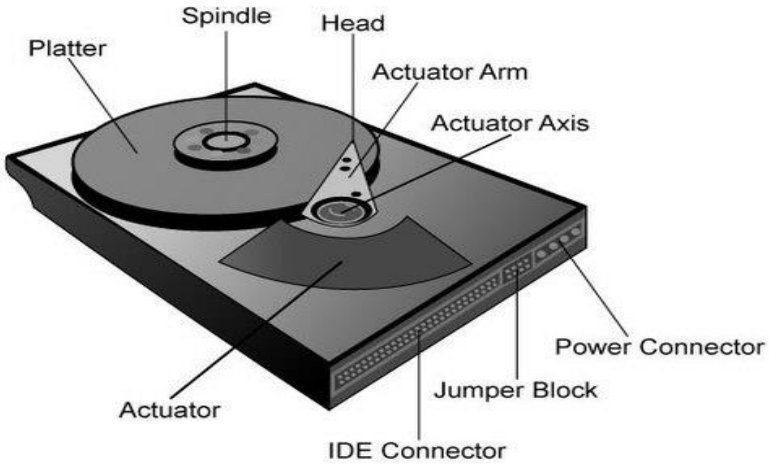
	Ans.	**Cluster :** • When OS writes some information on the hard disk, it does not allocate the space sector wise, instead uses a new unit of storage called "Cluster" • Clusters are the minimum space allocated by DOS when storing any information on the disk • Even to store only one byte long information on the disk requires minimum one cluster area on the disk surface **Landing zone :** It is the non-data space on a computer's hard disk where the read/write heads rest, or park, when the computer's power is turned off.	***Each term 1M***
	(vii) Ans.	**List any four features of SD-RAM.** **SDRAM features:** • SDRAM is designed to synchronize itself with the timing of the CPU. • This enables the memory controller to know the exact clock cycle when the requested data will be ready, so the CPU no longer has to wait between memory accesses. • SDRAM chips also take advantage of interleaving and burst mode functions, which make memory retrieval even faster. • SDRAM modules come in several different speeds so as to synchronize itself with the CPU's bus they'll be used in. • SDRAM speeds of up to 266MHz are possible.	***2M*** ***Any four - Each feature ½M***
	(viii) Ans.	**List any four features of SCSI**. **SCSI features:** ***Features of SCSI – 1*** • A 3 bit address is used by the SCSI so that devices are assigned addresses from 0 to 7. • Device with address 7 has the highest priority. • External switch is used to setup the address. • SCSI-1 is 8 bit parallel interface between host adapter and the device. • It runs at 5 MHz and is capable of transferring 8 million bytes per second. ***Features of SCSI – 2*** • It supports 8 bit, 16 bit or 32 bit data. • It supports "scripting" (It allows SCSI interface to undertake series of data transfer across the SCSI bus in batch mode without processor assistance) • It supports "Disconnect" (allows to send a command to any device and then disconnect the device from the bus, while the device is	***2M*** ***Any four - Each feature ½ M;*** ***SCSI 1/2/3 may be considered***

		carrying out the operation) • It provides the feature of queuing for multitasking operating system. • It requires active termination ***Features of SCSI – 3*** • It supports up to 32 devices using single host adapter. • It is a serial bus (SCSI-1 and SCSI-2 are parallel buses) • Because of serial nature the problems such as noise, termination, cable length etc are overcome. • It requires active termination	
1	**b)**	**Attempt any TWO of the following:**	**8**
	(i) Ans.	**What is need of cache memory? Describe types of memory.** **Cache memory :** ***Need:*** Computer's CPU is very fast device and most of the time it has to slow down because of slower RAMs. When CPU needs some data or information from these slower RAMs, it takes more time. To increase this fetch time cache memory is introduced in between CPU and RAM. Cache memory is extremely fast memory that is built into a CPU, or located next to it on a separate chip. It supplies the processor with the most frequently requested data and instructions. ***There are three types of cache memory:*** **L1, L2 & L3 cache memory.** **L1 cache memory:** • The L1 cache also called internal or integral cache is always a part of the processor chip. • L1 cache always runs at full processor speed. **L2 cache memory:** • The L2 cache originally called external cache because it was external to the processor chip when it was introduced. • It is present on the motherboard and runs at CPU bus speed. **L3 cache memory:** The L3 cache has been present in high end work stations and servers such as Xenon and Itanium.	***4M*** ***Need 1M*** ***Types 3M***
	(ii) Ans.	**Draw and explain working principle of hard disk.** **Working principle of hard disk**:	**4M**



Any Diagram 2M;

OR



A hard disk uses round flat disks called platters, coated on both sides with magnetic media to store information. The platters rotate at a speed of about 3600 rpm -7200 rpm and read/write heads are used to read or record the information. This information is communicated to the system with the help of a logic board.

- Each platter has two heads which are mounted onto sliders and used to either record information onto the disk or read information from it. The sliders are mounted onto arms which are thin pieces of metal

Description 2M

usually triangular in shape.

- The arms are controlled using a device called an actuator that positions the arms to the appropriate track on the disk
- All R/W heads are lined up and mounted on the Actuator. So when one head is over a track, all the other heads will also move and they will be at the same location over their respective surfaces .
- The spindle motor is responsible for turning the hard disk platters, allowing the hard drive to operate.

(iii) **Write any four specification of Blue_ray_disk.** ***4M***

Ans. **Specifications of Blue ray disk:**

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

Any four Each specification 1M

2 **Attempt any FOUR of the following:** **16**

a) Describe passive matrix and active matrix LCD with reference to their features. ***4M***

Ans. **Active Matrix or Thin Film Transistor (TFT)**

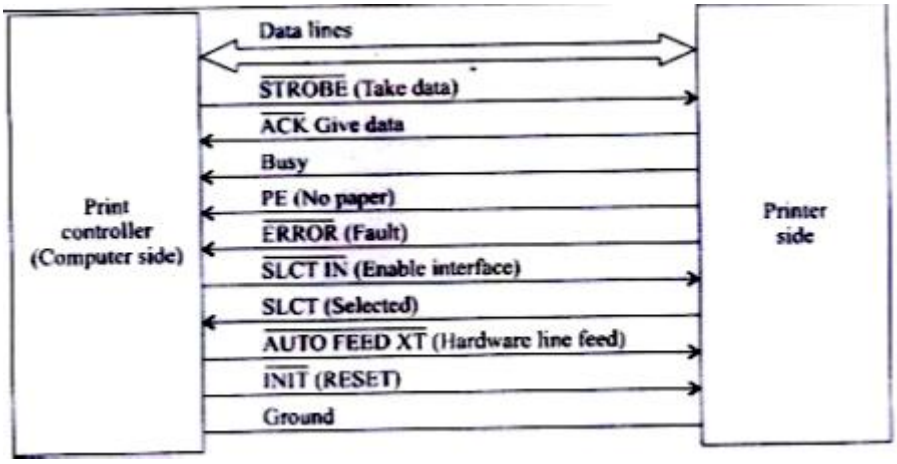
- In active matrix LCDs, a switching device (transistor)and a storage capacitor are integrated at the each cross point of the electrodes.
- The active addressing removes the multiplexing limitations by incorporating an active switching element.
- To address a particular pixel, proper row is switched on and charge 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.

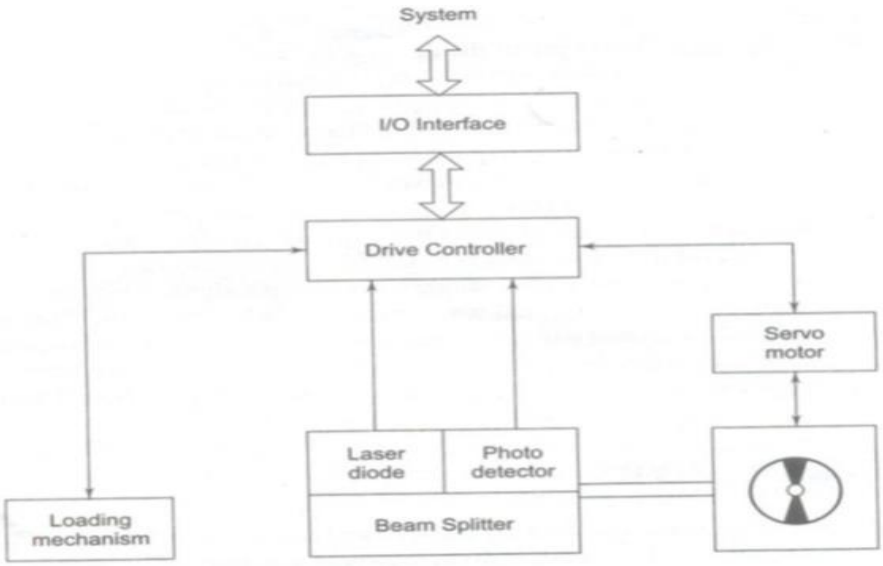
Active matrix – 2M

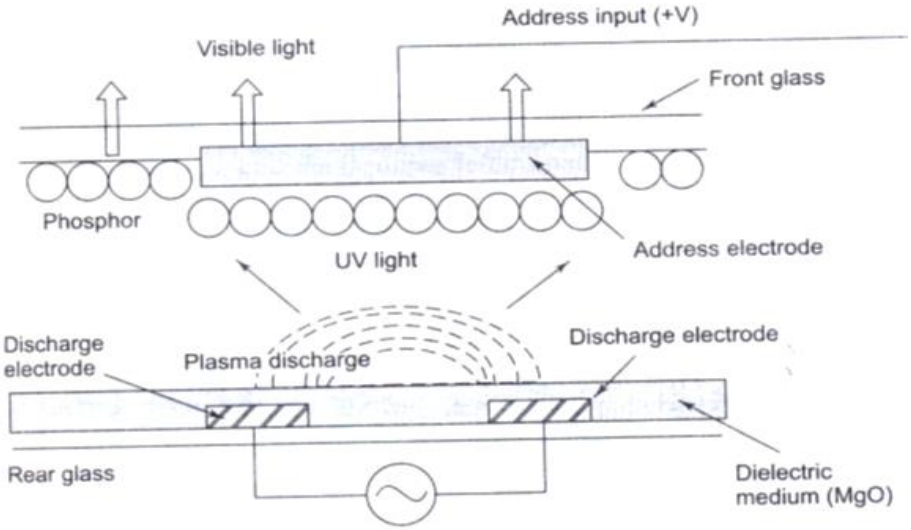
Passive Matrix:

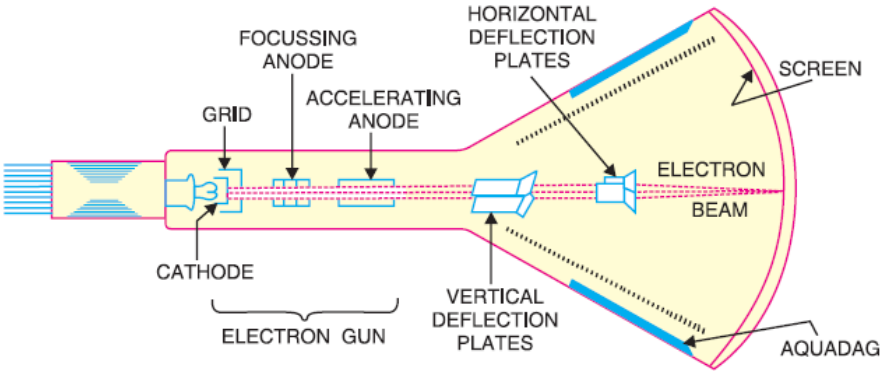
- Passive-matrix is a technology that uses a grid of vertical and

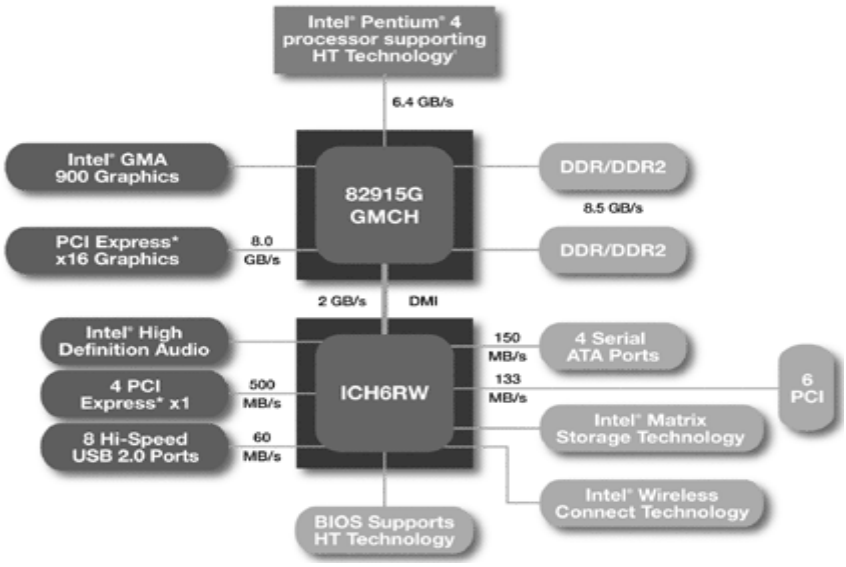
		horizontal wires to display an image on the screen. • Each pixel is controlled by an intersection of two wires in the grid. • The liquid crystal material is sandwiched between the two glass subtrates and a polarizing film is added to the outer side of each substrate. • To turn on a pixel, the integrated circuit sends a charge down the correct column of one substrate and a ground activated on the correct row of the other. • By altering the electrical charge at a given intersection, the color and brightness of the corresponding pixel can be changed. • Since the charge of two wires (both vertical and horizontal) must be altered in order to change a single pixel, the response time of passive-matrix displays is relatively slow. • In passive matrix there are no switching devices, and each pixel is addressed for more than one frame time.	***Passive matrix – 2M***
	b) Ans.	**List any four specification of dot matrix printer.** **Dot Matrix printer Specification:** • Printing method : It is an impact dot matrix printer, where printer head touches the paper with an inked ribbon • No. of pins used in the matrix. E.g., 24 pins. • No. of columns used. E.g. 80 • The quality of the image is determined by the dots per inch e.g., 240 x 144. • Paper type used for printing. E.g. A4. • Its speed is measured with respect to characters per second (cps). E.g. 260cps. • Type of interface used in Dot Matrix printers can be parallel ports (Centronics), serial or USB.	**4M** ***Any 4 - Each specification 1M***
	c) Ans.	**Write the sequence of POST.** The sequences of tests in POST are as given below. 1. CPU test 2. BIOS ROM Checksum test 3. Timer 1 test 4. DMA controller test 5. 16 KB DRAM test 6. Interrupt controller initialization 7. Interrupt controller test 8. Timer 0 initialization 9. CRT controller test	**4M** ***Correct sequence – 4M***

		10. DRAM after 16 KB test 11. Keyboard test 12. Disk drive test	
	d) Ans.	**Draw and explain centronics parallel interface with its signals.** **Centronics Interface:**  **Centronics interface signals:** The Centronics Interface is a handshake protocol between a computer and a printer. It supports maximum data transfer speed of 100Kb/s. There are 8signals lines for data bits. The control signals used are, $\overline{STROBE}$: The printer should take data when this signal is low. $\overline{INIT}$: When it is low the printer resets the electronics logic and clears the printer buffer. $\overline{SLCT\ IN}$: It is an interface unable signal. When it is low the printer responds to the signals from the controller. $\overline{AUTO\ FEED\ XT}$: After printer every line, the printer will provide one line feed automatically if this signal is low. This type of line feed is known as hardware line feed. There are five status signals from printer to PC. $\overline{ACK}$: It is an acknowledgement for strobe signal from the PC. When active it indicates that printer has received data sent by the PC and the printer is ready to receive the next data byte. PE (Paper End): When PE is high it indicates that there is no paper in the printer. Either the paper is torn or the paper is over. SLCT: It indicates that the printer is selected and logically connected to the PC. BUSY: When the busy signal is high, it indicates that the printer is busy	**4M** ***Diagram -2M*** ***Any four Signals descripti on – 2M***

		and it cannot receive data $\overline{ERROR}$: It indicates that there is some error condition in the printer.	
	e) Ans.	**Explain the construction of CD-ROM drive with block diagram.** **CD-ROM drive:**  **A CD drive consists of** 1. Optical head which contains laser diode, photo detector and beam splitter 2. Drive controller 3. Loading mechanism 4. Servo motor 5. I/O interface 1. The optical head contains: • Laser diode, which generates the laser beam • A lens system to focus the laser beam on the disc and to direct the reflected beam on to the photo detector. The beam splitter sends the reflected beam towards a different lens for focusing. • Servo motors that control the position of laser and lenses to ensure correct tracking and focusing. • Photo detector that detects the reflected light and converts it into electric pulses. 2. Drive controller is the overall controller of the CD drive. It controls the speed of rotation and processes the signals coming from the optical head. 3. The information coming from the photo detector is in the encoded from	**4M** ***Diagram -2M*** ***Description 2M***

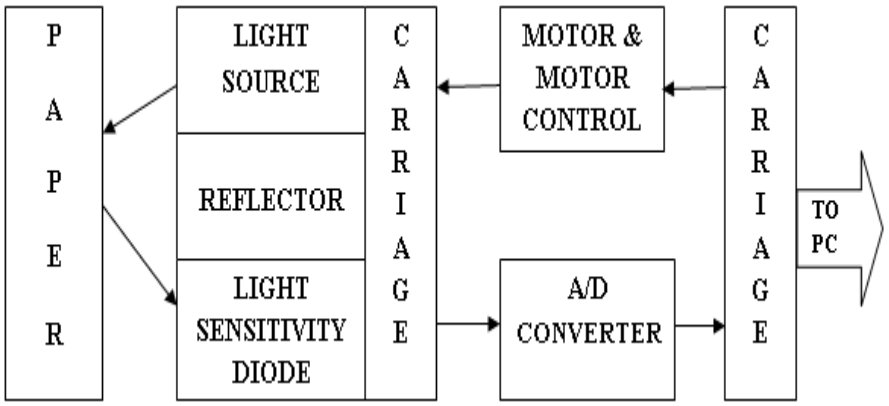
		(8 to 14 Modulation) (EFM). The decoding of data is done by the microprocessor on the controller. **4.** The decoded data is sent to the I/O interface, which makes it available to the system.	
	f) Ans.	**Explain working of plasma display with diagram.**  • Plasma is a slate of gas made up of free flowing ions (+ve) and electrons. Under normal conditions a gas is made up of uncharged particles. • In plasma display xenon and neon atoms are used. • When an electric current is passed through plasma, the electrons rush towards the positive electrode and ions rush towards the negative electrode. During this rush they collide with each other. • These collisions excite the gas atoms in the plasma, causing them to release photons of energy. These are ultraviolet photons invisible to human eye. • The released ultraviolet photons interact with phosphor material on the inside wall of the cell and phosphors give off colored light. • Each phosphor has three separate cells, a red, a blue and a green phosphor. These colors blend together to create the overall color of the cell. • The xenon and neon gas in plasma contain hundreds of thousands of tiny cells positioned between two plates of glass. • Long electrodes are sandwiched between the glass plates on both the sides of the cells.	**4M** ***Diagram 1M*** ***Description – 3M***

		• The address electrodes are at the rear glass plate and the discharge electrodes are transparent and mounted along the front glass plate. • Both sets of electrodes extend across the entire screen. • To ionize the gas in a particular cell, the electrodes that intersect at that cell are charged. • When an electric current flows through the gas in the cell, the gas atoms are stimulated sad they release ultraviolet photons. • By varying the pulses of current flowing through the different cells intensity of each sub-pixel color can be varied to create hundreds of different combinations of red, green and blue.	
3	**a)** Ans.	**Attempt any FOUR of the following:** **Explain internal structure of CRT with block diagram.** ***(NOTE: Any other relevant diagram and Description can also be considered)*** CRT  In the CRT, the electron beam generated, is accelerated to a high velocity and brought to focus on a fluorescent screen. This screen produces a visible spot where the electron beam strikes it. The beam is deflected over the screen in response to electrical signals. Low voltage supply is required for the heater of the electron gun to generate the electron beam and high voltage is required for the cathode ray tube to accelerate the beam. Normal voltage supply is required for other control units of the CRT. Horizontal and vertical deflection plates are fitted between the electron gun and the screen so that these can deflect the beam according to the	**16** ***4M*** ***Block diagram 2M*** ***Description 2M***

		input signal. The focusing anode is used to produce a narrow and sharp beam The accelerating anodes are used to accelerate the beam.	
	b) Ans.	**Write the signal voltages for the following colours of ATX connection.** **(i) Red (ii) Black** **(iii) Orange (iv) Purple** **COLOUR** / **VOLTAGE** RED / +5V BLACK / 0V ORANGE / +3.3 V PURPLE / +5 V SB	***4M*** ***Each Signal Voltage – 1M***
	c) Ans.	**Draw and explain architecture of intel chipset 915 G**.  The 915G chipset enables ultimate flexibility with different system bus speeds, memory configurations, and graphics solutions. The 915G chipset supports 800 MHz and 533 MHz system bus for LGA775 processors, either 333MHz/400MHz DDR memory or	***4M*** ***Diagram 2M***

		400MHz/533MHz DDR2 memory in single- or dual-channel mode, Intel Graphics Media Accelerator 900 graphics or discrete PCI Express x16 Graphics cards. Intel 915G chipset-based platforms also offer integrated Hi-Speed USB 2.0, High Definition Audio for improved sound quality and new audio usage models. It has enhanced RAID support. The 915G chipset enables lower system price points with graphics and hi-speed USB 2.0 integration. The 915G chipset delivers a complete range of support for the Pentium 4 processor with integration of the enhanced Intel Graphics Media Accelerator 900 core.	***Description 2M***
	d) Ans.	**State different functions of BIOS. (any four)** 1. The main function of the BIOS is to give instructions for the power-on-self-test (POST). This self-test ensures that the computer has all of the necessary parts and functionality needed to successfully start itself, such as use of memory, a keyboard and other parts. 2. If errors are detected during the test, the BIOS instruct the computer to give a code that reveals the problem. Error codes are typically a series of beeps heard shortly after startup. 3. The BIOS also works to give the computer basic information about how to interact with some critical components such as drives and memory that it will need to load the operating system. 4. Once the basic instructions have been loaded and the self-test has been passed, the computer can proceed with loading the operating system from one of the attached drives. 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.	***4M*** ***Each function – 1M***

	e) Ans.	**Explain following external SCSI connectors.** **(i) D-shell** **(ii) Centronics** **D-Shell (D-Sub, DD):** The earliest SCSI standard, SCSI-1, defined a 50-pin D-shell connector for narrow SCSI implementations. The name of this connector comes from the "D-shaped" metal shell that goes around the pins on the male half of the connector. The design is identical to the 25-pin and 9-pin D-shell connectors used for parallel and serial connections on PCs, but bigger. This connector type was very large and cumbersome. However, an alternative 25-pin version of the D-shell was widely used in the Apple hardware world. **Centronics:** Another external connector type defined by the SCSI-1 standard is a 50-pin connector that is commonly called a Centronics connector, after a formerly-popular printer that first used this type of connector. In Centronics connectors, instead of thin pins, two rows of flat contacts are used. Two latches on either side are used to hold the connector in place. Centronics connectors are still used for PC printer cables, on the end that attaches to the printer; SCSI Centronics connectors are the same, just with a different number of pins. These 50-pin connectors are still present in the current SCSI specification and are called "Alternative 2" external connectors.	***4M*** ***D – Shell 2 M*** ***Centronics 2M***
	f) Ans.	**State any four advantages of UPS over normal power supply.** **Continuity:** Experience no outages to critical equipment like computers and other appliances. **Consistency:** Electronics within a UPS tells it when it needs to work and kicks in alternate power as needed, which eliminates glitches or surges and allows time to safely shut down main systems if and when needed. **Protection: S**afeguards against all power supply problems such as surges, spikes, dips and failure because the UPS essentially senses those things and switches to alternate power before the irregularities cause damage. **Filter:** An UPS acts as a kind of filter by refining the power as it comes into the UPS then adjusting its output so that internal systems receive a clean, consistent supply free of abnormalities.	***4M*** ***Any four - Each advantage 1M***
4		**Attempt any FOUR of the following:**	**16**
	a) Ans.	**Explain working of flat bed scanner with diagram**. Light source illuminates piece of paper face down against glass window	***4M***

		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.  	***Description 2M*** ***Diagram 2M***
	b) Ans.	**Draw and explain hub architecture in detail.** **Hub Architecture:** The Hub architecture has following major components: **Processor: -** It supports Pentium IV Processor which is connected with Memory Controller Hub (MCH). Data is transmitted at a speed of 3.2 GB/s between processor and MCH. **Memory Controller Hub (MCH): -** The MCH is one where all memories are collected so that data can be feed to processor and saved to internal/External memory after processing. HUB architecture provides AGP which a dedicated bus for Graphics operations keeping PCI slots free for other cards.	***4M*** ***Description 2M***

I/O Controller HUB (ICH): - The ICH acts as a connection point where various I/O devices are connected. ICH supports connection to ATA100/IDE drives for secondary memory. It provides 10/100 Ethernet connection for network facility. Also it facilitates with USB and PCI Slot to enhance existing capability of system.

Flash Bios: - Hub architecture has Flash BIOS. With the flash BIOS you can boot with a special disk or execute a set of instructions and update the BIOS without having to open the case.

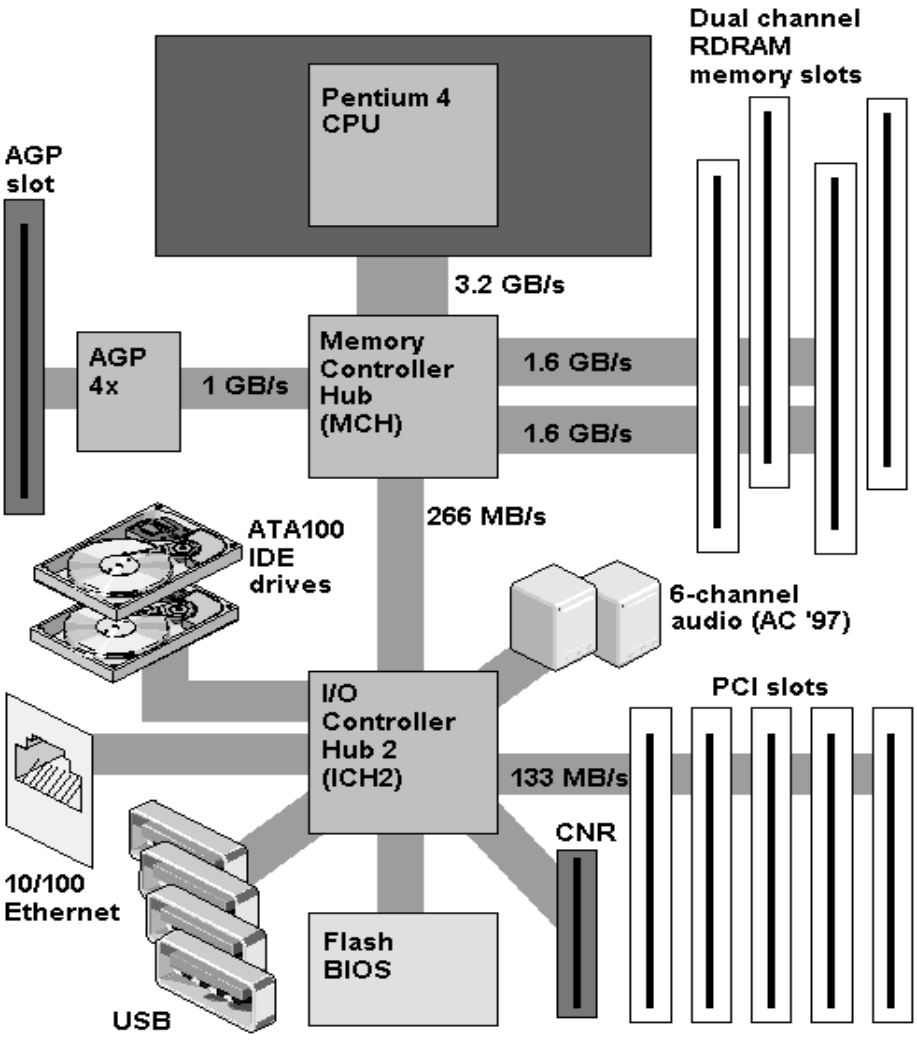
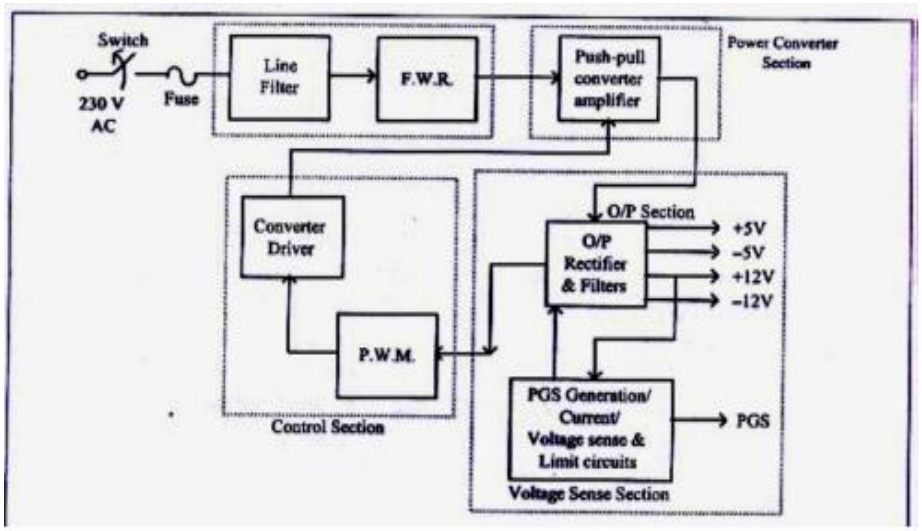


Diagram 2M

	c) Ans.	**With neat block diagram explain working of SMPS.**  **SMPS used in a PC has five sections:** **AC input section** Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining. **Power converter** It consists of push pull configuration of transistors which are driven by converter driver from the control section. Only desired quantity of power is delivered to the load. **Control section** It senses over voltage or over current at load. It changes the turn on time of the transistors in the push pull amplifier so that output power can be controlled. It applies Pulse Width Modulated Waveforms to converter driver circuit at 22 KHz frequency. **Output section** It rectifies and filters the power received from the power section. It provides short circuit and overload protection to the power applied to the load. **Voltage sense section** It generates Power Good Signal (PGS). When all four voltage outputs (+5V, -5V, +12V, - 12V) are steady above minimum sense levels for more than 100ms, PGS is generated by this section. It checks the	***4M*** ***Diagram 2M*** ***Description 2M***

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.

d) Ans.

Differentiate between low level formatting and high level formatting. (any four points) ***4M***

(Note: Any relevant point shall be considered)

Any four Points of comparison; 1M for each comparison point

High Level Formatting	Low Level Formatting
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.

e) Ans

Draw schematic of logic probe and logic pulser and describe working with suitable example. ***4M***

Logic Probe: -

A logic probe is able to give an indication of the logic state of a line carrying a digital signal. The logic probe indicates whether there is a logic state "1" or "0", normally using an LED as the indicator. Often the LED on the logic probe will use different colours to indicate different states.

A logic probe normally may be capable of indicating up to four different states:

Description 1M each

Logic high : If the logic circuit is at a logic or digital high voltage, the logic probe will indicate this on its interface - typically this will be a colour red.

Logic low: Again the logic probe will indicate a logic or digital low. The most common colour for this is green.

Pulses: The logic probe is likely to incorporate a pulse detection circuit. When the line is active a third colour, possibly amber will be indicated. The logic probe may well incorporate circuitry to detect very short pulses and in this way indicate when the line is active. Sometimes the length of te pulses may be indicated by the brightness of the LED.

Line tri-stated : Often it is possible for lines to be tri-stated, i.e. the output device has its output turned off and no real state is defined. Many logic probes are able to indicate this state by having all indicators turned off.

Some logic probes may have a control to select the logic family being tested - different logic families have slightly different high and low voltage levels.

Logic Pulser: -

The Logic Pulser is very effective tool for inspecting and repairing the logic circuits. It can be used directly to inject a signal into the logic circuits without removing the IC or breaking the circuits. The 100mA pulse output insures that the device under test will be pulsed while the short 10µs duration of the output pulse makes sure that no damage will be done to the circuit under test. The Logic Pulser output is switchable between 0.5 and 400Hz, making it suitable for use with either a logic probe or with an oscilloscope; also has an external sync input, which enables the user to synchronize the pulse output with an external signal, such as a computer clock circuit.

OPERATION

a. Attach red alligator clip to positive side of D.C. power supply of printed circuit board under test.

b. Attach black alligator clip to negative side of D.C. power supply of printed circuit board under test.

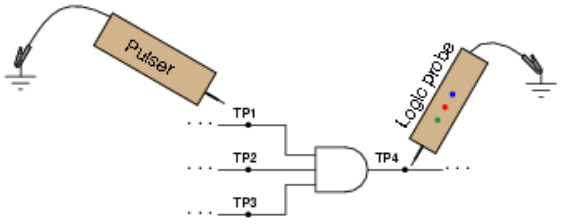


Diagram 2M

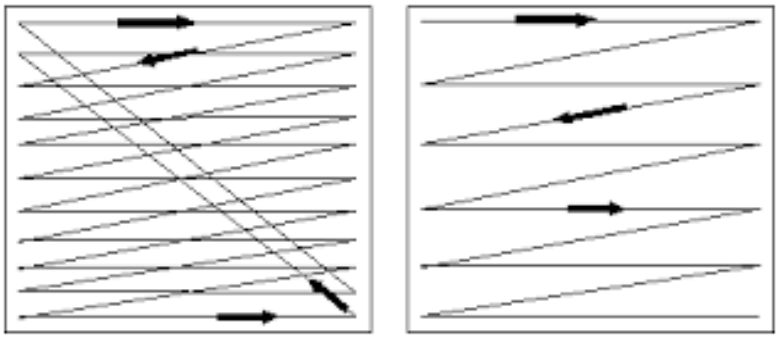
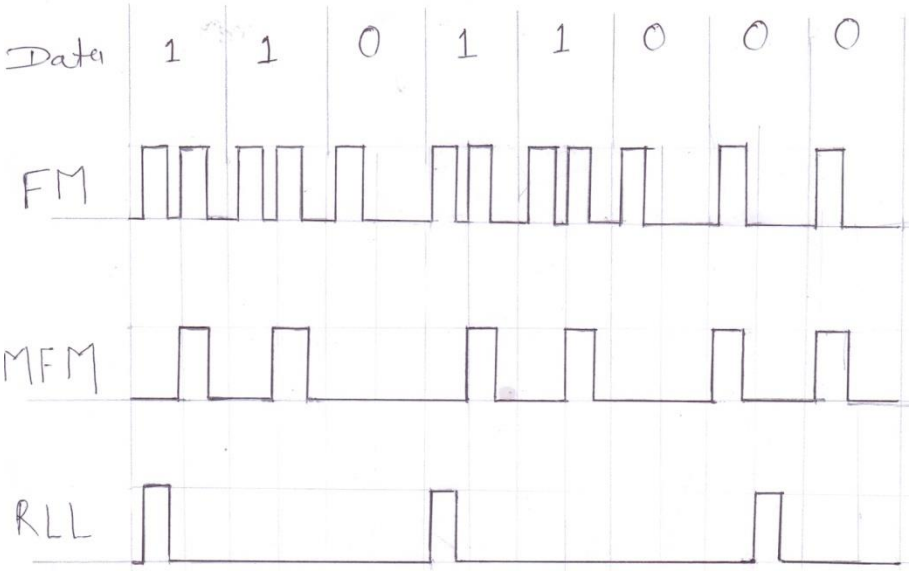
	f) Ans.	**Explain with diagram interlaced and non-interlaced monitor.** **Interlaced scanning:** Interlaced scan is used in normal TV and video systems and was designed for Television to reduce bandwidth, and flicker while maintaining resolution. The image is broken up into two fields: all odd lines (lines 1-3-5....) are imaged in the first field and all even lines (lines 2-4-6....) are imaged in the second field. A full frame image consists of two interlaced fields. This method of scanning is called 2:1 interlaced. The first field is imaged and output before the second field is imaged and output later. **Non-interlaced scanning:** Non-interlaced scan or progressive scan was developed for machine vision but is now finding its way into other application markets. In a progressive scan sensor all lines are captured at the same time. This eliminates the motion blur problem evident in interlaced sensors but also doubles the bandwidth required to transmit the signal along a cable. The entire image is first refreshed at the vertical scanning frequency. The effective image refresh rate is only half the stated vertical scanning rate.  	***4M*** ***Interlaced Scanning with diagram 2M*** ***Non-Interlaced Scanning with diagram 2M***
5		**Attempt any TWO of the following:**	**16**
	a) Ans.	**Draw waveforms of FM, MFM, and RLL recording techniques for data 11011000.** ***(Mark should be given for any other correct answer using other tables for RLL)*** ***(Note: Table is optional)*** For RLL waveform following table has been used:	***8M***

Table:

Data Bit	Pulse Encoding
10	NP NN
11	PN NN
000	NN NP NN
010	PN NP NN
011	NN PN NN
0010	NN PN NP NN
0011	NN NN PN NN



2M FM,

3M MFM,

3M RLL

b) **List different types of key switches in keyboard. Explain the working principle of any one in detail with neat diagram.** *8M*

Ans. **Types of Keyboard Switches:**

1. **Capacitive switch**
2. **Opto –electronic switch**
3. **Membrane switch**

List 2M

4. **Mechanical switch**
5. **Rubber Dome switch**

1. Capacitive switch

In Capacitive Key switch two plates of capacitor are used ,when key is pressed plates comes closer and key released plates move away. The capacitance of the switch is changed and this change can be detected by measuring the voltage change across the switch using some sense amplifier.

Sense amplifier measure the voltage change across the switch, Receive one voltage when switch is in open position and Another voltage when switch is in closed position, Voltages are converted into proper logic signal (*keyboard circuitry)* to inform CPU. Lifespan of this switch is about 20 million keystrokes.

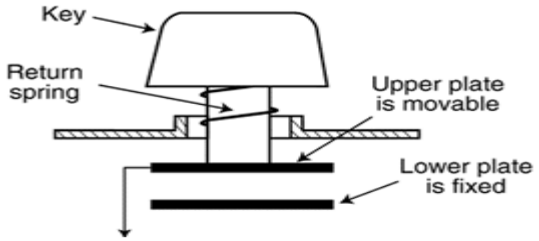
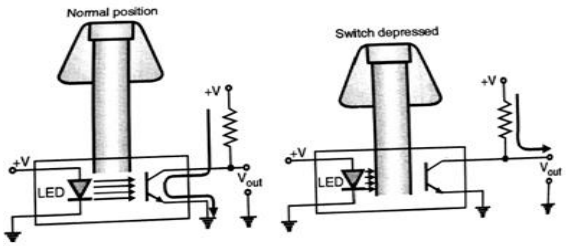


Diagram and explanation of any one switch 6M

2.Opto – Electronic Switch

In Opto- Electronic switch LED and Phototransistor are used. LED which generate light when proper electric power is applied and opposite to LED phototransistor is used, Phototransistor allows the current as long as light is applied to it, if light falling to phototransistor is removed then current not flow through it. When key is not press,light fall onto phototransistor, so the current flow through the phototransistor and produced very low voltage at the output **V**out, when key is depressed light emitted from LED is blocked,stop current flow through phototransistor,different value is produced at the output **V**out.



3. Membrane Switch

It is multilayer plastic or rubber assembly, two *rubber or plastic* sheet are used as row and column conductor sheet and row and column sheet having lines made up of *silver or some other conductor ink* row and column sheet separated by another sheet with holes at key top position.

When Key pressed- it forces the row conductor sheet through the hole to touch the column conductor sheet, Row conductor lines now touches with column conductor lines,key contact is made, Keyboard interface interpreted as key is pressed.

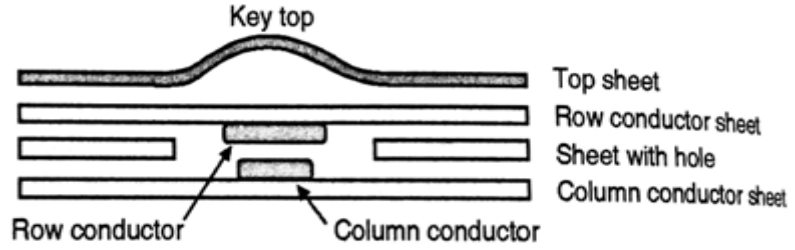
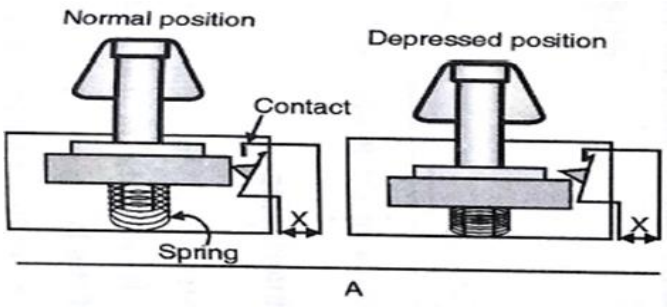


Fig. 4.5 : Membrane type keyboard switch

4. Mechanical Switch

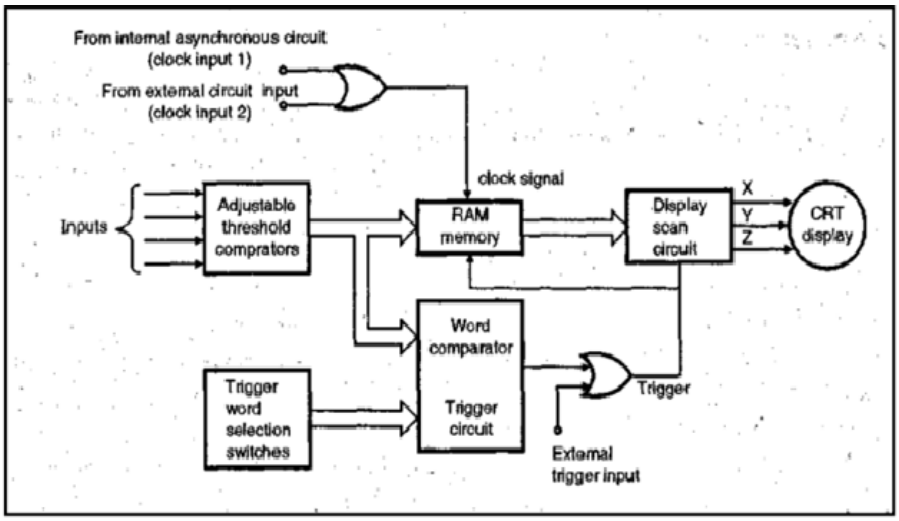
Two Metal pieces or contacts are used and are kept in open position and moved into close position when the switch is depressed.When key is not pressed (normal position) contact is in open position, When key depressed contact is in closed position, This contact sense by keyboard interface at the location 'X'. To improve lifespan of switch gold plating done on this contact

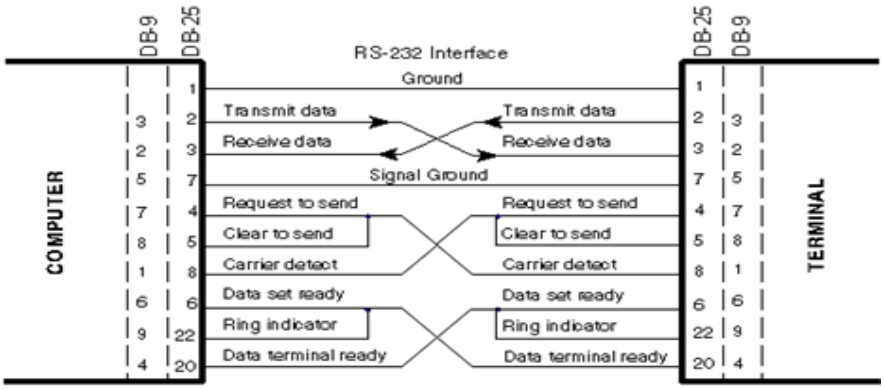
Life of switch is around 1 million keystroke.

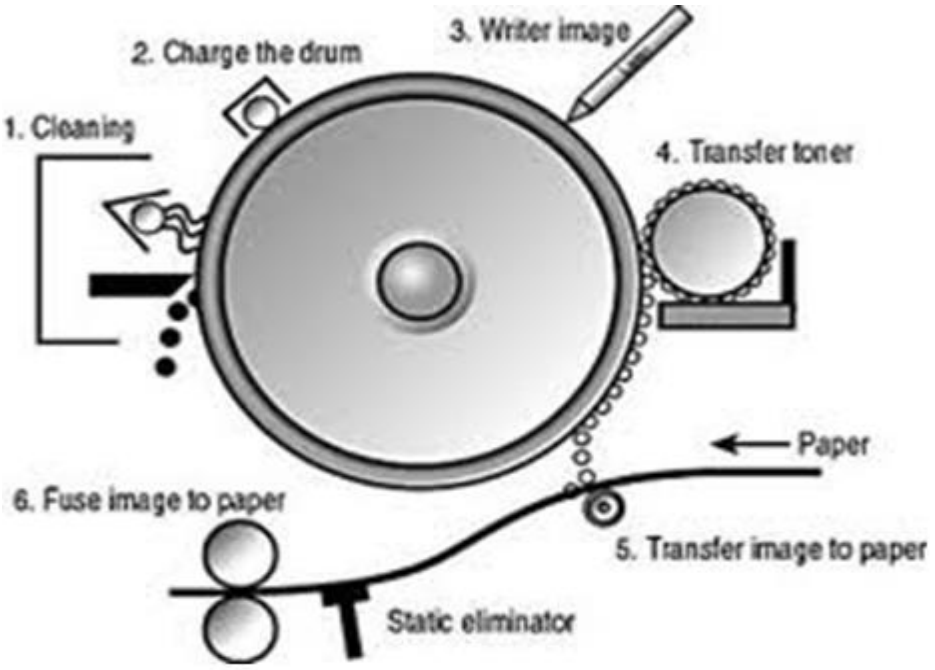


5. Rubber dome switch

Dome-switch keyboards are a hybrid of flat-panel membrane and mechanical keyboards.

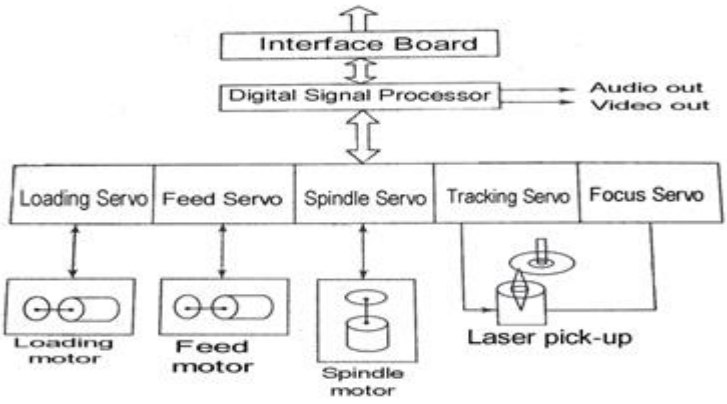
		It use small, flexible rubber domes, each with a hard carbon center.When you press a key, a plunger (spring on the bottom of the key) pushes down against the dome, and the carbon center presses against a hard, flat surface beneath the key matrix. As long as the key is held, the carbon center completes the circuit. When the key is released, the rubber dome springs back to its original shape, forcing the key back up to its at-rest position.	
	c) Ans.	**Draw the block diagram of logic analyzer and explain.** **Logic Analyzer:** A logic analyzer is an electronic instrument that displays signals in a digital circuit that are too fast to be observed and presents it to a user so that the user can more easily check correct operation of the digital system. Fig. shows functional block diagram of logic analyzer. A logic analyzer is a device, which allows you to see the signals on 16 to 64 signal lines at once. It is also called multi-trace digital oscilloscope. It captures and stores several digital signals, letting you view the signals simultaneously.  **Fig. Block diagram of logic analyzer** **Working**: All the input signals are applied to the adjustable threshold comparator one for each channel. Then reference input for each signal can be adjustable depending on logical state of device under testing. The logic analyzer takes sample of each input signal from comparator whenever clock signal is applied to memory and to stores into memory. The clock input may be from :	***8M*** ***Explanation 4M*** ***Diagram 4M***

		Internal asynchronous clock input: It produced by internal oscillator, which is very stable in operation. External clock input: It is clock from any external source. It takes around 256 to 1024 samples of each signal and stores them in memory. When trigger is applied to memory, memory displays these stared samples. The trigger input may be from Word comparator or External trigger input. The word comparator generates trigger when it's two input one from adjustable threshold comparator and another from word selection switch. If both inputs code are same then it send trigger to memory. After applying trigger to memory, then it send to display scan circuit. The display scan circuit then constructs the original waveform and displays it on the CRT.	
6	**a)** Ans.	**Attempt any TWO of the following:** **Draw the block diagram of RS232 connector and give the functions of each signal**.  **Figure 1.** Direct-to-computer RS-232 Interface 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	**16** ***8M*** ***Diagram 4M*** ***Functions 4M***

		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 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	
	b) Ans.	**Describe different stages of the process of printing a document on laser printer with suitable diagram.** **Image Formation System:**  		***8M*** ***Diagram 2M***

		Inside a Laser printer the image formation process revolved around an OPC drum (Organic Photo Conductive) The complete image formation process(6 steps) : 1. Cleaning the OPC Drum. 2. Conditioning of the OPC Drum. 3. Electro statically 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. **CLEANING THE OPC DRUM** Before transferring any image to the OPC Drum's surface, the surface needs to be cleaned and prepared to hold the image being transferred. The drum's surface cleaned physically to removed any trace of the old toner particle from the previous printing operation and it is cleaned electro statically to remove any charge on the drum's surface from the last printing. **CONDITIONING OF THE OPC DRUM** Once the drum surface is cleaned, then uniform charge of – 600 V is applied to the complete surface of the OPC Drum. This is done by a primary corona assembly. This high charge creates a corona effect on the surface of the OPC Drum. **WRITING OF IMAGE ON THE OPC DRUM** Once the drum is through the conditioning process its surface has a uniform – 600V potential. To write any info on this drum, Laser beam is focused on the selected areas of the drum. The image created by the Laser beam on the OPC drum; this image is called a latent electrostatic image. This image is **later developed into a visible image.** **DEVELOPING OF THE IMAGE ON THE OPC DRUM** Once the writing of the electrostatic image on the OPC drum is over, next to develop this latent image into a visible image. To convert the latent image into visible image, the toner is transferred to the discharged areas of the drum. This develops the image of the OPC drum using the toner particles. **TRANSFER OF THE IMAGE FROM OPC DRUM TO PAPER** Once the image is developed or generated on the OPC drum using toner	***Description of 6 stages 6M***

		particles, then this image is to be transferred to the paper or some other O/P medium. In this a transfer roller positive charge is given to the paper, the positive charges applied to the paper is stronger than the charge on the OPC drum, this makes the –vely charged toner particles to be pulled off from the drum to the paper. And image is transferred on paper. Once the paper moves to the fusing section, the OPC drum rotates back to the cleaning section to prepare it to receive the print. **FUSING OF THE IMAGE TO THE PAPER** The fusing section melts the toner ink and fuses it on the printing media(paper) by applying head and pressure. This makes the image permanent and print paper outputted.	
	c) Ans.	**Explain construction and recording of DVD with diagram.** **Construction**:-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.Aluminum is used behind the inner layers, but a semi-reflective gold layer is used for theouter 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. **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. **Loading servo**:- loading servo is used to load DVD in the DVD Drive. **Feed servo**: - Feed servo moves the entire pick up mechanism in the radial direction of the disk from inner periphery to the outer periphery. **Spindle Servo**:- Moves the DVD with highest velocity when it is reading from the innermost track and lowest speed when it is reading from the outermost track.Moves the DVD with highest velocity when it is reading from the innermost track ad lowest speed when it is reading from the outermost track. **Tracking servo**:- Tracking servo move objective lens in horizontal direction to the left or right of track until correct tracking achieved. **Focus Servo**:- Laser beam is focused constantly on the required track. Focusing achieved by moving objective lens up and down so as to focus	***8M*** ***Explanation 4M***

		the laser beam spot on required track.  *Block diagram of DVD drive* **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. The disk is cured under infrared light.	***Diagram 2M*** ***Recording 2M***