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. **Attempt any SEVEN:**   **14**

a) What do you understand by active preventive maintenance? (2M)
Active preventive maintenance includes
i) Regular cleaning of the system using cleaning tools & cleaning solutions
ii) Preventive maintenance of the system, which are either weekly or monthly.
   Weekly maintenance includes
- Backup of important data
- Deleting temporary files
- Empty recycle bin
- Check for antivirus software updates
- Run defragmentation program
   Monthly maintenance includes,
- Create a startup disk
- Check for updated drivers
- O.S. updates
- Cleaning the drivers

b) List any four features of 8 bit ISA bus.
(Any four 2M)
1. Eight data lines
2. Eight interrupt request levels
3. 20 address lines
4. Enables to handle 1MB of memory**.**

c) What is passive maintenance? (2M)
- Passive preventive maintenance includes precautionary steps you can take to protect a system from the environment.
- This type of maintenance involves the protection of the system from the environment, such as using power-protection devices; ensuring a clean, temperature-controlled environment; and preventing excessive vibration.
- It involves
  i. Protection from physical environment

ii. Protection from electrical environment
- For e.g. using power protection devices, ensuring clean temperature controlled environment, preventing excessive vibrations.

d) List two important features of peer to peer network. (two feature, 2M)
1. A peer-to-peer (P2P) network is a type of decentralized and distributed network architecture in which individual nodes in the network (called "peers") act as both suppliers and consumers of resources.
2. In Peer-to peer network each computer is responsible for making its own resources available to other computers on the network.
3. Peer to peer network is useful for a small network containing less than 8-10 computers on a single LAN and each computer maintains its own accounts and their security settings.
4. In a peer to peer network, a group of computers is connected together so that user can share resources and information.

e) State characteristics of L2 cache. (Any four ½ mark each)
1. **It is external to the processor core.**
2. **Same processor can be used with different L2 cache.**
3. **Larger L2 cache increases the performance of the system.**
4. **Cache performance can be measured in terms of Miss Rate, Hit, Time, Miss Penalty.**
5. **Miss Rate = Fraction of memory references not found in cache**
6. **Hit Time = Time to deliver a line in the cache to the processor (includes time to determine whether the line is in the cache)**
7. **Miss Penalty = Additional time required because of a miss**

f) What do you understand by subnet masking? (2M)
A subnet mask is a screen of numbers used for routing traffic within a subnet. Once a packet has arrived at an organization's gateway or connection point with its unique network number, it can be routed to its destination within the organization's internal gateways using the subnet number. The subnet mask consists of a screen of numbers indicating to the router which numbers it should look at underneath. In a binary mask, for example, a "1" over a number says "Look at the number underneath;" a "0" says "Don't look." Using a mask saves the router having to handle the entire 32 bit address; it can simply look at the bits selected by the mask.

g) List any two basic types of RAM.
(Two type 2M)

SRM (Static RAM): the content remain permanent as long as power is given to it. Once the information is written in any location is SRAM, it is preserved there.

DRAM (dynamic RAM): it store data in small capacitor. The presence of charge on the capacitor represents a 1 and absence of charge represents 0

h) List any two important benefits of networks.
(Two benefits 2M)
1. Help to enhance connectivity
2. Networking help in sharing of hardware
3. Eases out management of data

4. Internet
5. Data sharing

i) What is BIOS?
(**Definition 2M**)
The BIOS (Basic Input Output System) provides the processor with the information required to boot the system from a non-volatile storage unit (HDD, FDD, CD or other). It provides the system with the settings and resources that are available on the system

j) Why UDP protocol is used?
(UDP 2M)
- UDP is user datagram protocol.
- It is connectionless protocol because data is sent without establishing a connection between sender and receiver before sending the data.
- UDP is unreliable because data is delivered without acknowledgement.
- UDP does not perform Auto retransmission.
- UDP does not use flow control.
- UDP has high transmission speed

Q.2. Attempt any FOUR: 12
a) State any three points of difference between online UPS and off-line UPS.
(Any three points 3M)

Sr. No	On-line UPS	Off-line UPS
1.	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.
2.	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
3.	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.
4.	In this type of UPS isolation from mains is available.	In this type UPS isolation from mains is not available.
5.	In this type of UPS frequency stability is not available on the mains power.	In this type of UPS frequency stability is always available.

b) What do you meant by POST? Give solution for the following error indication

    i.   **No beep**
    ii.   **Continuous beep**
        (POST 1M, for each error 1M)

The PC has built – in test programs which do their jobs as soon as the PC is powered on. This Power On Self Test (POST) firmware is stored in ROM on the motherboard. This ROM occupies the place (address) from where the microprocessor starts instruction processing, after a power on reset or hardware manual reset.

    i.   **No beep:** Checking of power supply system board, or disconnected speaker.

    ii.   **Continuous beep:** Checking of power supply system board, key board.

c) **Explain working principle of LCD monitor.**

    (Block diagram – 1 m; working – 2m)(Any one diagram can be drawn)
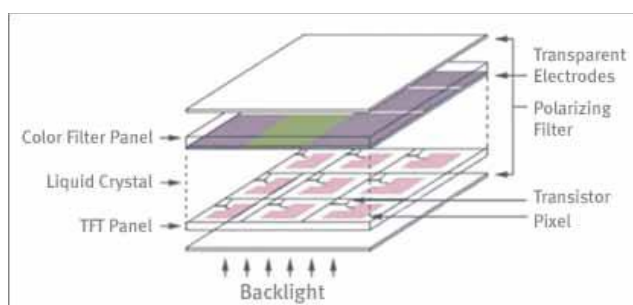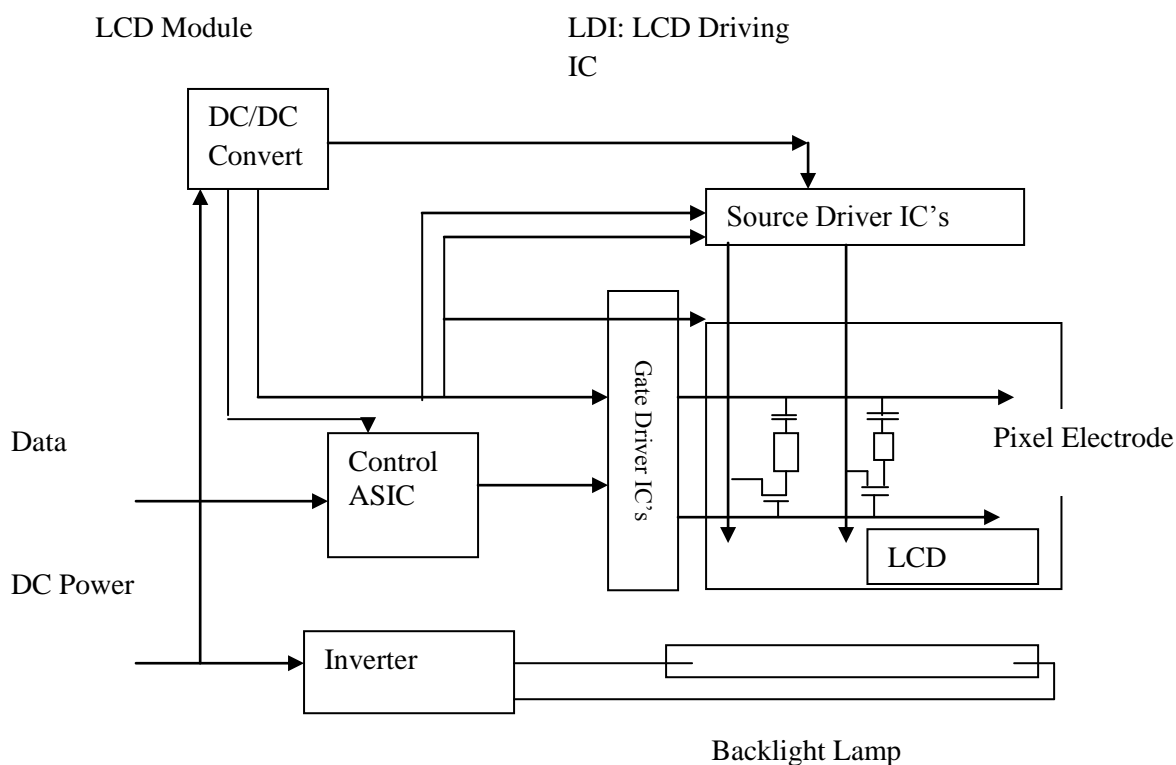
Backlight Lamp

Backlight: The amount of light supplied by Back Light is determined by the amount of movement of the liquid crystals in such a way as to generate color.

Driving Circuit Unit

Driving an a-Si TFT LCD (Thin Film Transistor Liquid Crystal Display) requires a driving circuit unit consisting of a set of LCD driving IC (LDI) chips and printed-circuit-boards (PCBs).

LCD Panel:

A TFT LCD panel contains a specific number of unit pixels often called subpixels.

Each unit pixel has a TFT, a pixel electrode (IT0), and a storage capacitor (Cs).

Generation of colors:

The color filter of a TFT LCD TV consists of three primary colors - red (R), green (G), and blue (B) - which are included on the color-filter substrate.

The elements of this color filter line up one-to-one with the unit pixels on the TFT-array substrate.

Each pixel in a color LCD is subdivided into three subpixels, where one set of RGB subpixels is equal to one pixel.

d) **List important features of routers used in computer network.**
   (List 1M, Explanation 1M each type)
   Router: Router is a device that connects two or more networks. It consists of a combination of hardware and software.
   Types of Router 1) Static 2) Dynamic
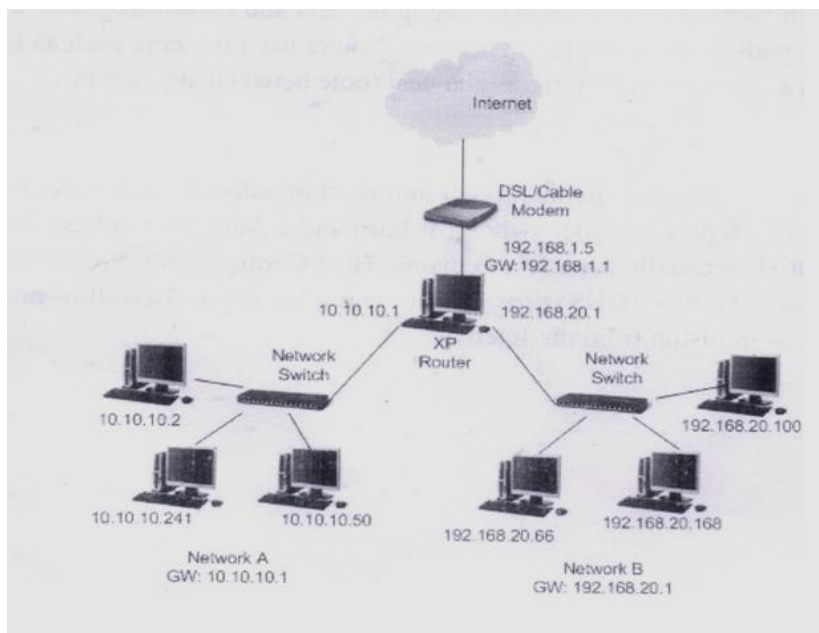
   1) A router is a specialized computer connected to more than one n/w
   2) Router operate at the n/w layer
   3) The primary function of a router is to connect n/w together & keep layer 2 broadcast traffic under control.
   4) A router is typical connected to at least two n/w commonly two LAN OR WAN or LAN and its ISP s n/w or more n/w connects.
   5) Routers are located at gateways, the places where two or more n/w connect.
      Two types of Router

1)Static Router:
- This router is hard coded in the routing table The administrative has to configure & setup all router manually.
- Static routing is the process of predefining router paths across data n/w & can be used to conserve LAN & WAN bandwidth.

2) Dynamic Router:
- Only the 1st Route has to be manually configured after that additional route are automatically discovered.
- The route is decided by the router on the basis of traffic & cost.
- They use specialize protocols to exchange information.

e) List any six important features of DDR 3.
(Any six, ½ M each)

Features of DDR 3
- DDR SDRAM or Double Data Rate three Synchronous Dynamic Random Access Memory is a random access memory technology used for high speed storage of the working data of a computer or other digital electronic devices.
- Its primary benefit is the ability to run its I/O bus at four times the speed of the memory cells it contains, thus enabling faster bus speed and higher peak throughputs than earlier technologies.
- Also the DDR3 standard allows for chip capacities of 512 MB to 8 GB, effectively enabling memory modules of maximum 16 gibibytes in size.
- Higher bandwidth performance increase (up to effective 1600 MHz)
- Enhanced low power feature
- Improve thermal design (cooler).

f) Explain what you understand by data encapsulation.
(This question should be data Encapsulation) (Data Encapsulation in sending and receiving machine optional. If a candidate has attempted it, due marks should be given)
(1M diagram, 2 M Explanation)
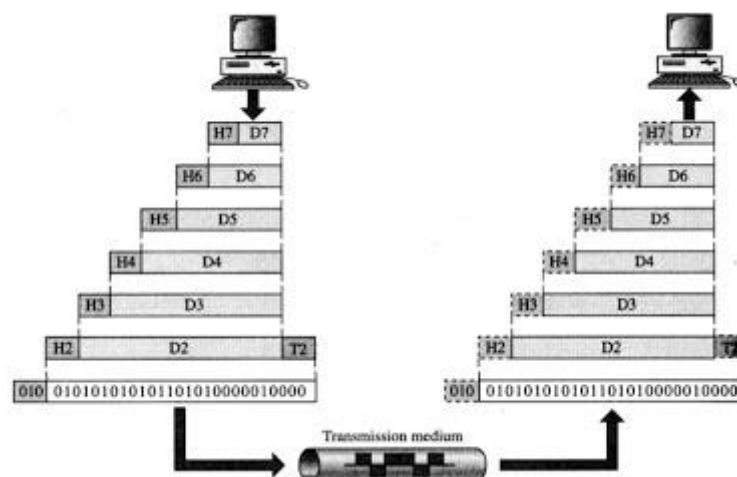
Each layer in the layered architecture provides service to the layers which are directly above and below it. The outgoing information will travel down through the layers to the lowest

layer. While moving down on the source machine, it acquires all the control information which is required to reach the destination machine. The control information is in the form of headers and footers which surrounds the data received from the layer above. This process of adding headers and footers to the data is called as data encapsulation. The headers and footers contain control information in the individual fields. it is used to make message packet reach the destination. The headers and footers form the envelope which carries the message to the desired destination.
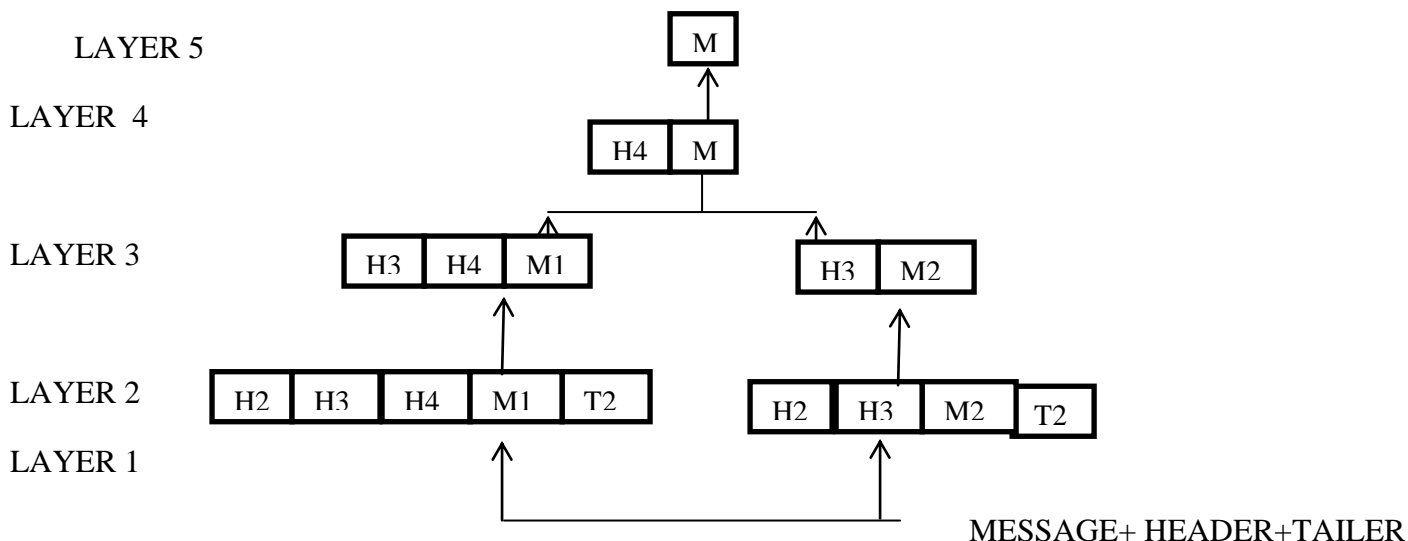
Eg:

DATA ENCAPSULATION IN SENDING MACHINE
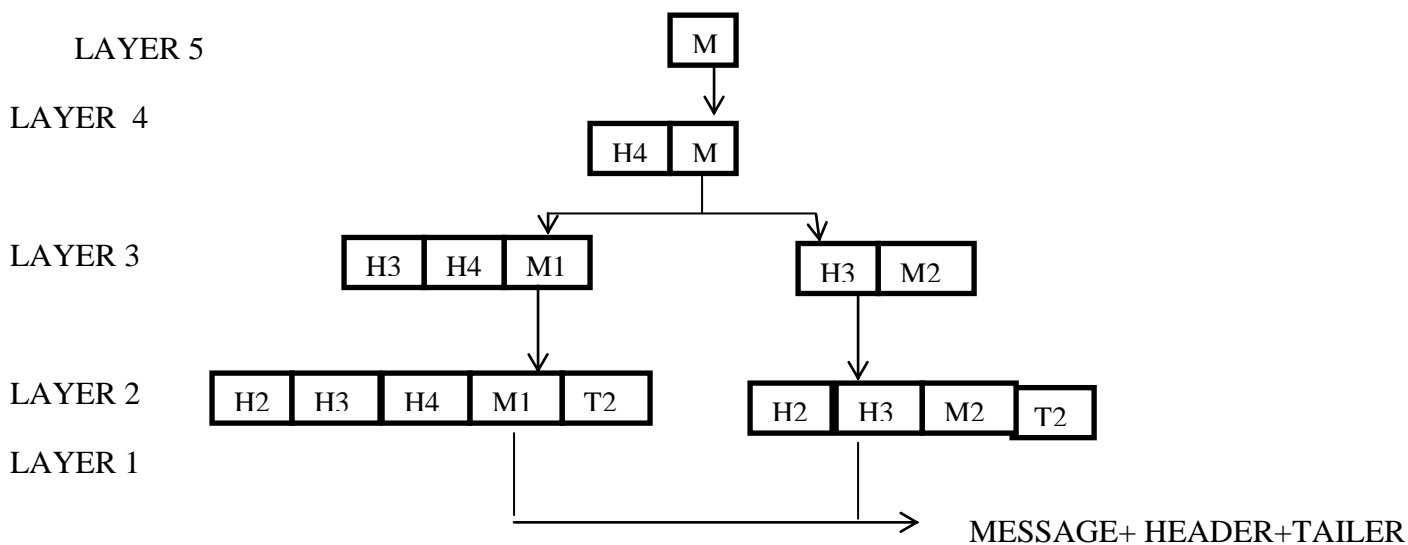
H4 = LAYER 4 HEADER
H3 = LAYER 3 HEADER
H2 = LAYER 2 HEADER
T2 = LAYER 2 TAILER

REVERSE PROCESS AT THE DESTINATION MACHINE

H4 = LAYER 4 HEADER
H3 = LAYER 3 HEADER
H2 = LAYER 2 HEADER,T2 = LAYER 2 TAILER

The figure shows the example of five layer stack for data encapsulation. The fifth layer of sending machine wants to send a message M to the fifth layer of destination machine. The message M is produced by layer 5 of machine 1 and given to layer 4 for transmission. Layer 4 adds header H4 in front of the message and pass it to layer 3. Layer 3 breaks up the incoming message into small units as M1 and M2 and pass these packets to layer 2. Layer 2 adds the header as well as footer to each packet obtained from layer 3 and pass it to layer 1 for physical transmission.

Q.3.   **Attempt any Four:**   **12**
     a) **Draw the architecture of Intel 945G chipset.**
       (Diagram 3M)
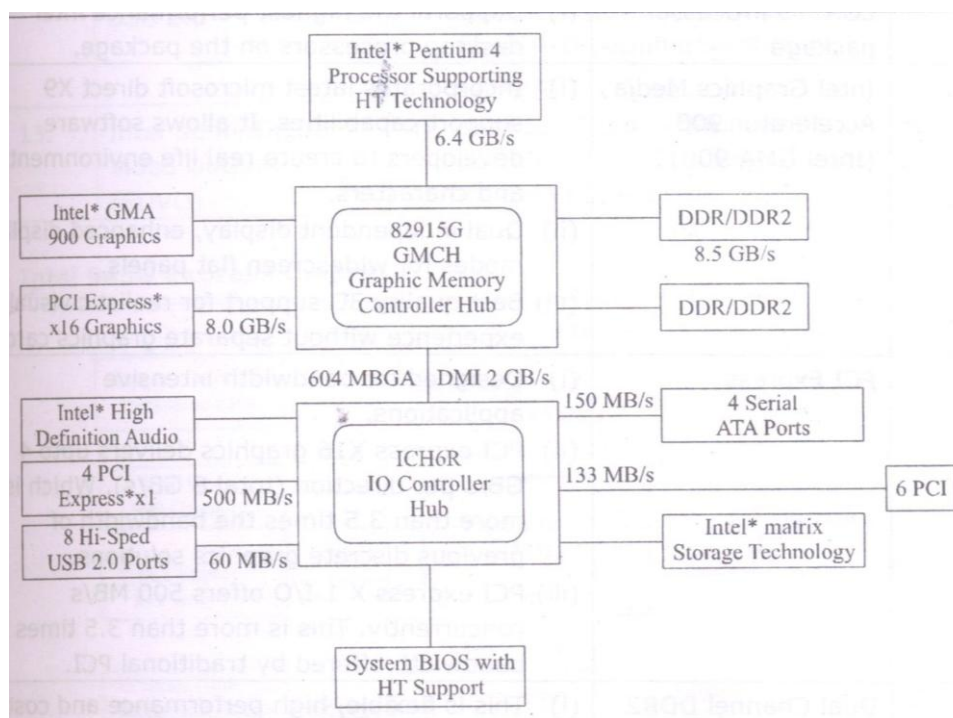
     b) **Give function of each layer of OSI reference model.**
       (Brief Description of each layer 3M)

- OSI model (open system interconnection) model was developed by ISO (international standard organization)
- **Function of OSI model:**
  - i. It provides way to understand how internetwork operates.
  - ii. It gives guideline for creating network standard.
- OSI model has 7 layers as shown in the figure.

Application Layer
Presentation Layer
Session Layer
Transport Layer

| Network Layer |
| Data link Layer |
| Physical Layer |

OSI model has following 7 layers as Physical layer, data link layer, Network layer, Transport layer, session layer, presentation layer, application layer.

1. **Physical layer:** It co-ordinates the functions required to transmit bit stream over physical medium. It deals with mechanical and electrical specifications of interface and transmission medium. For transmission it defines procedures and functions that devices and transmission medium has to perform
   - Physical characteristics of interfaces and media.
   - Representation of bits: Data rate (transmission rate).
   - Synchronization of bits.
   - Line configuration: Point to point or multipoint configuration should be used.

2. **Data link layer:** It is responsible for transmitting group of bits between the adjacent nodes. The group of bits is called as frame. The network layer passes a data unit to the data link layer. Header and trailer is added to the data unit by data link layer. This data unit is passed to the physical layer. Data link layer is responsible for moving frames from one node to the next.
   Functions of data link layer are:
   1) Framing
   2) Physical addressing
   3) Flow control
   4) Error control
   5) Media access control
   6) Node to node delivery

3. **Network layer: It is responsible for routing the packets within the subnet i.e. from source** to destination. It is responsible for source e to destination delivery of individual packets across multiple networks. It ensures that packet is delivered from point of origin to destination.
   Functions of network layer:
   1) Logical addressing
   2) Routing.
   3) Congestion control
   4) Accounting and billing
   5) Address transformation
   6) Source host to destination host error free delivery of packet.

4. **Transport layer:** Responsibility of process to process delivery of message Ensure that whole message arrives in order.
   Functions of Transport layer:
   1) Service point addressing
   2) Segmentation and reassembly
   3) Connection control
   4) Flow control: Flow control is performed end to end 5) Error control

5. **Session layer:** Establishes, maintains, and synchronizes the interaction among communication systems It is responsible for dialog control and synchronization.
   Functions of Session layer:
   1) Dialog control
   2) Synchronization, session and sub session
   3) Session closure

6. **Presentation layer:** It is concerned with syntax, semantics of information exchanged between the two systems.
   **Functions of Presentation layer:**
   - Translation: presentation layer is responsible for converting various formats into required format of the recipient
   - Encryption: Data encryption and decryption is done by presentation layer for security.
   - Compression and Decompression: data to be transform compressed while sending and decompress while receiving for reducing time of transmission.

7. **Application layer:** It enables user to access the network. It provides user interfaces and support for services like email, remote file access.
   Functions of Application layer:
   - Network virtual terminal
   - file transfer access and management
   - mail services and directory services

   c) **Draw and explain the block diagram of SMPS.**
      (Diagram 1M, Explanation 2M)
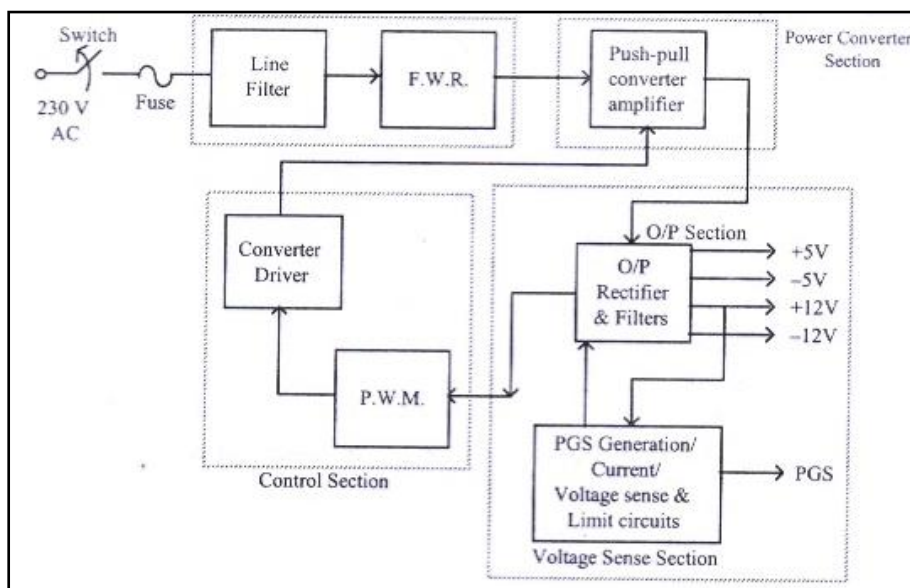
SMPS used in a PC has five sections
AC input section
- Receives unregulated input AC supply from mains. This signal is filtered using line filter and given to full wave rectifier for rectification. The fuse protects the SMPS from over current draining.

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, -!2V) 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.

d) **Explain the different classes of IP addressing.**
   (Explanation Class 3 M)
   Class A Addressing:
   1. First byte specifies the network portion.
   2. Remaining bytes specify the host portion.
   3. The highest order bit of the network byte is always 0.
   4. Network values of 0 and 127 are reserved there are 126 class A networks.
   5. There are more than 16 million host values for each class A network.

   Class B Addressing
   1. The first two byte specifies the network portion.
   2. The last two bytes specify the host portion.
   3. The highest order bit 6 and 7 of the network portion are 10.
   4. There are more than 16 thousand class B network.
   5. There are 65 thousand nodes in each class B network.

   Class C Addressing
   1. The first Three byte specifies the network portion.
   2. The last bytes specify the host portion.
   3. The highest order bit 5, 6 and 7 of the network portion are 110.
   4. There are more than 2 million class C network.
   5. There are 254 nodes in each class C network.

   Class D Addressing
   1. Class D address defines a group ID and used for multicasting
   2. Internet authorities have designated some multicast address to specific groups.

   Class E Addressing:
   Fig show address format of class E addressing. This format begins with 1110 that show a it is reversed for the future use.

net-id——Network number   host-id——Host number
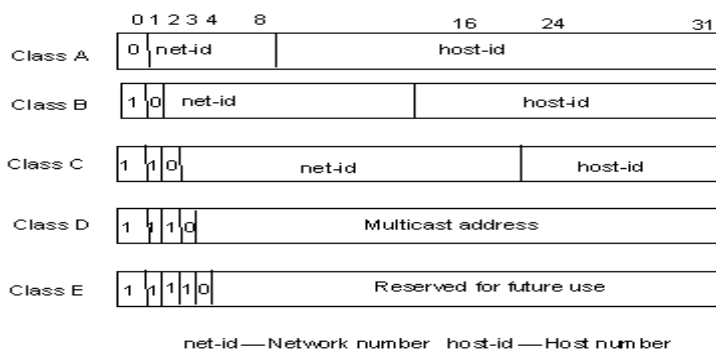
e) Explain how preventive maintenance of Laser printer is performed. (3M)
Since printer is partly mechanical, it requires more maintenance.
1. Clean the exterior of printer using soft cloth with mild organic solvent.
2. Do not place printer near heat generating machines such as heater and furnaces.
3. Periodically, clean out dust, paper fragments and dirt from its mechanism using soft brush.
4. Check that the paper feed path is free of obstruction and clean paper feed path, platen and ribbon path with soft cloth
5. Check an clean the print head and ink cartridge.
6. Denatured alcohol can be used for cleaning the inner parts such as stepper motor, printer head etc.
7. Test for the satisfactory print quality.
8. The mechanics of different printers vary with their types. So consult their manual for their PM.

f) What is network topology? List their types with meaning.
(Any Three with explanation 1M each)
The topology of a network is the geometric representation of the relationship of all the links and linking devices (usually called nodes) to one another.
List:
1. Mesh topology
2. Bus topology
3. Star Topology
4. Ring topology
5. Tree Topology
6. Hybrid Topology

1. **Mesh Topology:** in a mesh network topology, each of the network node, computer and other devices, are interconnected with one another.

2. **Bus Topology:** In networking a topology that allows all network nodes to receive the same message through the network cable at the same time is called bus topology.

3. **Star Topology: unlike** bus topology, where nodes are connected to central cable, here all the hosts or workstations are connected to central device called hub or connector with a point-to-point connection.

4. **Ring Topology:** A network topology that is setup in circular fashion. In other words all nodes in ring topology are connected in ring structure.

5. **Tree Topology:** as its names implies in this topology devices make a tree structure. It is also called expanded star topology.

6. **Hybrid Topology:** a combination of two or more different topologies makes for a hybrid topology.

Q.4.   **Attempt any Four:**   **12**
   a) **Explain the recording process of CDROM drive.**

(Diagram 1M, Explanation 2M)
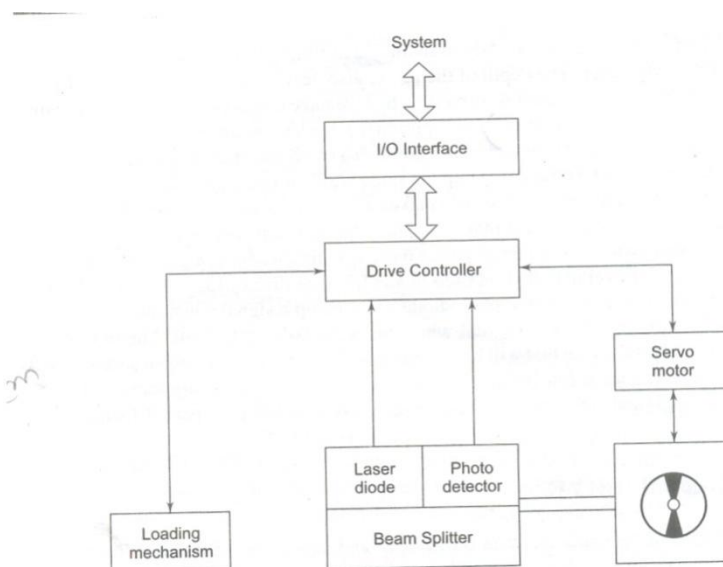
The CD-ROM drive reads the data on the CD and sends the information to the interface connector (expansion board) attached to the computer motherboard. The information then travels to the CPU for processing to make video, text or sound.

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 exits, 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.

b) **Define the following power problems.**
     i.   **Blackout**
     ii.   **Surge**
     iii.   **Spike**
         (Definition 1M each)
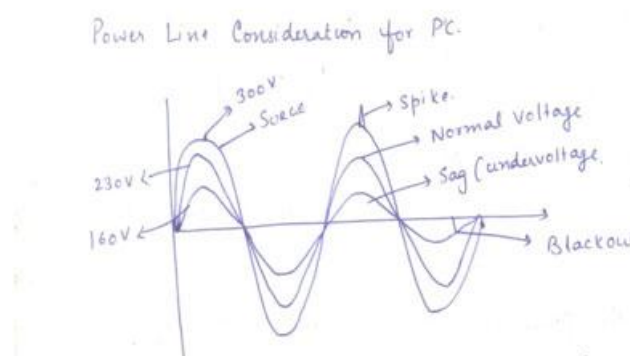
     i.   **Blackout:** It is the complete loss of electrical power where voltage and current drop to a very low value (typically zero). They are caused due to physical interruption in the local network.
     ii.   **Surges:** They are small over voltage conditions that take place over relatively long periods of few milliseconds.
     iii.   **Spikes:** It is a large over voltage condition that occurs over short duration of few microseconds.

c) **Explain how preventive maintenance of CD ROM drive is carried out.**
     (Three points, 1M each)

     1. Cleaning of the head: use head cleaning diskettes for purposes.
     2. Disk drive heads can also be manually cleaned using alcohol and foam swab rapped in a lint free material with immense care.
     3. Carry out disk speed test and adjustments by test programs.
     4. Disk drive alignment and tracking adjustment should be checked every year.
     5. Use a canned gas duster to dust off the interior of the drive.
     6. Use the silicon lubricant ion whatever items that need lubrication.

d) Explain the working principle of Firewall.
   (Diagram 1M explanation 2M)

1. A firewall is a part of computer system or network that is designed to block unauthorized access while permitting authorized communications.
2. It is a device or set of devices configured to permit, deny, encrypt, decrypt, or proxy all (in and out) computer traffic between different security domain based upon a set rules and other criteria.
3. Firewalls can be implemented in either hardware or software, or a combination of both. Firewalls are frequently used to prevent unauthorized internet users from accessing private networks connected to the internet, especially intranets.
4. All messages entering or leaving the intranet pass through the firewall, which examines each messages and block those that do not meet the specified security criteria.
5. A firewall blocks unauthorized connections being made to your computer or LAN,, normal data is allowed through the firewall but all other data is blocked.

   There are several types of firewall techniques:
   i.   Packet filter
   ii.   Proxy server
   iii.   Circuit-level Gateway
   iv.   Application Gateway
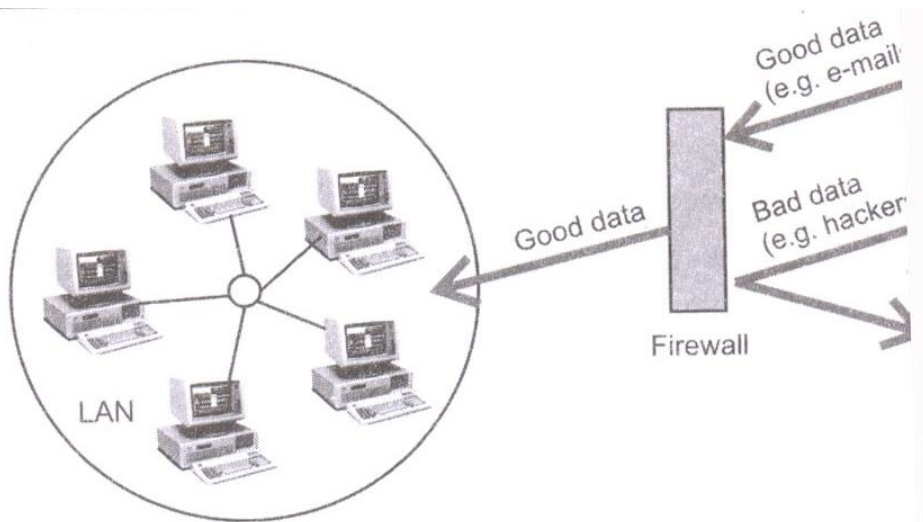
Summer – 15 EXAMINATION

e) Give function of the following TCP/IP protocols.
- **i. ARP**
- **ii. FTP**
  - **(Each for 1 ½ M)**

    i. ARP

<u>**ARP:(Address resolution protocol)**</u>
- Networking H/W demands that a datagram contain the physical address of the intended recipient.
- If problem Address Resolution protocol (ARP) was developed.
- ARP takes the IP address of a host as input & gives its corresponding physical address as the output.
- As if doesn't know who must be having address if sends the broadcast message to all the computer on the network.
- The computer whose IP address matches the broadcast IP address sends a reply and along with if, its physical address to the broadcasting computer.
- All other computers lignose the broadcast message as IP address is different Now, when it is responding whose IP address gets match is aware of the sender.
- So it doesn't require sending broadcast message.
  As it knows sender hardware as well as IP address that the reason it uncast the reply so that senders only receive it.

    ii. FTP

- FTP is a stranded mechanism provided by the Internet for copying a file from one host to the other.
- Some of the problem in transferring files from one system to the other are as follows:
- ➢ Two systems may use different file name conventions.
- ➢ Two systems may represent text data in different types.
- ➢ The directory structure of the two systems may be different.
- FTP provides a simple solution to all these problems.
- FTP established two connections between the client and server. One is for data transfer and the other is for the control information.
- The fact that FTP separates control and data makes it very efficient.
- The control connection uses simple rules of communication. Only one line of command or a line of response is transferred at a time.
- But the data connection uses more complex rules due to the variety of data types being transferred.
- FTP uses port 21 for the control connection and port 20 for the data connection.

f) Explain importance characteristics of fiber optic cable.
(Any 3 points 3M)

1. Fiber optic cabling can provide extremely high bandwidths in the range from 100 mbps to 2 gigabits because light has a much higher frequency than electricity.
2. The number of nodes which a fiber optic can support does not depend on its length but on the hub or hubs that connect cables together.
3. Fiber optic cable has much lower attenuation and can carry signal to longer distances without using amplifiers and repeaters in between.
4. Fiber optic cable is not attached by EMI effects and can be used in area where high voltages are passing by.
5. The cost of fiber optic cable is more compared to twisted pair and co-axial.
6. The installation of fiber optic cables is difficult and tedious.