



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) What is form factor? List any two form factors of motherboard.(02-marks for definition, 02 marks for any two form factors)

Form factor determines the general layout, size and feature placement on a motherboard.

Two form factors of motherboard

- i. AT
- ii. Baby AT
- iii. ATX Mini-ATX
 Micro-ATX
 Flex ATX
- iv. LPX Mini LPX
- v. NLX

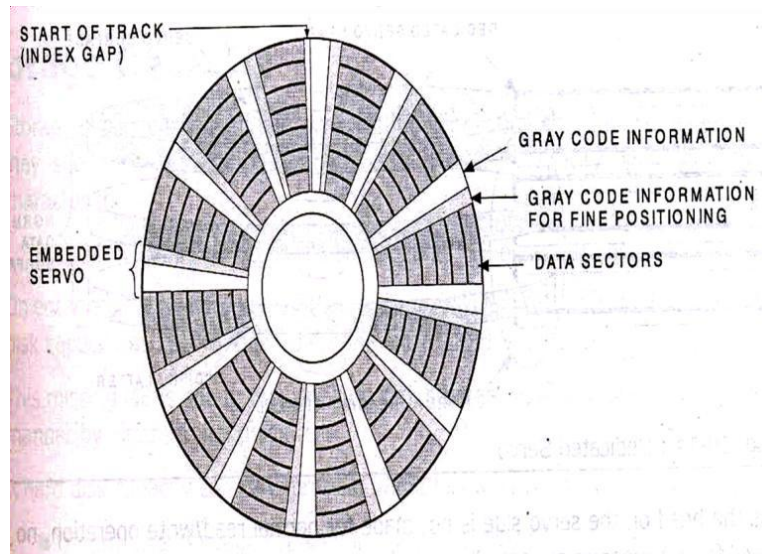
Q.1] b) Enlist types to servo techniques. Describe embedded servo technique in brief. (02-marks for listing, 01-mark for embedded servo, 01-mark for diagram)

There are 3 types of servo for controlling the voice coil based head positioning system (relative position of information with respect to the head position)

- Wedge servo
- Embedded servo
- Dedicated servo

Embedded servo

- Servo information is kept at the beginning of each sector
- This design allows the head positioning system to receive the current position many times in a single rotation. This makes it precise and faster .



Q.1] c) Characteristics of Monitor – Any 4 points (1 mark each)

1. Resolution describes the number of potential pixels the monitor is capable of displaying.
Resolution = Total Horizontal Pixels x Total vertical pixels

2. Frame rate : It is the number of Frames per Second. Higher the frame rate , less the flicker problem

3. Video Bandwidth : It is the highest input frequency a monitor can handle and helps in determining the resolution capabilities of the monitor .The video bandwidth is measured in MHz. Higher the video bandwidth , better the image quality.

$$\text{Bandwidth} = \text{Hor. Pixel} \times \text{Ver. Pixel} \times \text{Frame rate}$$

4. Scanning frequency – Horizontal and vertical

Horizontal : The frequency at which the horizontal lines form an image is called Horizontal Scanning Frequency(KHz)

Vertical :It is the frequency at which screen gets refreshed is the Vertical scanning frequency(Hz).

5. Dot pitch : It is the measurement of the distance between dots on a CRT.

It is independent of the size of the tube or the displayed image

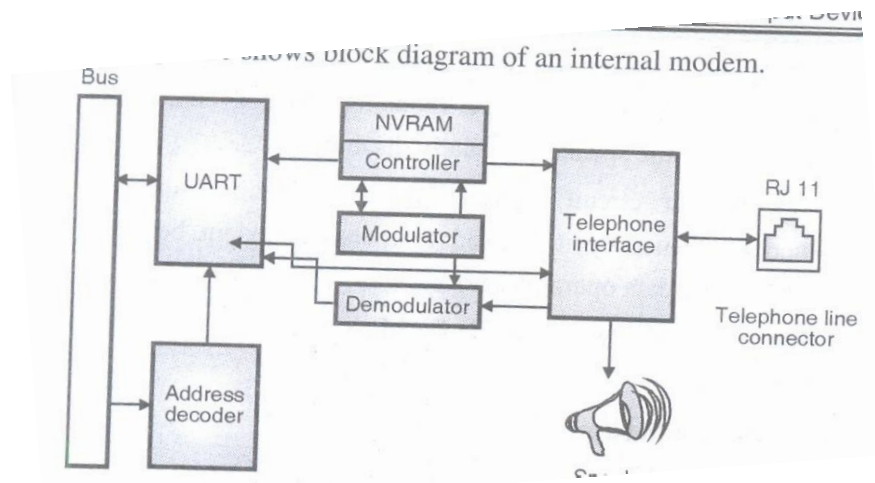
6. Pixel: An individual dot on the screen. Each pixel can be of different color thus producing the images

Q.1] d) With neat sketches explain internal and external modem. (02-marks for internal modem, 02-marks for external modem)

Types of Modem:

1. Internal Modem
2. External modem

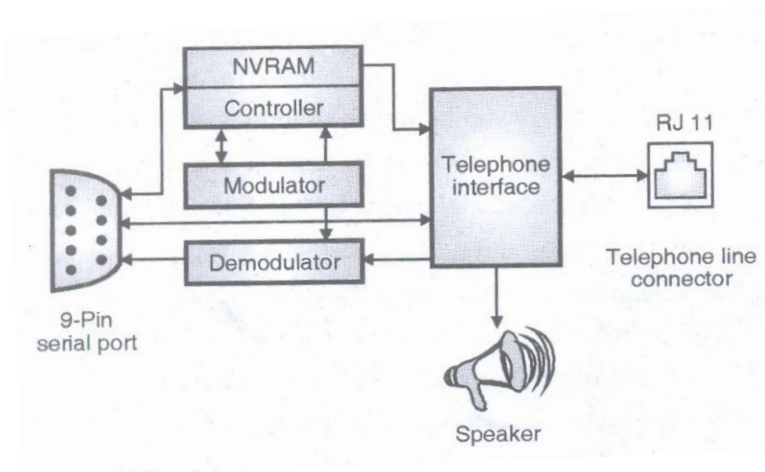
Internal modem



- The internal modem is a stand-alone board that plugs directly into an ISA or PCI expansion slot
- It contains its own Universal Asynchronous Receiver/Transmitter (UART).
- A modulator Circuit converts the serial data from the computer into audio signals to be transmitted over telephone lines. This modulated audio is then coupled to the telephone line. The signal passes through telephone jack (RJ-11) connector at the rate of the modem to the telephone line.
- On the receiver side, signals received from the telephone line is translated into serial data. The telephone interface separates the received signals and passes them to the demodulator. After demodulation the resulting serial data is passed to UART, which in turn converts the serial bits into parallel words that are placed on the system's data bus.

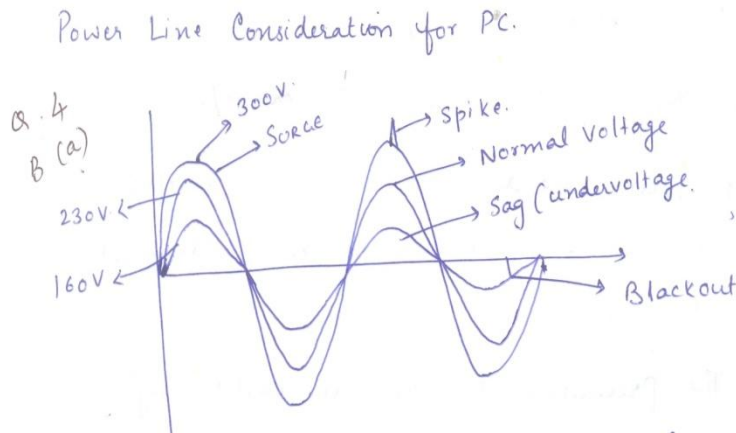
- The telephone interface also generates Dual Tone multi Frequency (DTFM) dialing signals needed to reach a remote modem. When the remote modem dials in, the telephone interface detects the incoming signal and alerts the UART to begin negotiating a connection.
- The telephone interface drives a speaker. During the initial stages of modem operation the speaker is used to hear the dial tone, dialing signals, and audio negotiation between the two modems. Once the connection is established, the speaker is disabled.
- The controller circuit manages the overall operation of the modem. It switches the modem between the control and data operating modes. The controller accepts commands from the modulator that allow the modem characteristics and operating parameters to be changed.
- In the event of power loss or reset conditions default modem parameters can be loaded from NVRAM. Permanent changes to modem parameters are stored in the NVRAM.

External Modem



- The external modem does not include built in UART. It uses existing serial port already configured in the PC.
- A 9 pin (DB9) or 25 pin serial cable connects the PC serial port to the modem. Thus CPU need not be opened during modem installation.
- External modems avoid hardware conflicts such as (conflict of I/O address lines and that of interrupt lines) the external modem setup is faster and easier than internal modems.
- In the external modem the status of serial communication can be checked from the signal status LEDs.

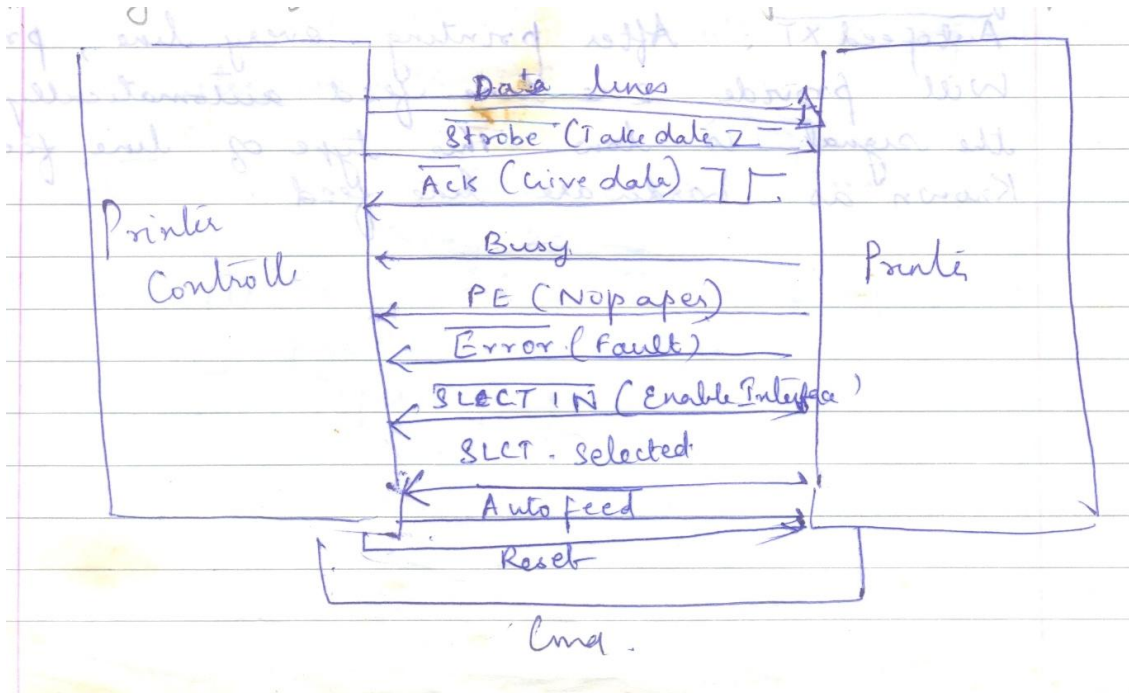
Q.1] e) With neat diagram explain the following terms: (02-marks for diagram, ½ mark for each definition)



- 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.
- Blackout:** Blackout is the complete no power condition. Sometimes sudden power failure can bring about wastage of time, money and resources.
- Surge:** These are overvoltage that last for more than one cycle. Surges are caused when some heavy electrical load is suddenly switched off.
- Spikes:** Spikes are very high voltage, split second events that can disrupt the operation of electronic devices such as computers.

Q.1] f) Draw diagram of centronics interface and explain function of any four signals (02-marks for diagram, ½ mark each for any four signal)

It provides a handshake protocol between a computer and a printer. The printer side of the interface is a 36 pin connector and the PC side is a 25 pin D-type connector.



Signals from PC-Printer

There are 12 signals from PC to Printer. Out of these, 8 signals are data bits and 4 signals are control signals.

The control signals are:

Strobe, INIT, SLCT IN, AUTOFEED XT. All control signals are low active.

Strobe: The printer should take the data when this signal is low.

INIT: When INIT is low, the printer resets its electronics logic and clears the printer buffer.

SLCT IN: It is an interface enable signal. when the signal is low, the printer responds to signals from controller.

AUTOFEED XT: After printing every line, printer will provide one line feed automatically if the signal is low. This type of line feed is known as hardware line feed.



Signals from Printer to PC

There are 5 signals from the Printer to PC. These are ACK, Busy, PE, SLCT, and Error.

ACK: is acknowledgement for Strobe signal from the PC. When active, it indicates that the printer has received data sent by the PC and the Printer is ready to accept next data type.

Busy: When busy is high, it indicates that the printer is busy and cannot receive data. This signal becomes high under any of the following four conditions

1. On receiving Strobe active
2. During printing operation
3. When printer is in offline status.
4. When printer senses some error condition.

PE: When PE signal is high, it indicates that there is no paper in printer. With or absence of paper.

SLCT: Printer is selected and logically connected to the Pc.

Error: This indicates that there is error in printer. Following may be the reasons:

1. Mechanical fault or electronic fault.
2. Printer is offline
3. Paper Out.

Q.1] g) Explain terms: (02-marks each)

i. RFI (Radio Frequency Interference) Protection : It occurs at frequencies > 10 KHz. It can destroy the data in magnetic disk. It can disturb the electron beam in the CRT monitor, causing improper deflection. To avoid RFI effect on PC operation

1. Locate computer system at least 6 ft. away from TV set.
2. Reposition the TV antenna if interference occurs.

Subscribe the cable TV to avoid antenna connection.

ii. Electrostatic Discharge: Whenever the user walks over woolen carpet, the body develops static voltage / charge. If PC is touched for servicing, this static charge, discharges through the PC components to PC-Chassis – gnd. This heavy discharge current may damage the PC components.

Causes:

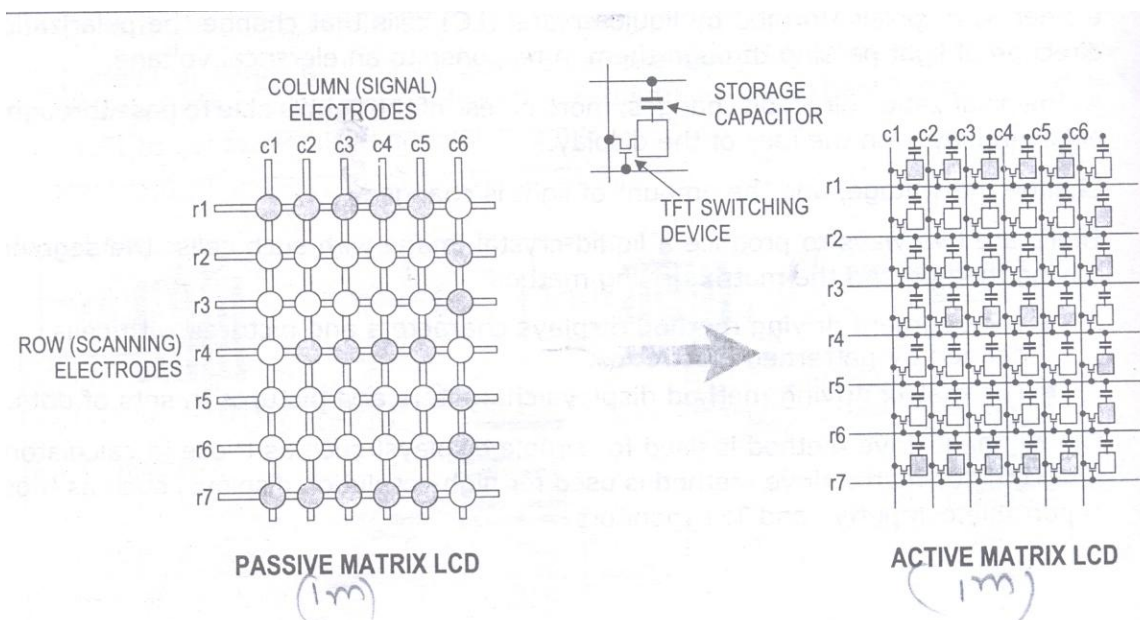
1. Lightning: To avoid this, lightning arresters are used.
2. Carpets in Computer Room: Earth belts must be used to discharge static charge before operating PC.

Q.2] a) What is partitioning of Hard disk? How it is done? Give use of partitioning. (02-marks for definition, 01-mark for use, 01-mark for how)

Partitioning is a procedure which divide the hard disk into multiple sections or logical parts. Each partition is comprised of several cylinders or tracks. Different operating systems may be stored on different partitions.

FDISK.exe program is used for creating partitions on a disk. It is a utility provided by DOS.

Q.2] b) Explain passive and active matrix LCD with diagram. (02-marks for diagram, 01-mark for passive LCD explanation, 01-mark for active LCD)





- Passive matrix LCDs use a simple grid to supply the charge to a particular pixel on the display.
- The liquid crystal material is sandwiched between the two glass substrates 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.
- The row and column intersect at the designated pixel, and that delivers the voltage to untwist the liquid crystals at that pixel.
- To address a pixel the column containing the pixel is sent a charge, the corresponding row is connected to ground. When sufficient voltage is placed across the pixel, the liquid crystal molecules align parallel to the electric field.
- In passive matrix LCDs (PMLCDs) there are no switching devices, and each pixel is addressed for more than one frame time.

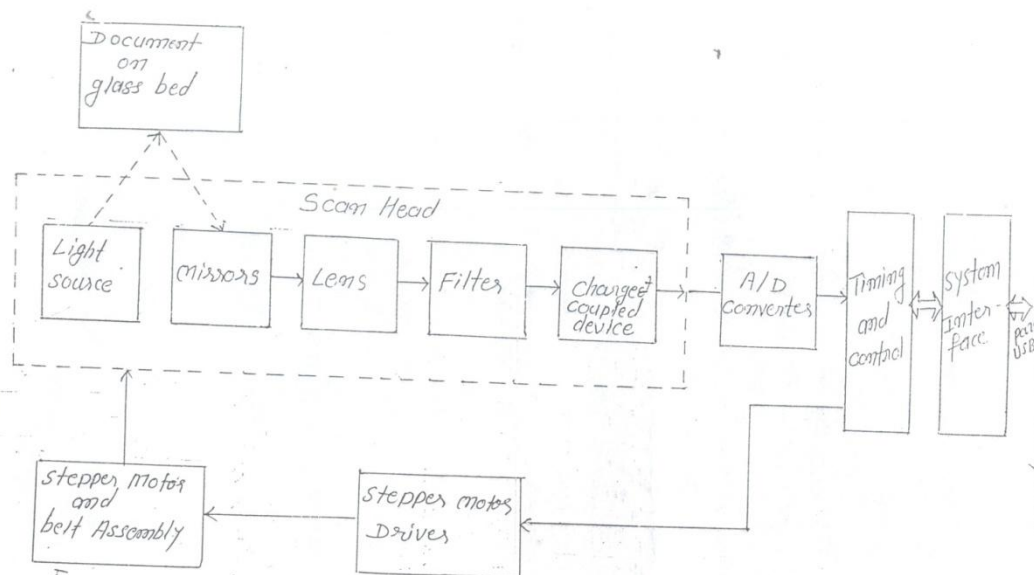
Active matrix LCD

In active matrix LCDs, a switching device 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.

In contrast to passive matrix LCDs, active matrix LCDs have no inherent limitation in the number of scan lines, and they present fewer cross talk issues.

Q.2] c) Draw the block diagram of flatbed scanner and give the function of each block. (01-mark for diagram, 03-marks for explanation)



1. Light Sources: Every scanner has an internal light. It is a small powerful unit which turns on the scanner lamp. The types of lamps used in scanners are:

Xenon gas discharge lamp.

Hot cathode fluorescent lamp

Cold cathode fluorescent lamp.

2. Light sensitive matrix: this transforms the colour and brightness of the incoming light flux into analog electrical signal. Depending on the principles used there are three types.

- Photomultiplier tube (PMT)
- Charged coupled device (CCD)
- Contact image sensor (CIS)

3. CCD: The core component of the scanner is the CCD array. CCD is the most common technology for image capture in scanners. CCD is a collection of tiny light sensitive diodes which convert photons (light) into electrons (electrical charge). These diodes are called photosites.

4. Control Unit: All scanners are controlled by the computer to which they are attached and the user can adjust scan settings through the control settings. Each button has a specific function such as: launching a standard scan operation with the output to the printer, mail fax etc.



5. A-D Converter: This converts the output of the CCD matrix into digital form so that the scanner processor can process the signal. It has a bit capacity of 24-48 bits. The higher the bit capacity the more true to life the image reproduced.

Q.2] d) Give the signal voltages for the following colors of ATX connector (01-mark each)

- i. Red +5V DC
- ii. Black Gnd
- iii. Orange -3.3 V DC
- iv. Purple +5V DC (standby voltage)

Q.2] e) Explain following external SCSI connectors: (01-mark each)

Connectors are the physical devices that are used to attach a SCSI cable to SCSI device
There are 4 types of external connectors:

D- Shell

Centronics

High density

Very high density cable interconnect

D Shell : It is D shaped. The connector is large and cumbersome.

Centronic: In centronics connector instead of pins, two rows of flat contacts are used to hold the connector in place. Two latches on either side are used to hold the connector firmly. This is called as Alternative 2.

High Density (HD) HD are used in SCSI 2. In this space between the pins were reduced. The narrow 50 pin connector is called Alternative 1 and the 68 pin version is called Alternative 3.

Very high Density : VHD is a 68 pin connector. The contacts are much smaller and closer together. It is called Alternative 4.



Q.2]f) Which different testing are performed by diagnostic software?(01-mark each)

A diagnostic program is a program written for the purpose of locating problems with the software, hardware, or any combination of both in a system, or a network of systems. Diagnostic programs provide solutions to the user to solve issues.

POST: The power on self test operates whenever any PC is powered . These routines are contained within the motherboard ROM and the ROM as well as ROMs on expansion cards.

Manufacturer supplied diagnostics software: This manufacturers specific software normally consists of a suite of test that thoroughly examines the system. In some cases, these utilities are included with the system, or we can download these diagnostics from the manufacturer's online services.

Peripheral diagnostics software: Used for hardware devices, network adapters, sound cards etc.

Operating system diagnostic software: Operating systems, such as windows 9x/Me and Windows NT/2000/XP, include a variety of diagnostic software utilities designed to identify and monitor the performance of various components in the computer.

Aftermarket diagnostic software: A number of manufacturers make genral purpose diagnostics software PCs. This type of software is often bundled with other system maintenance and repair utilities to form a general PC software toolkit.



Q.3] a) What is the need of cache memory? Describe in detail types of memory. ((Need of cache 2 marks, Types of cache memory – 2 marks each)(Marks should be allotted if any other types of memory are mentioned)

- Need of Cache memory
- 1. With each new model the processor speed has increased, but the speed of memory chip has not increased.
- 2. CPU has to wait for data from memory.
- 3. High speed RAM cannot be used as main memory as they are very costly.
- 4. Hence a small amount of high speed memory is used between main memory and CPU.

Types of cache memory

L1 cache

- 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.
- It was the fastest cache in the system.
- L1 cache was originally 8 KB.

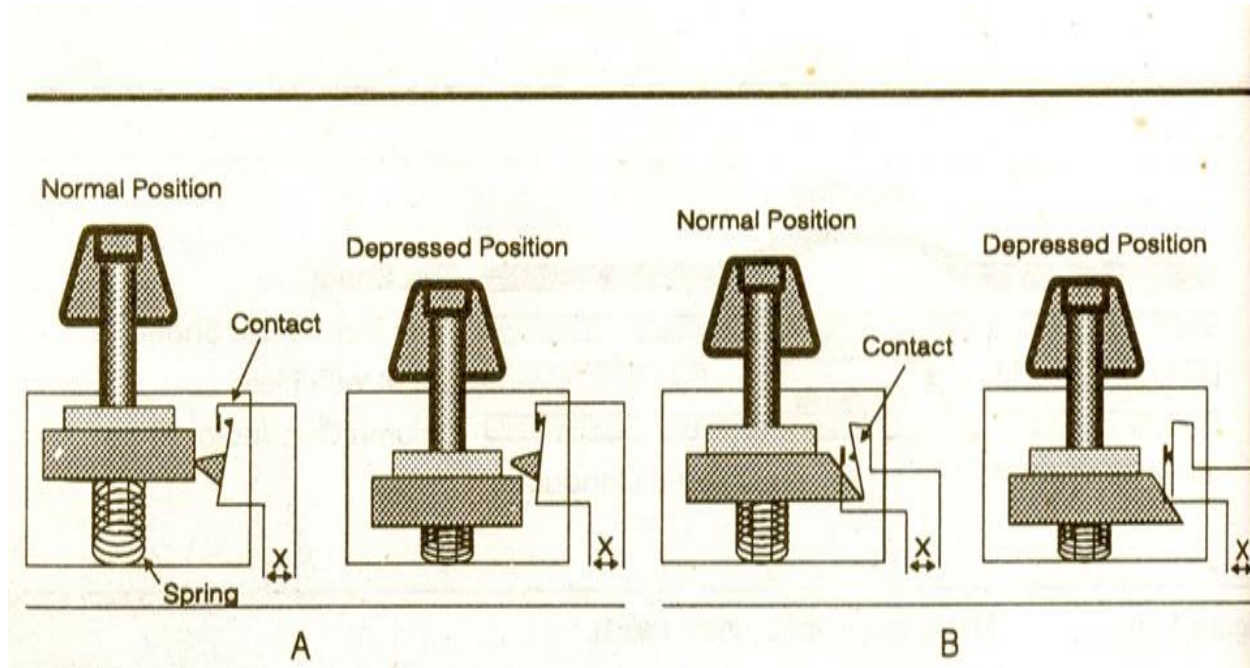
L2 cache

- The L2 cache originally called external cache because it was external to the processor chip when it was introduced.
- It was present on the motherboard and used to run at CPU bus speed.
- To improve the performance of the system, L2 cache was directly incorporated as part of the processor die.
- L2 cache was originally 128 KB.

L3 cache

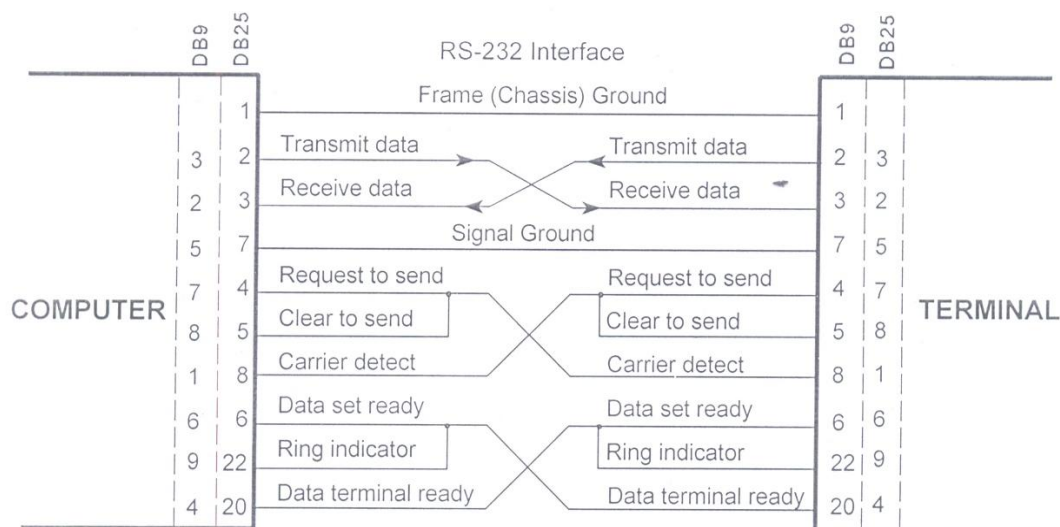
- The L3 cache has been present in high end work stations and servers such as Xenon and Itanium.
- Pentium 4 Extreme Edition was the first desktop PC processor with L3 cache.
- Later Editions of same processor were introduced with larger L2 cache rather than L3 cache.

Q.3] b) Working principle of Mechanical Key switch (Diagram 3 marks Working 5 marks)(Any one diagram either A or B)



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

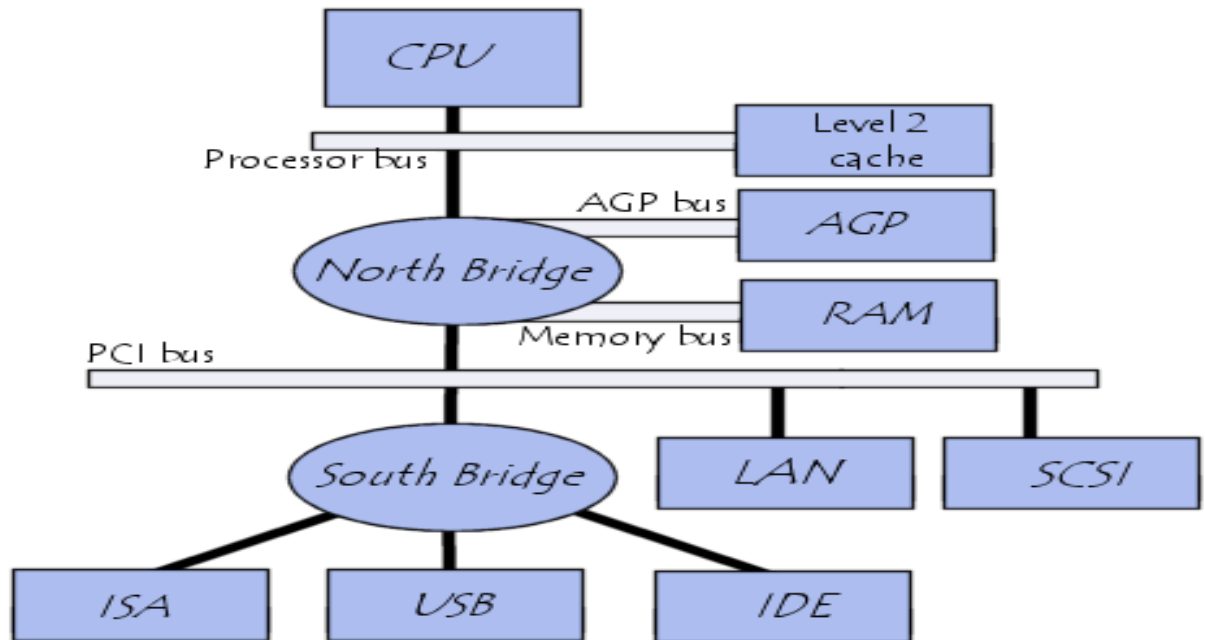
Q.3] c) Block diagram of RS 232 connector (Diagram 4 marks signals 4 marks(Any 4 signals))



RS 232 Signals

- **Carrier Detect:** This signal gives a modem a means of signaling the data terminal that it has made a connection with the distant modem.
- **Receive Data:** The bits coming in from a distant serial port go through receive data line.
- **Transmit Data:** The serial data leaving the port travels on Transmit data line
- **Data Terminal Ready:** when the data terminal is able to participate in communications, it signals its readiness by applying a positive voltage on the DTR line.
- **Signal Ground:** It provides the return path to all the signals used in the serial port.
- **Data Set Ready:** When the data terminal is ready to receive data, it signals its readiness by applying a positive voltage on the DSR line.
- **Request To send:** When the data terminal is on and capable of receiving transmissions, it puts a positive voltage on the request to send line. Absence of RTS signal will prevent the data set from sending out the data.
- **Clear To Send:** The data set needs to control the signal flow of from the data terminal. The CTS signal indicates to the data set that data can be sent. Absence of CTS signal will prevent the data set from sending out the data.

Q 4[a) North Bridge/South Bridge Architecture (Diagram 2 marks, Explanation 2 marks)



North Bridge: It is the connection between the high speed processor bus and the slower AGP & PCI buses. It is responsible for communication from the CPU to memory, the CPU to the PCI (Peripheral Component Interconnect) Express bus, and the Advanced Graphics Port (AGP) device. It is the only motherboard circuit (besides the processor) that runs at the full motherboard speed. It serves as the four way connection between CPU, Memory, Video card and south bridge

South Bridge: It is the bridge between PCI bus and even slower ISA bus. It is responsible for communication between the CPU and other devices, such as PCI, ISA, and IDE devices. The Southbridge actually contains some on Chip integrated peripherals, such as Ethernet, USB and audio devices. It is responsible for communication between the CPU and other devices, such as PCI, ISA, and IDE devices. These two chips contain the bulk of the logic that allows a CPU to communicate with other hardware.



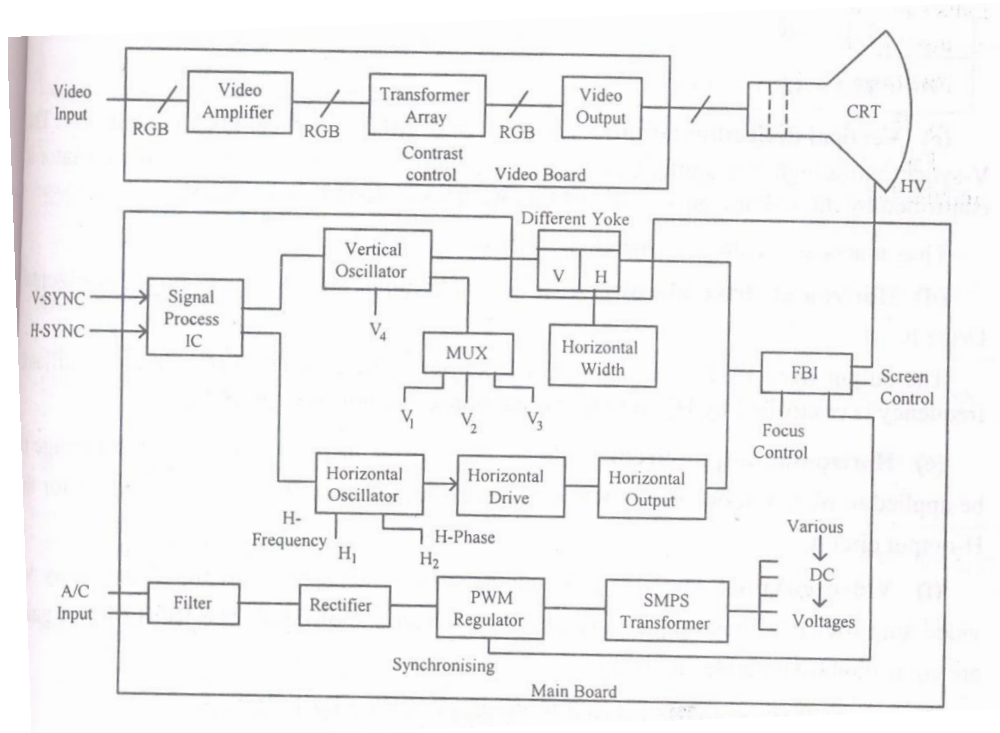
Q.4] b) Compare FAT 16, FAT 32, NTFS (Any four points – 1 mark each)

Criteria	NTFS	FAT 32	FAT16
OS	Windows 2000, XP, 2003 server	DOS V7, Win 2000,98,XP	Dos , All version of Windows
Maximum Vol Size	2TB	32GB	2GB
Max. Files on Vol	Unlimited	4194304	65536
Max file size	Limited by vol size	4GB	2 GB
Max Cluster number	Unlimited	4177918	65524
Boot sector location	1 st and last	First sector and copy in sector No 6	First sector
Compression	Yes	NO	NO
Built in security	Yes	NO	NO
Recoverability	Yes	NO	NO
performance	High on large vol Low on small vol	Good on small vol, Low on large	Good on small vol, Low on large
Security	Folder and file access can be controlled individually	Very little	Very little

Compatibility	Not compatible with window 95/98/Me	Compatible with all OS (32 bit)	Compatible with all OS (16 bit)
Space efficiency	Supports disk quotas to control amount of disk space per user	Does not support disk quota	Does not support disk quota

Q.4] c) Color Monitor (Block diagram 2 marks, Functions 2 marks) (Any other diagram showing similar blocks may also be considered)

Block diagram



Functions of blocks

- **POWER CIRCUIT:** To provide different DC voltages required in the monitor. AC input is filtered & rectified & modulated using PWM and is then given to the primary of SMPS transformer. The O/P of the transformer is the DC voltage of various values such as 75V, 165V, 5V, 15V, 6.3V, -12V etc.
- **Video Board:** It contains circuits for displaying the video information as dots on the CRT screen. It receives video signal from the PC and displays it on the monitor. Three separate



electron guns are used for three primary colors R, G, B. Three complete video drive circuits are required to process information about three colors. R, G, B analog signals are amplified using video amplifier and then applied to the transistor array for further amplification. Different combinations of H-sync and V-sync will decide the resolution of the monitor.

- **Vertical Deflection Circuits:** They contain the vertical oscillator circuit and a multiplexer. V-sync signal is applied to the vertical oscillator which works as voltage controlled oscillator. Frequency of the oscillator is controlled by varying voltage V_4 .
- **Horizontal Deflection Circuits:** H-sync is applied to the horizontal drive IC horizontal oscillator frequency is controlled by H1, H2 inputs.
- **Fly- Back Transformer:** The FBT's primary winding is coupled to the horizontal O/P transistor. Another primary winding is used to compensate the high voltage level for changes in brightness and contrast. Flyback voltage is generated during horizontal retrace. The topmost tap from the FBT secondary provides high voltage to CRT anode; lower tap provides voltage to focus circuit.

Q.4] d) Protection Devices (List 2 marks, Surge Suppressor 2 marks)

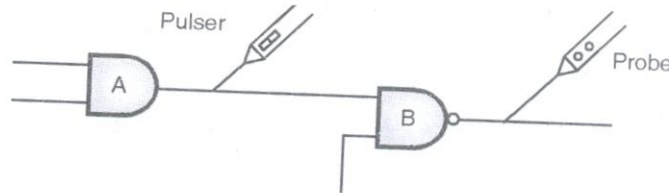
1. Surge Suppressor
2. Circuit breaker

Surge Suppressor

These circuits are designed to absorb high voltage transients produced by lightning and other high energy equipment. Protection is accomplished by clamping voltages above a certain level. MOVs (Metal oxide varistors) are often included that respond quickly and clamp the voltage.

The MOV is a disc shaped electronic component made from a layer of zinc oxide particles held between two electrodes. The granular zinc oxide offers a high resistance to electricity until the voltage reaches a break over point. The electrical current then forms a low resistance path between the zinc oxide particles. The MOVs are designed to accept voltages as high as 6000V and divert any power above 250V to ground.

MOVs degrade with each spike. Once they have passed a number of surges they must be replaced by new a one. Many suppressers show a LED when the MOV has blown.

Q.4] e) Logic Pulsar (Diagram 1 marks, Explanation 3 marks)

- It is used to inject pulses into the circuit using logic pulser.
- A logic pulser is designated to test circuit reaction by delivering a logical high (+5 V) pulse into a circuit.
- Logic probe and pulser are used together to test ICs and verify truth table.
- It has ability to introduce a changing signal into circuit without desoldering or cutting wires
- The above figure shows several way to test logic gates using the probe and pulser. Pulser injects pulses to output of AND gate and probe should checking or indicating a change at the input to the NAND gate.

Q.4] f) Preliminary Checks (2 marks each)**1. Can't read from "C" drive**

- Check cables for continuity and proper mating
- Check for drive motor activation.
- Check +12V power output of SMPS
- Check data cable.
- Check CMOS setup.

2. Junk characters displayed on the screen

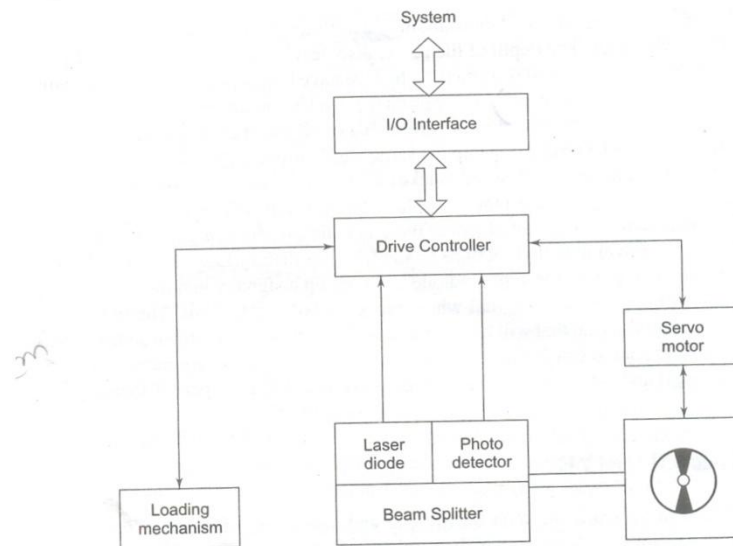
It may be due to improper keyboard section

- Hence check keyboard controller as well as keyboard cable

It may also be due to improper display section.

- Check video RAM, display adapter as well as monitor cable.

Q.5] a) Draw block diagram of CD drive and state the function of each sub system. (04-marks for diagram, 04-marks for explanation)

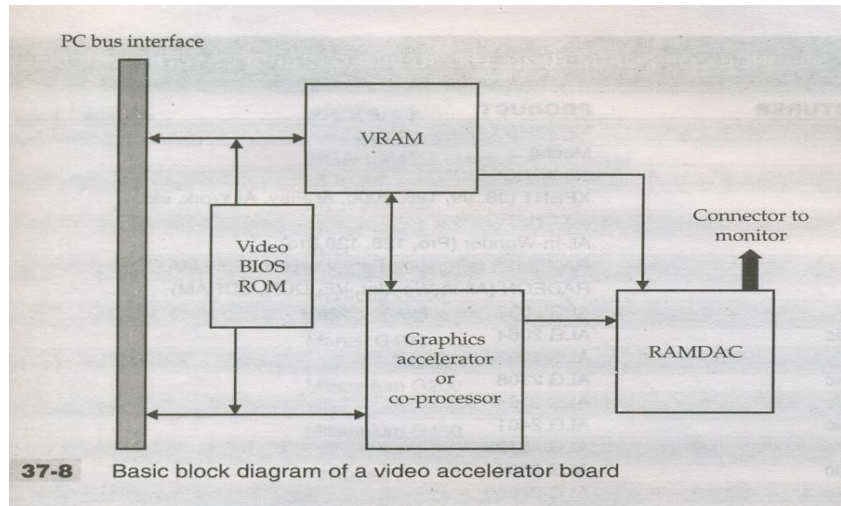


The CD-ROM drive reads the data on the CD and sends the information to the interface connector (expansion board) attached to the computer motherboard. The information then travels to the CPU for processing to make video, text or sound.

The CD recording method makes use of optical recording, using a beam of light from a minute semiconductor laser. Such a beam is of low power (milli watts) but the focus of the beam can be a very small point so that low melting point materials like plastics can be vaporized by a focused beam. Turning the recording beam onto a place on a plastic disc for a fraction of a millionth of a second will therefore vaporize the material to leave a tiny created pit, about 0.6 μm (1 μm - 1 millionth of a meter, equal to one thousandth of a millimeter) in diameter a human hair e.g. is around 50 μ in diameter. The depth of the pits is also very small of the order of 0.1 μm . if no beam strikes the disc, then no pit is formed, so that we have here a system that can digitally code pulses into the form of pit or no pit.

Reading a set of dimples on a disc also makes use of semiconductor laser, but of much lower power since it need not vaporize material. The reading beam will be reflected from the disc where no dimple exists, but scattered where there is a dimple. By using an optical system that allows the light to travel in both directions to and from the disc surface, it is possible to focus a reflected beam onto a detector, a photodiode and pick up a signal when the beam is reflected from the disc. There will be no signal when the beam falls onto a pit. The output from the detector is the digital signal that will be amplified and then processed into an audio signal.

Q.5] b) Draw the block of a video accelerator card and explain in detail. (04-marks for diagram, 04-marks for explanation)



Components of Video Accelerator Card:

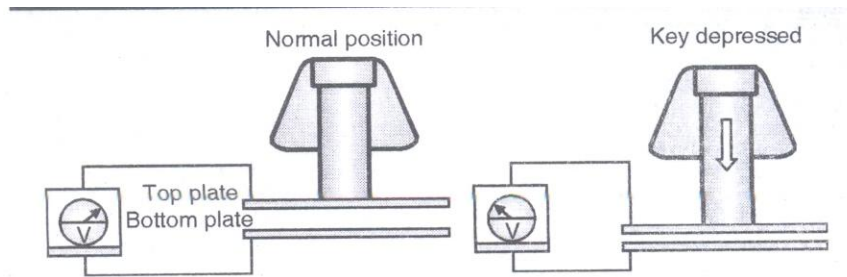
- Incorporate processing power onto video board (rather than CPU) for graphics data processing.
- A graphics accelerator application specific chip (ASIC) that intercepts graphics tasks and processes them without the intervention of system CPU.
- Core of the accelerator is the graphics chip which connects 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 to Analog Converter).
- Graphics chip directs RAMDAC operation and ensures that VRAM data is available.
- RAMDAC(random access memory digital-analog converter) 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.

Q.5] c) Name different types of key switches in keyboard. Explain the principle of working of any one in detail. (02-marks for types, 02-marks for diagram, 04-marks for explanation)

The type of key switches are:

- Capacitive switch
- Membrane switch
- Mechanical switch
- Rubber dome switch.

- Working principle of Capacitive switch

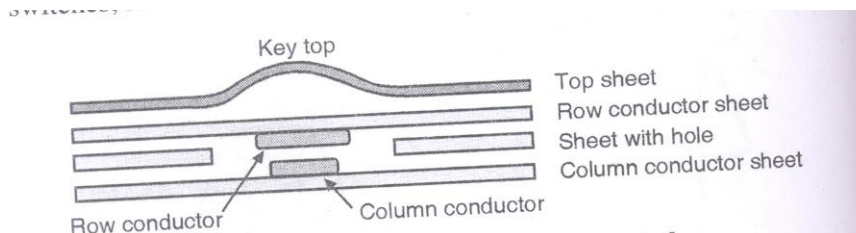


This is one of the most common keyboard switch type as shown. In this type of switches have two plates of the capacitor are closer when the key is pressed.

When the plates are brought closer or moved away, the capacitance of the switch is changed can be detected by measuring the voltage change across the switch using some sense amplifier.

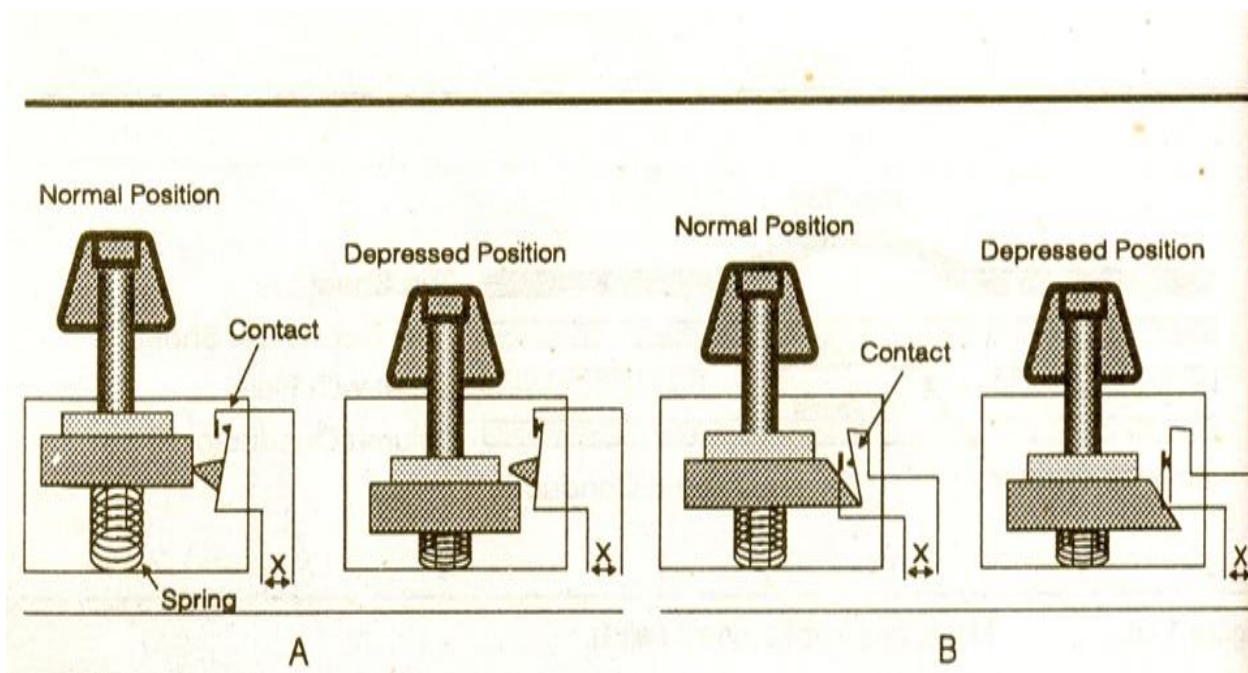
The sense amplifier will receive one voltage when the switch is in open position. These voltages are converted into proper logic signals to inform the computer about the open or close position of the switch. These switches have a normal lifespan of about 20 million keystrokes.

- Working principle of Membrane Key switch



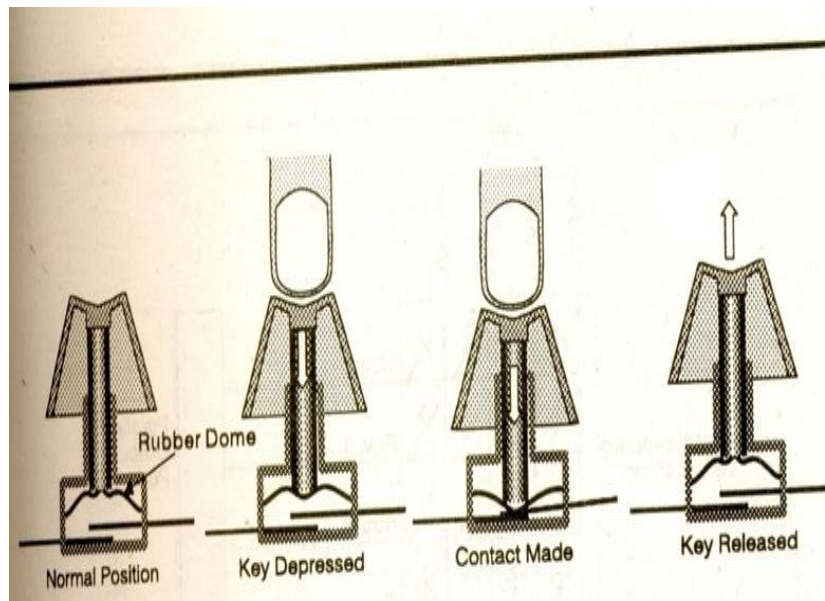
- a) It is a multi-layer plastic or rubber assembly.
- b) It is used as keyboard in video game machines, calculators, medical instruments, cash registers etc.
- c) Two rubber or plastic sheets are used as row conductor sheet and column conductor sheet.
- d) Row and column lines are made on the plastic or rubber sheet using silver or some other conductor ink.

c) Working principle of Mechanical Key switch



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

d) Working principle of Rubber dome switch



- A dome like rubber structure keeps the key in up position.
- When the key is pressed, the dome collapses and joins the two contact points.
- When key is released, the dome goes back to its normal shape, pushing the key into normal up position and breaking the contact.

Q.6] a) Describe Real and virtual Real mode of processor in detail. (04-marks for real mode and 04-marks for virtual real mode)

Processor Modes

A processor can operate in several different modes. The processor mode controls how the processor sees and manages the system memory and the tasks that use it.

1. Real Mode (8086 mode)

Original IBM PC could address only 1 MB of RAM as it had only 20 address lines. It could execute 16 bit instructions using 16 bit internal registers. E.g. DOS operating system. When a processor is running in real mode it has the advantage of speed but it accesses memory with some restrictions.

Later processors like 286 could run the same 16 bit instructions but much faster. The 16 bit instruction mode of 8088 and 286 processors is known as real mode. All softwares running in real mode must use only 16 bit instructions and live within the 20 bit (1 MB) architecture it supports.



Software of this type is usually single tasking – only one program can run at a time. No built in protection exists to keep one program from overwriting another program or even the operating system in the memory.

2. Virtual Real Mode

It is the (virtual) real mode 16 bit environment that runs inside 32 bit protected mode. E.g. When a DOS prompt window is run under windows a virtual real mode session is created. Any program running in virtual real mode can access up to only 1MB of memory, which that program will believe is the first and only megabyte of memory in the system. All Intel and Intel compatible processors power up in real mode. If 32 bit operating system is loaded, it automatically switches the processor into 32 bit mode and takes control from there.

Some of the 16 bit applications misbehave in the 32 bit mode. For e.g. diagnostic software. In such cases the application can be run on Pentium 4 processor by booting the system using a DOS floppy.

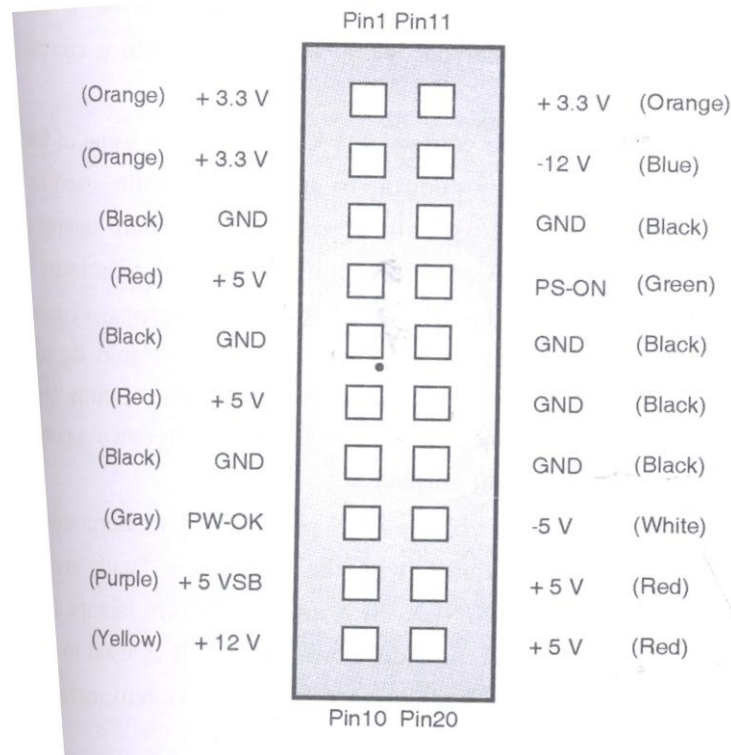
A protected mode OS can create multiple virtual mode machines. Each machine gets its own 1 MB of memory.

Q.6] b) Give the eight specifications of blue ray disk with typical value. (Specifications 01 mark each)

Specifications	Value
Capacity (Single Layer)	23.3GB/25GB/27GB
Capacity (Dual Layer)	46.6GB/50Gb/54Gb
Laser wavelength	405nm (blue-violet)
Lens Numerical Aperture	0.85
Cartridge dimensions	Approx 129X131X7mm
Disc Diameter	120mm
Disc Thickness	1.2mm
Optical Protection Layer	0.1mm
Tracking Pitch	0.32μm
Shortest Pit Length	0.160/0.149/0.138μm

Recording Density	16.8/18.0/19.5 Gb/Sq. In
Data transfer rate	36Mbps
Recording Format	Phase Change Recording
Tracking Format	Groove Recording
Video Format	MPEG2

Q.6] c) Draw 20 pin ATX power connector with color code. State function of PS_ON, 5VSB, PWR_OK signals. (05-marks for diagram, 03-marks for explanation)



Raw 20 pin ATX power connector with color code. State function of PS-ON, 5VSB, PWR_OK Signals.

The PS-ON is an input to SMPE only when this signal is low; the SMPS outputs should be ON. Otherwise the output should be OFF. This signal can be generated by software.

The 5VSB is a standby voltage, which supplies power to special circuits even when the SMPS and the system are off.

The PWR_OK is a power good signal.