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

WINTER – 13 EXAMINATION

Subject Code: 12110   **Model Answer**   Subject Name: Computer Networks

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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 judgment 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.

1. **A) Attempt <u>any six</u> of the following:**   **Marks 12**

    a) List any two advantages of Computer Network.

    (Any two Advantages- 1 Mark each)

Ans:

     1)   Resource Sharing

     2)   Reducing cost

     3)   High Reliability

     4)   Improved security

     5)   Centralized management.

     6)   E-mail

     7)   Flexible access.

    b) Draw and define wide area network.

    (Diagram-1 Mark, Define-1Mark)

Ans: **WAN:** Network that Connects users across large distances, often crossing the geographical boundaries of cities or states is called as WAN.

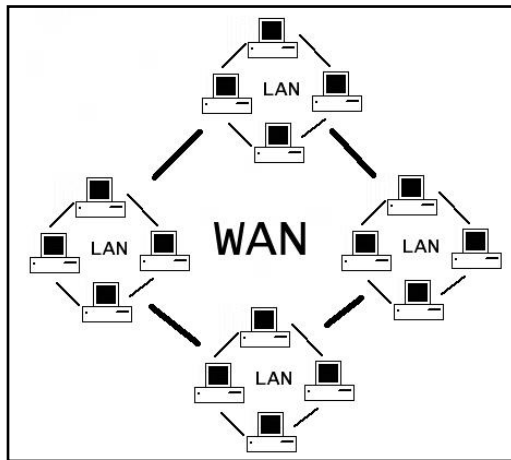   WAN is a network that spans large geographical area.

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Fig: **Wide Area Network**

c) Differentiate between Peer to Peer and server based network.
(Any Two points- 1 Mark each)

Ans:

Peer to Peer Networks	Server based Networks
1. Each PC is an equal participant on the Network	1. One PC act as a Network Controller
2. Network Access and Security are not Centrally Controlled	2. Network Access and Security are Centrally Controlled
3. Less Expensive	3. More Expensive
4. Can Operate on a Workstation Operating System	4. Need a Network Operating system
5. Central administration not required.	5. Central administration required

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d) What is Hub? Give types of Hub.
(Definition of hub-1 Mark, List types of hubs- 1 Mark)

Ans: Hub is amplifying & splitting device. Hub contains multiple ports & is a common connection to rest of ports so that it can be sent to all other nodes in the network.

Types of Hub:-

1) Active Hub
2) Passive Hub
3) Intelligent Hub

e) State any two advantages of Co-axial Cable.

(Any two Advantages- 1 Mark each)

Ans:

1. Lower attenuation than twisted pair.
2. Low Cost due to less total footage of cable.
3. Cheaper to design.
4. Noise immunity due to low error rate
5. Good Immunity to EMI/RFI.
6. High Bandwidth

f)   Define protocol.
(Any one Definition-2 Marks)

Ans: Protocol: - It is set of rules and conventions .Sender and receiver in data communication must agree on common set of rules before they can communicate with each other.

   OR

Protocol is a system of digital message formats and rules for exchanging those messages in or between computing systems.

Protocol defines.

a)   Syntax (what is to be communicated)
b)   Semantics (how is it to be communicated
c)   Timing (When it should be communicated)

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g) Enlist any four problems with SLIP protocol.

(Any four problems ½ Mark for each problem)

Ans: It only supports Internet Protocol (IP).

      i)   It does not allow to the IP address to be assigned dynamically.

      ii)   Lack of Security because it does not allow authentication.

      iii) No Control Messaging.

      iv) It does not provide error detection.

      v)   It does not provide Type identification.

      vi) It does not compress any packet data.

h) What is PPP?

(Explanation-2 Marks)

Ans: PPP means *Point to Point Protocol*. It is a much more developed protocol than SLIP (which is why it is replacing it), insofar as it transfers additional data, better suited to data transmission over the Internet (the addition of data in a frame is mainly due to the increase in bandwidth).

In reality, PPP is a collection of three protocols:

- a datagram encapsulation protocol
- an **LCP**, Link Control Protocol, enabling testing and communication configuration
- a collection of **NCP**s, Network Control Protocols allowing integration control of PPP within the protocols of the upper layers

Data encapsulated in a PPP frame is called a *packet*. These packets are generally datagrams, but can also be different (hence the specific designation of *packet* instead of datagram). So, one field of the frame is reserved for the type of protocol to which the packet belongs. A PPP frame looks like this:

Data to be transmitted	Padding data

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B) Attempt <u>any two</u> of the following: **Marks 8**

a) State and explain in brief at which layer the following protocol works?

   i. **ICMP**
  ii. **ARP**
 iii. **IP**
 iv. **SMTP**
(1 Mark each point)

Ans:

1) <u>ICMP : Network layer</u>

ICMP allows IP to inform a sender if a datagram is undeliverable. A datagram travels from router to router until it reaches one that can deliver it to its final destination.

2) <u>ARP : Network layer</u>

ARP converts an Internet Protocol (IP) address to its corresponding physical network address. ARP is a low-level protocol that operates at Network Layer of the OSI model.

3) <u>IP : Network layer</u>

Network Layer is responsible for communicating two different devices, and IP is used to define source address and destination address.

4) <u>SMTP : Application layer</u>

SMTP was developed to send E-mail message across internet. It utilizes TCP as the transport protocol to transmit mail to a destination mail exchanger.

b) Describe horizontal and vertical communication.

(Horizontal Comm.-2 Marks, Vertical Comm.- 2 Marks)

Ans: **Horizontal communications**

- The horizontal communication between the different layers is logical, there is no direct communication between them. Information included in each protocol header by the transmitting system is message that will be carried to the same protocol in the destination system.

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- For two computers to communicate over a network, the protocols used at each layer of the OSI model in the transmitting system must be duplicated at the receiving system.

- The packet travels up through the protocol stack and each successive header is stripped off by the appropriate protocol and processed.

- When the packet arrives as it destination, the process by which the headers are applied at the source is respected in reverse.

- The protocol operating at the various layers communicate horizontally with their counterparts in the other system, as shown in below fig.
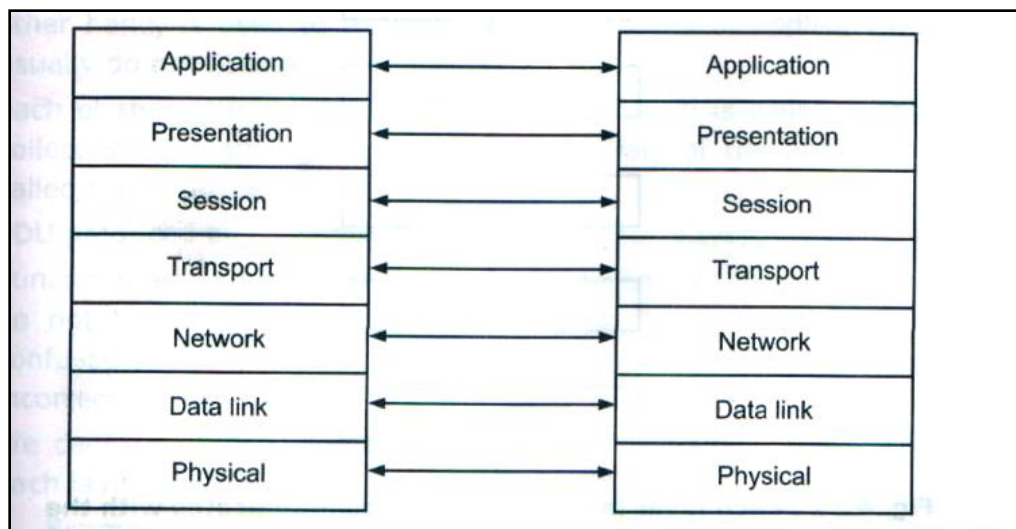

Fig: **Horizontal communications**

Vertical Communications

- In addition to communicating horizontally with the same protocol in the other system, the header information also enables each layers to communicate with the layer above and below it.

- The headers applied by the different protocols implemented the specific functions carried out by those protocols.

- For Example: When a system receives a packets and passes it up through the protocol stack, the data link layer protocol header includes afield that identifies which network-layer protocol the system should use to process the packet.

- Network –layer protocol header in tern specifies one of the transport-layer protocol and the transport-layer protocol identifies the application for which the data is ultimately destined.

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- Vertical communication makes it possible for a computer to support multiple protocol at each of the layers simultaneously.

Fig: **Vertical communications**
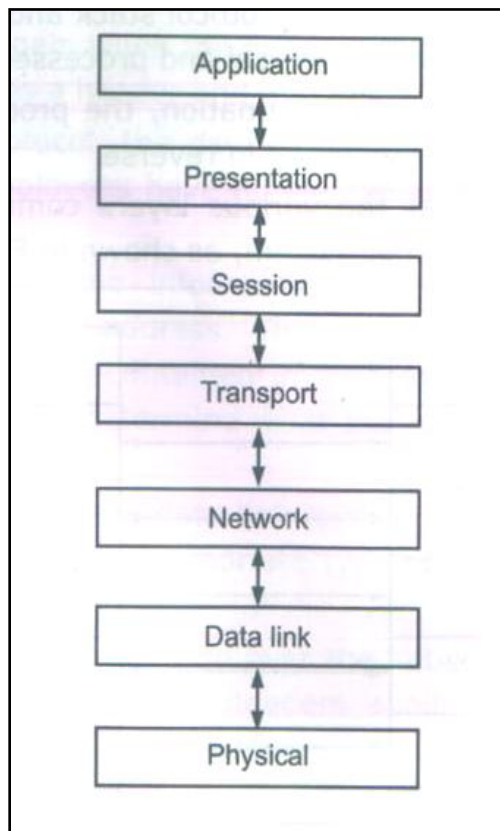
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c) Compare IPV6 and IPV4   protocol (4 points).

(Any four points-1 Mark each)

 Ans: Comparison of IPv4 and IPv6

IPv4	IPv6
Source and destination addresses are 32 bits (4 bytes) in length.	Source and destination addresses are 128 bits (16 bytes) in length. For more information.
Uses broadcast addresses to send traffic to all nodes on a subnet.	There are no IPv6 broadcast addresses. Instead, multicast scoped addresses are used.
Fragmentation is supported at originating hosts and intermediate routers.	Fragmentation is not supported at routers. It is only supported at the originating host.
IP header includes a checksum.	IP header does not include a checksum.
IP header includes options.	All optional data is moved to IPv6 extension headers.
IPSec support is optional.	IPSec support is required in a full IPv6 implementation.
No identification of payload for **QOS** handling by routers is present within the IPv4 header.	Payload identification for **QOS** handling by routers is included in the IPv6 header using the Flow Label field..
Addresses must be configured either manually or through DHCP.	Addresses can be automatically assigned using stateless address auto configuration, assigned using DHCPv6, or manually configured.
Uses host address (**A**) resource records in the Domain Name System (DNS) to map host names to IPv4 addresses.	Uses host address (**AAAA**) resource records in the Domain Name System (DNS) to map host names to IPv6 addresses.

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2.   A) Attempt <u>any three</u> of the following: Marks 12

   i)   Describe any 4 services provided by the network to people.
       (Any Four services- 1 Mark each)

Ans:

   1. **File sharing: -**files can be centrally stored and used by multiple users. Shared directory or disk drive is used. If many users access same file on network and make changes at same time and conflict occurs. Network operating system performs file sharing and provides security to share files.

   2. **Printer sharing:** Printer connected in a network can be shared in many ways . Use printer queues on server. Here printer is connected to server. Each work station can access printer directly. Printer can be connected to server. Connect a printer to a computer in a network and run special print server software. Use built in print server. Use dedicated print server. By printer sharing reduces no. of printers needed. Share costly and high quality printers.

   3. **Application services:** Share application on a network. When applications are centralized, amount of memory required on disk of work station is reduced. It is easier to administer an application. It is more secure and reliable. It is faster and convenient.

   4. **E-mail services.** Two types of email systems are available:

      1) File based system: Files are stored in shared location on server. Server provides access to file. Gate way server connects from file based email system to internet.

      2) Client server e-mail system: E-mail server contains message and handles e-mail interconnections. E-mail client functions (also consider other e-mail functions): read mail, send, compose, forward, delete.

      E-mail protocols: SMTP, POP etc**.**

   5. **Remote access**: Set up remote access service on network operating system. Setup VPN (virtual private network) on internet terminal services (TELNET).

   User can access files from remote location.

   User can access centralized application or share files on LAN**.**

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ii) Differentiate LAN and WAN by considering following points.

1) **Geographical area**

2) **Installation cost**

3) **Bandwidth**

4) **Speed.**

(Each point-1 Mark)

Ans:

Points	LAN	WAN
1) **Geographical area**	Limited Geographical area of few kilo meters	It covers a large area, it can operate Worldwide
2) **Installation Cost**	Less	High
3) **Bandwidth**	High	Low
4) **Speed**	High	Slow

iii) Describe Subnet Mask with example.
(Description: 2 Marks, Example: 2 Marks)

Ans: Subnet mask is a netmask with the only real difference being that we are breaking a larger organizational network into smaller parts, and each smaller section will use different set of address numbers.

The subnet mask is a 32-bit value that usually expressed in the same dotted-decimal notation used by IP addresses. The purpose of the subnet mask is to let IP separate the network ID from the full IP address and thus determine whether source and destination are on the same network. It is the combination of Net-ID and Host-ID.

Default Subnet Mask: Net-ID+ Host-id

      Class A: 255.0.0.0

      Class B: 255.255.0.0

      Class C: 255.255.255.0

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For example:

Given site address: 201.70.64.0.

| 201 | 70 | 64 | 0 |

11001001	01000110	01000000	00000000

It is class C IP address: 201.70.64.0

IP Address:	11001001	01000110	01000000	00000000
Subnet Mask for class C:	11111111	11111111	11111111	00000000

Anding:	11001001	01000110	01000000	00000000

NET-ID   HOST-ID

iv) Describe the situation where MAN is Useful for an Organisation? Give one example.
(Situation - 2 Marks, Example-2 Marks)

Ans: **Metropolitan Area Network** is a computer network that spans across a wide populated area such as campus, town or city, generally interconnecting Local Area Networks. A MAN can provide uplink services to the Internet (or to a separate WAN).

Situation: A chain of community college could be linked by MAN. A single campus might use a LAN, but the entire academic institution would require a MAN to track activities conducting in colleges and student progress across different classrooms and majors.

Example:

CATV system: CATV system that provides Internet and television services. The network could be size of an entire town, connecting homes and business via cable. Those homes and businesses would contain small to large (relative) local area networks (wired or wireless) that are connected by equipment to the WAN, which in turn provides an uplink to the Internet.

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B) Attempt <u>any one</u> of the following: Marks 4

a) For the following situation state which type of network architecture is appropriate?

     i)   Number of user 50 or more

     ii)   Data and resources need to restricted

     iii)   No network administrator required

     iv)   All users with equal priority.

    (Each point-1 Mark)

Ans: **i.** Number of users 50 or more- <u>Client-Server Architecture</u>

     ii. Data and Resources need to restrict- <u>Client-Server Architecture</u>

     iii. No administrator required- <u>Peer to peer Architecture</u>

     iv. All users with equal Priority- <u>Peer to peer Architecture</u>

b) Draw client server network configuration. Name the operating system used in this model. Comment on level and effort of administration and training required for client – server network.

   (Diagram-1 Mark, Network OS-1 Mark, Level of administration and training: 2 Marks)
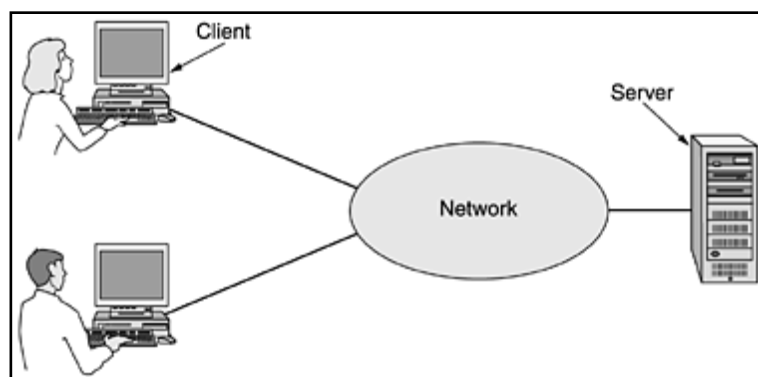
Ans:

Client Server Network:

Fig: Client Server Network

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Network Operating System for Server: Windows Server 2003 SP1, Windows Server 2008, Windows Server 2008 R2, Unix Server, Linux server etc.

Client Operating System:　　Windows XP, Vista, Windows 7, Ubuntu, Red-Hat etc.

Level of Administration:　Administrator must be highly qualified and Certified Professional.

Training : Client user must have proper training for handling network related activities such as authentication and security. Network administrator must be able to focus upon network components within the organisation. Network administrator must be able to deploy and design the network, and maintenance of computer hardware and software systems that make up a computer Network. In smaller organisations Network administrator may be technically involved in maintenance and administration of servers, desktop computers, printers, routers, firewalls as well as vast array of additional technologies.

Additional Responsibilities

1.　　　Network Monitoring.
2.　　　Testing the network weakness.
3.　　　Keeping an eye out for needed updates.
4.　　　Installing and implementing security programmes.
5.　　　Evaluating implementing Network management software.

3.　A)　Attempt <u>any one</u> of the following:　　　　　　　　　　　　　**Marks 4**

a)　The mesh topology is preferabaly used for very small network. State whether this statement is true or false with your justification.

　　(Stating True or false- 1 Marks, Justification- 3 Marks)

Ans:　　This statement is TRUE .

In case of mesh topology every computer is connected to every other computer in the network so to connect or add new node , this node has to be connected to all the other nodes in the network so it becomes too costly plus it goes on difficult or complicated if we are go on increasing number of nodes so it is specifically used for small network only

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in case of server connectivity through mesh connectivity it's not feasible & not worth to use for bigger network as leasing such a huge amount of cable it's costly so now a days mesh is replaced by FDDI.

b) State any two advantage of bus topology .Explain whether adding more computers in bus topology affects performance of network.

(Any two advantages-1 Mark each, Explanation for adding new node - 2 Marks)

Ans: Advantages of BUS topology:

1) Single shared bus so less costly

2) Simple to understand & simple to implement

3) Very much suitable for small network

Yes - Adding more computers in bus topology affects performance of Network.

As there is a single shared bus, so adding more computers in the network more the waiting period to transmit the data so it affects the performance of the network as the bus is used by using CSMA PROTOCOL.

Bus topology is designed for small network hence increase in computer reduces the performance of entire network.

B) Attempt any three of the following: **Marks 12**

a) State two advantages and two disadvantages of star topology.
(Any two advantages-1 Mark each, Any two disadvantages- 1 Mark each)

Ans: ADVANTAGES OF STAR TOPOLOGY:

1) All the computers are connected to server directly so they can communicate directly

When they are ready to communicate

2) Adding the new Node is very easy

3) Highly reliable topology so used in almost in all industry

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DISADVANTAGES OF STAR TOPOLOGY:

1) If Central device fails, entire networks fall down.

2) Cable cost is more compared to bus topology.

b) Identify the following devices operate in which of OSI reference model –repeater, bridges, switches, gateways.
   (Each point – 1 Mark)

Ans: Repeater   : Physical layer

   Bridge   : Data link layer

   Switch   : Data link layer

   Gateway   : All seven layers or upper 3 layers

c) Write distinguish between Hub and Switches.
   (Any four point- 1 Mark each)

Ans:

HUB	SWITCH
Not an intelligent device	It is an intelligent device
Broadcasting device	Uni casting device
Types of hubs are : active hub , passive hub	types of switches : cut through & store & forward switch
Creates unnecessarily network traffic to intended destination	avoid the unnecessary traffic just sending
Works at Physical layer of OSI model	Works at Data link layer of OSI model

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d) **Describe role of modem in Transmission.**

(Diagram -1 Mark, Explanation - 3 Marks)

Ans:
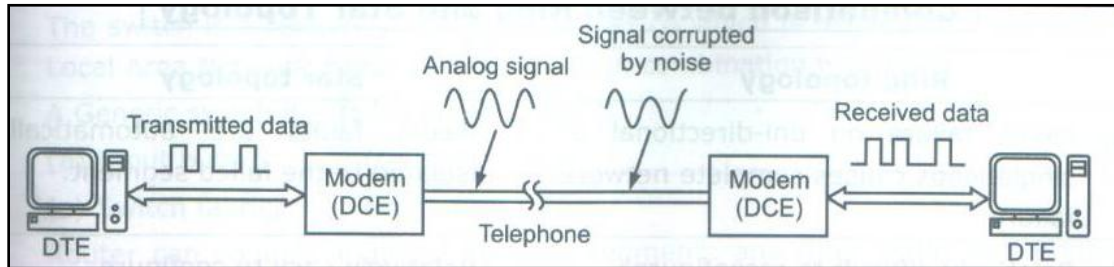
ROLE OF MODEM : MODEM works as modulator as well as demodulator. MODEM convers analog signal to digital signal and vice versa. In case of networking data has to be transferred from one location to another location. At present to transfer such a data whatever the infrastructure (PSTN) is available it is of analog tech. but computer sends digital data to transfer this data to another location it is needed to convert into analog format so that it can be transferred by using currently available infrastructure.

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4.   **Attempt <u>any two</u> of the following:**   **Marks 16**

a) **Compare twisted pair cable and fiber optic cable with (eight point).**

(Any eight points- 1 Mark each)

Ans:

PARAMERTER	TWISTED PAIR CABLE	FIBER OPTIC CABLE
Bandwidth.	less	More
Ease of installation	Very Easy	Very Difficult need a proper training
Technical expertise required to install and utilize	No	Yes
EMI	More	No
Attenuation characteristics	More	Negligible
Cost	Moderate	Costly
Reliability	Moderate	Highly reliable
Distance	Less in meters	Very high in kilometer
Speed	Moderate	Very high (may attain speed of light if silica material used)
Application	LAN (specifically for shorter distance)	LAN , MAN, WAN (specifically for longer distance)

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b) Draw a neat labled diagram showing the OSI reference model. Explain two functions of network layer and presentation layer.

(Labeled diagram -4 Marks, Any two function of n/w & presentation layer -1 Mark each)

Ans:
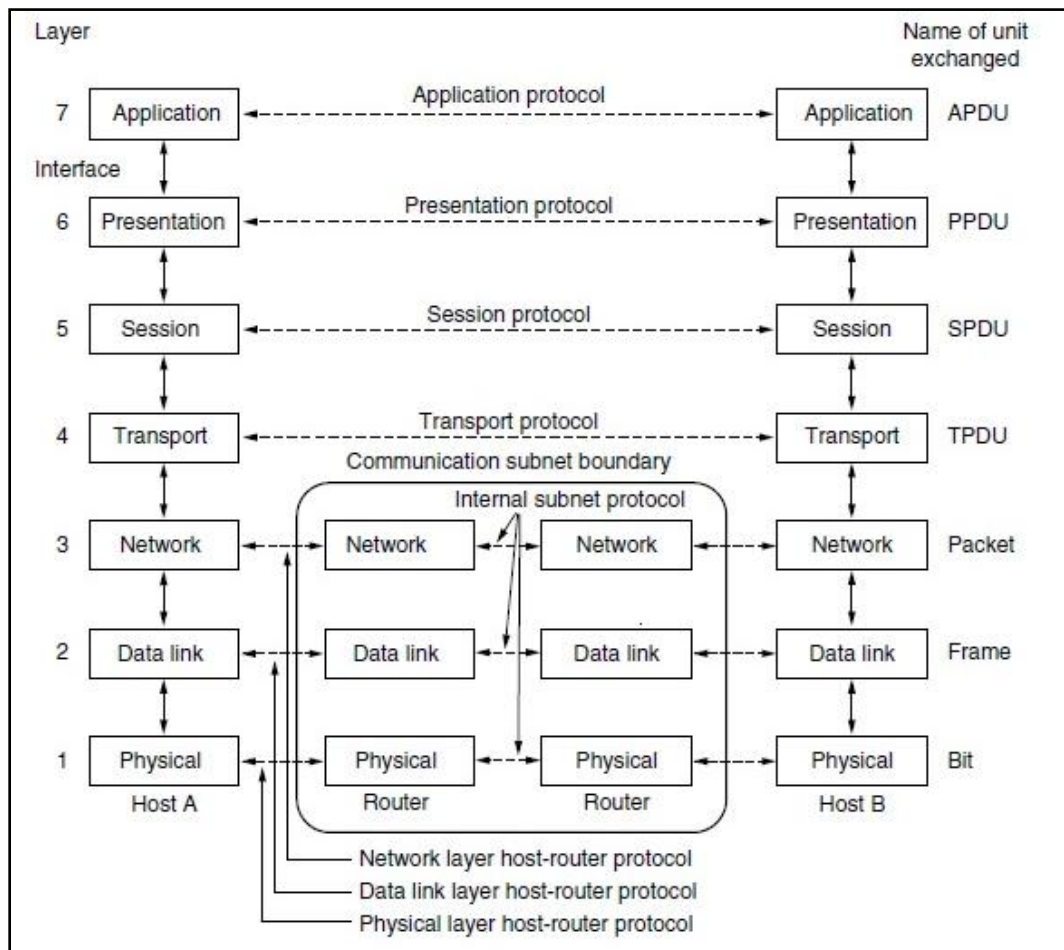
Function of network layer:

1) Addressing: source and destination address of a packet is stamped by network layer .

2) Routing: Packets are guided by the network layer to select appropriate path till destination.

Function of Presentation layer:

1) Translation: presentation layer is responsible for converting various formats into required format of the recipient.

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2) Encryption: Data encryption and decryption is done by presentation layer for security.

3) Compression and Decompression: data to be transform compressed while sending and decompress while receiving for reducing time of transmission.

c) **Describe router with neat and label diagram. State the situation under which router is necessary in the network.**

(Labeled diagram -2 Marks, Explanation -2 Marks, for stating situation and diagram -4 Marks)

Ans:
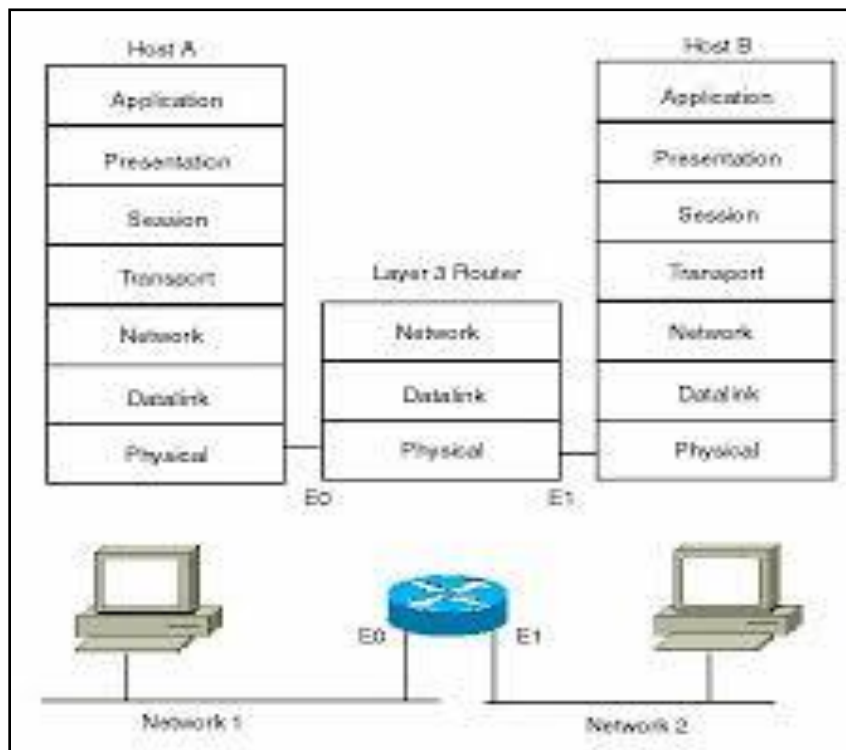
Router:

Router is an interconnectivity device used to interconnect more than one networks together it specifically works at network layer of OSI reference model called as layer 3 device.

Routers are of two types:

1. **Static routers**: A router with **manually configured** routing tables is known as a static router. A network administrator, with knowledge of the internetwork topology, manually builds and updates the routing table, programming all routes in the routing table.

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Static routers are **not fault tolerant**. The lifetime of a manually configured static route is infinite and, therefore, static routers do not sense and recover from downed routers or downed links.

2. **Dynamic routers**: A router with **dynamically configured** routing tables is known as a dynamic router. Dynamic routing consists of routing tables that are built and maintained automatically through an ongoing communication between routers. This communication is facilitated by a routing protocol, a series of periodic or on-demand messages containing routing information that is exchanged between routers. Except for their initial configuration, dynamic routers require little ongoing maintenance, and therefore can scale to larger internetworks.

Dynamic routing is **fault tolerant**.
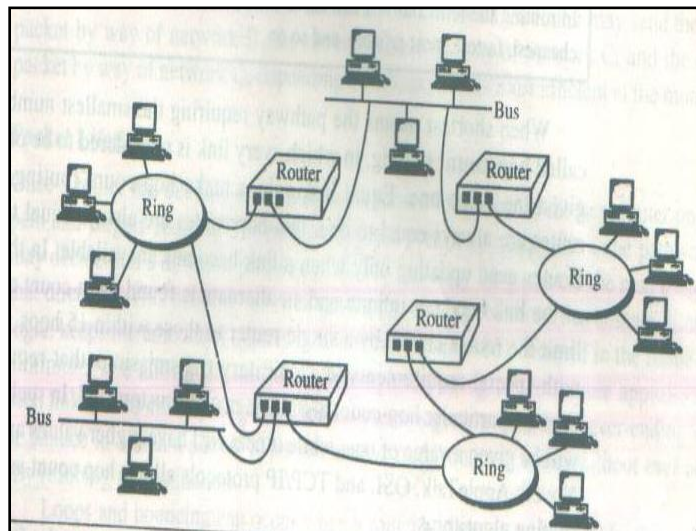
Following are the situations under which routers are necessary in the network:

- Efficiently direct packets from one network to another, reducing excessive traffic.
- Join neighboring or distant network.
- Connect dissimilar networks.
- Prevent network bottlenecks by isolating portions of a network.
- Secure portions of a network from intruders.
- The logic that routers use to determine how to forward data is called a routing algorithm.

Diagram give above show uses of router in a network.

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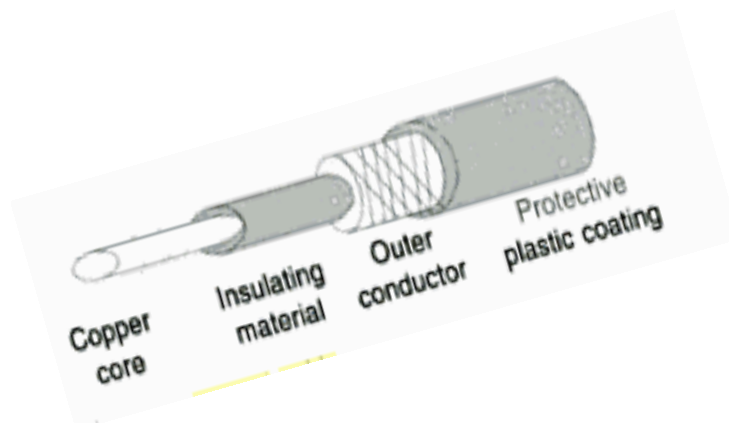
5.   Attempt <u>any four</u> of the following: Marks 16

   a) Describe the construction of co-axial cable with neat and labled diagram.
      (Diagram-2 Marks, Explanation- 2 Marks)

Ans:

Co-axial cable as inner central conductor surrounded by an insulating sheath which in turn is enclosed in a outer conductor (Shield). This acts not only as a second conductor for completing the circuit but also acts as shield against noise. Outer conductor is covered by Plastic covering .Co-axial cable is also called as coax and is more expensive than UTP, STP , less flexible and more difficult to install in building where number of twists and turns on needed. It is reliable & can carry higher data rates. Various categories of Co-axial cable are available dependent on thickness & size of shield, insulator and outer coating. Co-axial cable standards are RG(radio government) 59,RG 58,RG11,etc.

Categories of   coaxial cables:

Category	Impedance	Use
RG-59	75 Ω	Cable TV
RG-58	50 Ω	Thin Ethernet
RG-ll	50 Ω	Thick Ethernet

   b) Describe 4 advantages and 4 disadvantages of optical fiber.
      (Any four advantages- ½ Mark each, Any four disadvantages- ½ Mark each)

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Ans: **Advantages:**

1) **Higher bandwidth**: Fiber-optic cable can support dramatically higher bandwidths (and hence data rates) than either twisted-pair or coaxial cable. Currently, data rates and bandwidth utilization over fiber-optic cable are limited not by the medium but by the signal generation and reception technology available.

2) **Less signal attenuation**: Fiber-optic transmission distance is significantly greater than that of other guided media. A signal can run for 50 km without requiring regeneration. We need repeaters every 5 km for coaxial or twisted-pair cable.

3) **Immunity to electromagnetic interference**: Electromagnetic noise cannot affect fiber-optic cables.

4) **Resistance to corrosive materials**: Glass is more resistant to corrosive materials than copper.

5) **Light weight**: Fiber-optic cables are much lighter than copper cables.

6) **Greater immunity to tapping:** Fiber-optic cables are more immune to tapping than copper cables. Copper cables create antenna effects that can easily be tapped.

7) Easily available.

Disadvantages:

1) **Installation/maintenance expertise: Installation and maintains need expertise that is not yet available everywhere.**

2) **Unidirectional:** propagation of light is unidirectional.

3) **Cost:** fiber optic cable is more expensive

4) **Fragility**: glass fiber is more easily broken than wire, making it less useful for applications where h/w portability is required.

5) **Limited physical arc of the cable**: bend it too much and it will break.

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   c) With help of diagram describe satellite communication.
     (Diagram-2 Marks, Explanation-2 Marks)

Ans:
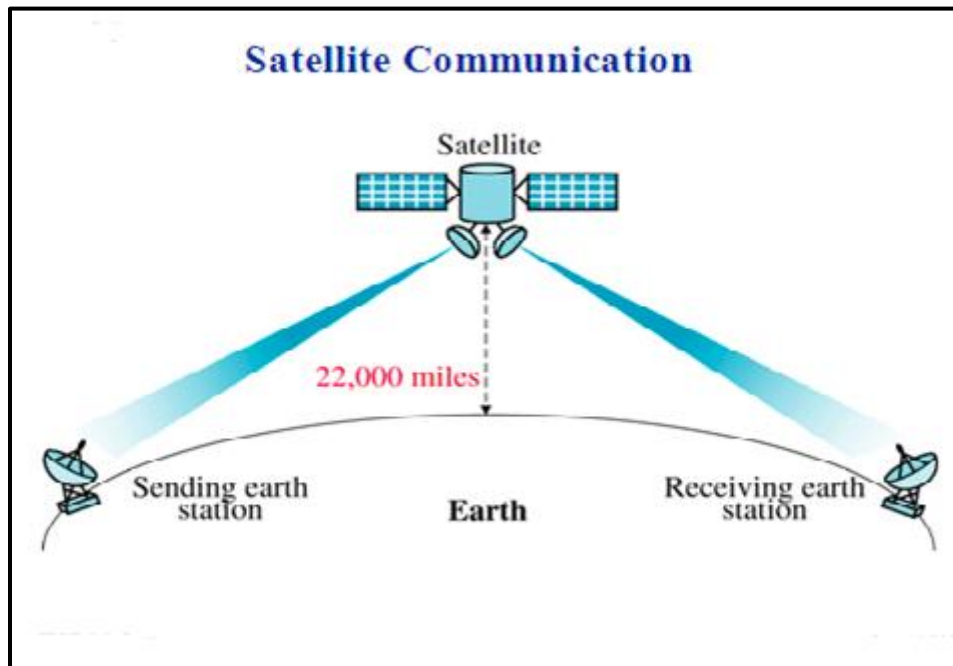
Satellite communication is similar to terrestrial microwave communication except that satellite acts as one of the station. Satellite performs the functions of an antenna and the repeater together. Ground station A sends information to ground station B via the satellite

Problem arises that if the earth along with its ground stations is revolving and the satellite is stationary the sending and the receiving earth stations and the satellite will be out of sync as time passes by. So normally geo stationary satellites are used which move at the same revolutions per minute as the earth in the same direction exactly like the earth. So both earth and satellite complete one revolution in exactly same time. Relative position of ground station with respect to satellite will never change. Movement of earth doesn't matter to communicating nodes on earth. Using satellite we can communicate between any two parts of the world. However 3 satellites are needed to cover earth's surface entirely

Two frequency bands are used for signals from earth to satellite (uplink 6GHz) and from satellite to earth (down link 4GHz)

There are 3 methods for satellite communication system:

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1) FDMA (frequency division multiple access)

2) TDMA (time division multiple access)

3) CDMA (code division multiple access)

FDMA puts transmission on separate frequency .TDMA assigns each transmission a certain portion of time On the designated frequency .CDMA gives unique code to each transmission and spreads on available set of frequencies Multiple access indicates that many users can use.

Advantages:

1) Satellite communication has low delay because signals travel faster in air than solid.

2) Satellite communication is broad cast media

d) Which is the most practice medium to use when connecting computer that are fewer than 100 mtrs apart but located at different building? Why?

(Medium used for communication-2 Marks, Reasons-2 Marks)

Ans:

In this situation **fibre optic (Any Other medium with proper justification)** use for connecting computer that are fewer than 100 meters apart but located in different building.

Reasons: fiber optic cable had lot of advantages over other different transmission medium such as twisted pair, coaxial cable such as higher bandwidth, high data transfer rate, less signal attenuation, immunity to electromagnetic interference, resistance to corrosive materials, light weight.

e) State the transmission media applicable now a days for the following application:

　　i)) Cable TV   ii) Cellular telephone

　　iii) Wired LAN   iv) Internet Backbone.

(1 Mark each)

Ans: 1) Cable TV: Coaxial cable (RG59)

2) Cellular telephone: microwave communication

3) Wired Lan: Twisted Pair and Fiber optic cable

4) Internet backbone: Satellite Communication, fiber optic cable.

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6.   Attempt <u>any four</u> of the following: Marks 16

a) Describe the functioning of 'application layer' in TCP/IP protocol suit.

(*Explanation- 4 Mark*)

Ans: **Function of Application layer:**

The TCP/IP protocols at the application layer can take several different forms. Some protocols, such as the File Transfer Protocol (FTP), can be applications in themselves, whereas others, such as Hypertext Transfer Protocol (HTTP), provide services to applications.

The most widely-known Application layer protocols are those used for the exchange of user information:

- The Hypertext Transfer Protocol (HTTP) is used to transfer files that make up the Web pages of the World Wide Web.
- The File Transfer Protocol (FTP) is used for interactive file transfer.
- The Simple Mail Transfer Protocol (SMTP) is used for the transfer of mail messages and attachments.
- Telnet, a terminal emulation protocol, is used for logging on remotely to network hosts.

Additionally, the following Application layer protocols help facilitate the use and management of TCP/IP networks:

- The Domain Name System (DNS) is used to resolve a host name to an IP address.
- The Routing Information Protocol (RIP) is a routing protocol that routers use to exchange routing information on an IP internetwork.
- The Simple Network Management Protocol (SNMP) is used between a network management console and network devices (routers, bridges, intelligent hubs) to collect and exchange network management information.

Examples of Application layer interfaces for TCP/IP applications are Windows Sockets and NetBIOS. Windows Sockets provides a standard application programming interface (API) under Windows 2000. NetBIOS is an industry standard interface for accessing protocol services such as sessions, datagram, and name resolution.

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b) Write the name of layers that perform the following function:

i) Data encryption   **ii) Error detection.**

iii) File transfer   **iv) Data encoding**

(1 Mark each point)

Ans:

1) **Data Encryption**: Presentation layer

2) **Error detection:** Transport layer

3) **File transfer:** Application layer

4) **Data Encoding:** Presentation layer

c) Compare the OSI reference model with TCP/IP network model.

(Any four points one mark each)

Ans:

OSI reference model	*TCP/IP network model*
1)It has 7 layers	1)Has 4 layers
2)Transport layer guarantees delivery of packets	2)Transport layer does not guarantees delivery of packets
3)Horizontal approach	3)Vertical approach
4)Separate presentation layer	4)No session layer, characteristics are provided by transport layer
5)Separate session layer	5)No presentation layer, characteristics are provided by application layer
6)Network layer provides both connectionless and connection oriented services	6)Network layer provides only connection less services

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7)It defines the services, interfaces and protocols very clearly and makes a clear distinction between them	7)It does not clearly distinguishes between service interface and protocols
8)The protocol are better hidden and can be easily replaced as the technology changes	8)It is not easy to replace the protocols
9)OSI truly is a general model	9)TCP/IP can not be used for any other application
10)It has a problem of protocol filtering into a model	10)The model does not fit any protocol stack.

d) Describe any four IP address classes.

(Any four IP address classes-1 Mark each)

Ans:

An IPv4 address is 32-bit address that uniquely and universally defines the connection of a device (for example, a computer or a router) to the Internet **IP address classes: IP addresses are classified into 5 types:**
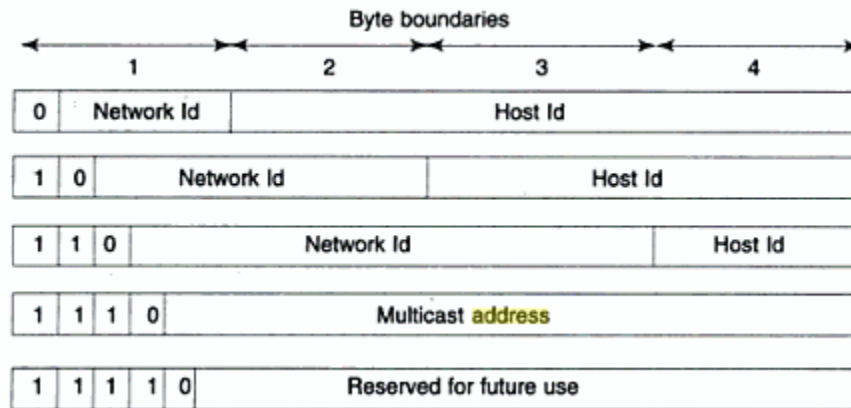
1) class A

2) class B

3) class C

4) class D

5) class E

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IP Address Classes and Parameters:

class	First bits	First byte values	Network ID bits	Host ID bits	No. of networks	No.of hosts
A	0	1-127	8	24	126	16,777,214
B	10	128-191	16	16	16,384	65,534
C	110	192-223	24	8	2,097,152	254

Class A format:

(For first byte)In the first field the first bit '0' indicates that it is class A network address. The next 7 bits are used indicate network id .Rest of the 3 bytes are used to indicate host id.

Class A: Minimum value is 0.0.0.0 and maximum value 127.255.255.255

Class B format: Minimum value is 128.0.0.0 to maximum value 191.255.255.255

Class C format: Minimum value 192.0.0.0 to maximum value 223.255.255.255 **Class D format**:

If first 4 bits are 1110 the IP address belongs to class D

The IPv4 networking standard defines **Class D** addresses as reserved for **multicast**. Multicast is a mechanism for defining groups of nodes and sending IP messages to that group rather than to every node on the LAN (broadcast) or just one other node (**unicast**). Multicast is mainly used on research networks. As with Class E, Class D addresses should not be used by ordinary nodes on

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the Internet. For class D minimum value for multi cast address is 224.0.0.0 and maximum multi class address is 239.255.255.255

Class E format: For class E minimum value for reserved address is 240.0.0.0 to 255.255.255.255

e) **Explain the concept used in following network services:**

   i) File sharing   **ii) Printer sharing.**

(Explanation of file sharing-2 Marks, Explanation of printer sharing-2 Marks)

Ans:

1) **File sharing:-**files can be centrally stored and used by multiple users. Shared directory or disk drive is used. If many users access same file on network and make changes at same time and conflict occurs. Network operating system performs file sharing and provides security to share files. Managing concurrent file access.

2) **Printer sharing:** Printer connected in a network can be shared in many ways. Use printer queues on server. Here printer is connected to server. Each work station can access printer directly. Printer can be connected to server. Connect a printer to a computer in a network and run special print server software. Use built in print server. Use dedicated print server. By printer sharing reduces no. of printers needed

f) **Describe 'network plan'.**

(Explanation - 4 Marks)

Ans:

- Networking the computers and tracking the connections can become confusing and unmanageable, when we try to find which computers communicates with and shares resources with which other computers.

- We have a plan for information sharing. The information sharing must take place as per this plan only.

- For computer networks plan should be ready even before connecting the first computers.

- The network plan is therefore a plan which shows all the network components and the planned connections between them. Such a plan can be used to manage various types of information.

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- Our plan should show what types of information are stored where and who are allowed to use which type.

Information management:

- The information plan should enable you to manage the information gathering. Storage and sharing between the users.

- A network plan can tell you that a specific type of data like medical, personal or payment information) are guarded or grouped, should be stored higher in the hierarchy.

- The data is generally stored from most sensitive at the top to least sensitive at the bottom.

- The plan should also specify that the sources requirements are stricter for sensitive data and restrict the number of people allowed to use the sensitive information.