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<u>**Model Answer**</u>

Subject Title: Computer Networks   Subject Code: 12110

Q.1.A   Attempt any <u>SIX</u> of the following: MARKS 12
a. Define computer network *(Any 1 Definition- 2 marks)*
   i) Computer Network –It is collection of computers which are connected to each other for communication   using communication media, through protocols.
   ii) A computer network is a group of computers that shares information across wireless or wired technology.
   iii) Computer Network - Two computers are said to be connected if they are able to exchange information.
   iv) A computer network is a set of devices (nodes)connected by communication links. A node can be a computer, printer, or any other device capable of sending and receiving data

b. Write any two Characteristics Of LAN *(Any 2 points, 1 mark each)*
   i)   LAN covers Small geographic area.
   ii) LAN is network within a single building or campus of up to few kilometers.
   iii) Transmission Channels are privately owned.
   iv) Error rate is less.
   v)   LAN cables are highly reliable.
   vi) Generally lower in cost than a WAN.

c. Write any two advantages of star topology.*(Any 2 points, 1 mark each)*
   i)   A single computer Failure dose not affect the entire network.
   ii) Easy to expand – Adding new node in Network is easy.
   iii) Centralized control-It enhance N/w monitoring & management.
   iv) Fault detection is easy because all nodes are connected to central HUB

d. EnList any four Network Control Devices*. (Any 4 devices , ½ mark each device)*
   List of Network Control Device is as follows -
   i)   Hub
   ii)   Switch
   iii) Router
   iv)   Bridge
   v)   Repeater
   vi)   Gateway
   vii) Modem

e. Write any two Features of STP *(Any 2 Features of STP, 1 mark each)*
   i)   It has metal shield that covers twisted pair.
   ii) STP costs more than UTP but less than fiber-optic cable.
   iii) STP can theoretically run at 50OMbps for a 100-meter cable length.
   iv) STP eliminates Cross talk.
   v)   The requirement for special connectors can make STP more difficult to install than UTP.
   vi) It is less noisy, so signal is more secure as compared to UTP.

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f. Enlist any two Services Provided By PPP *(Any 2 services, 1 mark each)*
   i)   Provides Error Detection
   ii) Provides Authentication and Security
   iii) Assigns IP address Dynamically
   iv) Support IP, Link Control protocol and other protocols

g. Define Protocol *(Any 1 Definition ,2 marks)*
   i)   A network protocol defines rules and conventions for communication between
        network devices.
        OR
   ii) Protocol is a system of digital message formats and rules for exchanging those
        messages in or between computing systems.

h. Define Packet *(Any 1 Definition ,2 marks)*
   i)   In computer networking, a packet is a formatted unit of data carried by a computer
        network
   ii) A packet is one unit of binary data capable of being routed through a computer
        network. Address field in packet specifies intended receiver.

B.   Attempt any <u>TWO</u> of the following   MARKS8

a. State the reason for implementing a network *(Any 4 reasons, 1 mark each)*
   i)   Resource Sharing =computer network is helpful for sharing resource with every
        computer on network. For Example-Printer sharing
   ii) Sharing data= computer network is helpful for sharing data, software with every
        computer on network. For example -File sharing
   iii) Saving Money= Reducing equipment cost by sharing resources, software, data.
   iv) Providing high reliability= all files are Backup on 2 or more pcs, so if one of the PC is
        unavailable then, file can be read from other available PC.
   v)   Communication =computer network used for communication between people who are
        far apart. For Example -Email.

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b. Compare between twisted pair cables UTP and STP w.r.t. following factors:
(Each point 1 mark)

Factors		UTP	STP
i)	Bandwidth capacity	Bandwidth capacity of UTP is as follows: CAT2-upto 2Mbps CAT3-upto 10Mbps CAT4-upto 20Mbps CAT5-upto 100 Mbps UTP may support data rates from 1 to 155Mbps at distances of up to 100 meters	STP can theoretically run at 500 Mbps for a 100-meter cable length.
ii)	Node Capacity or Segment	It supports more nodes per segment as compared to STP. There is a specified maximum limit of 1024 nodes	It supports less nodes per segment as compared to UTP There is a specified maximum limit of 270 nodes
iii)	Attenuation	Attenuation is High than STP	Attenuation is Less than UTP
iv)	Cost	Cost is less than STP	Cost is more than UTP

c. You are said to establish a small network with minimum cost, atleast five computers and also necessary to use the centralized database. Which type of network and topology you will prefer in this situation? Justify your answer.
(Identification of type of network 1mark, its justification 1mark, Identification of Topology- 1mark, its justification -1mark)

Type of network =Client- Server Network. *(1 mark)*
Justification -For the mention situation client Server network is preferred because centralized database can be maintained at server. *(1 mark)*
Type of topology = Bus Topology*. (1 mark)*
Justification -For the mention situation Bus Topology is preferred because cost is less due to short cable length, no need of HUB, simple wiring layout. Bus topology can support 5 computers and additional nodes can be easily added to existing bus network. *(1 mark)*

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Q.2.   **Attempt any <u>FOUR</u> of following:**   MARKS16

a. **Write any four Characteristics of Co-axial cable.** *(Any 4 characteristics, 1markeach)*

   i)   It consists of copper wire surrounded by insulating material. Insulator is covered by outer conductor. Outer conductor is covered by plastic sheath.
   ii) Construction and shielding of coaxial cable give high bandwidth and excellent noise immunity.
   iii) Cover long distance than twisted pair cable.
   iv) Less susceptible to Electromagnetic interference(EMI)
   v)   Costly than twisted pair cable.
   vi) Two types of coaxial cable- Thin net and Thick net.

b.   **Describe Light sources for fiber.** *(Listing 1 mark, 3 marks for description)*

   Two kinds of light sources are used in signaling
   i) LED (light emitting diodes)
     ii) Semiconductor Laser.
   Properties of LED-
     i)   It has low data rate.
     ii) It covers short distance
     iii) Cost is less.
   Properties of Semiconductor laser –
     i)   It has high data rate.
     ii) It covers long distance.
     iii) Cost is more.

Factor	LED	Semiconductor laser
Data rate	Low	High
lifetime	Long life	Short life
Distance	Short	Long
Cost	Low cost	Expensive

c.   **Describe any two Advantages and two disadvantages of print server.**
   Advantages (Any 2 points-2 marks, 1 mark each) and disadvantage of print server (Any 2 points -2 marks, 1 mark each)

   Advantage of print server *(Any 2 points,2 marks)*
   i)   Print server lowers the administrative and management workload due to centralizing local and remote printer management.
   ii) It allows prioritization of print jobs. It is known that priorities can be assigned to print jobs such that more important jobs are printed before those less important.

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iii) Print server allows an administrator to manage and control access to each printer.
iv) Troubleshooting the printers is also easier since there is only one print server.
v) Saves resources like power, and extra cables, printers and network investment.

Disadvantage of print server*(Any 2 points,2 marks)*
i)   The main computer or the host computer may slow down on the network if there are too many commands and too much data flow on the printer line.
ii) Every person in the office has to come to a single point to collect their print outs.

d. **Describe N/W topology. Explain mesh topology in details with suitable diagram.**
   (Topology1 mark),Mesh Topology Diagram(1 mark), Mesh Topology (2marks)

Network topology- Network topology is the arrangement of the various elements (links, nodesetc.) in a computer network. Topologies are – Bustopology, Ringtopology, Startopology, Mesh topology etc. (1 mark)

Mesh topology diagram*(1 mark)*
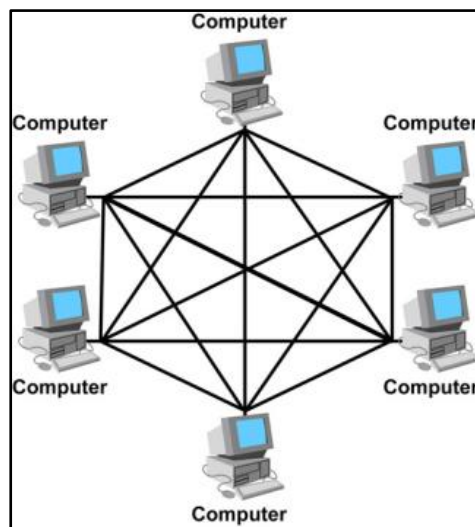
Mesh topology   *(2 marks)*
In a mesh topology, each computer is connected to every other computer by a separate cable. This configuration provides redundant paths through the network so that if one cable fails, another carries the traffic and the network continues to function.

Advantage- An advantage of a mesh topology is its back-up capabilities by providing multiple paths through the network

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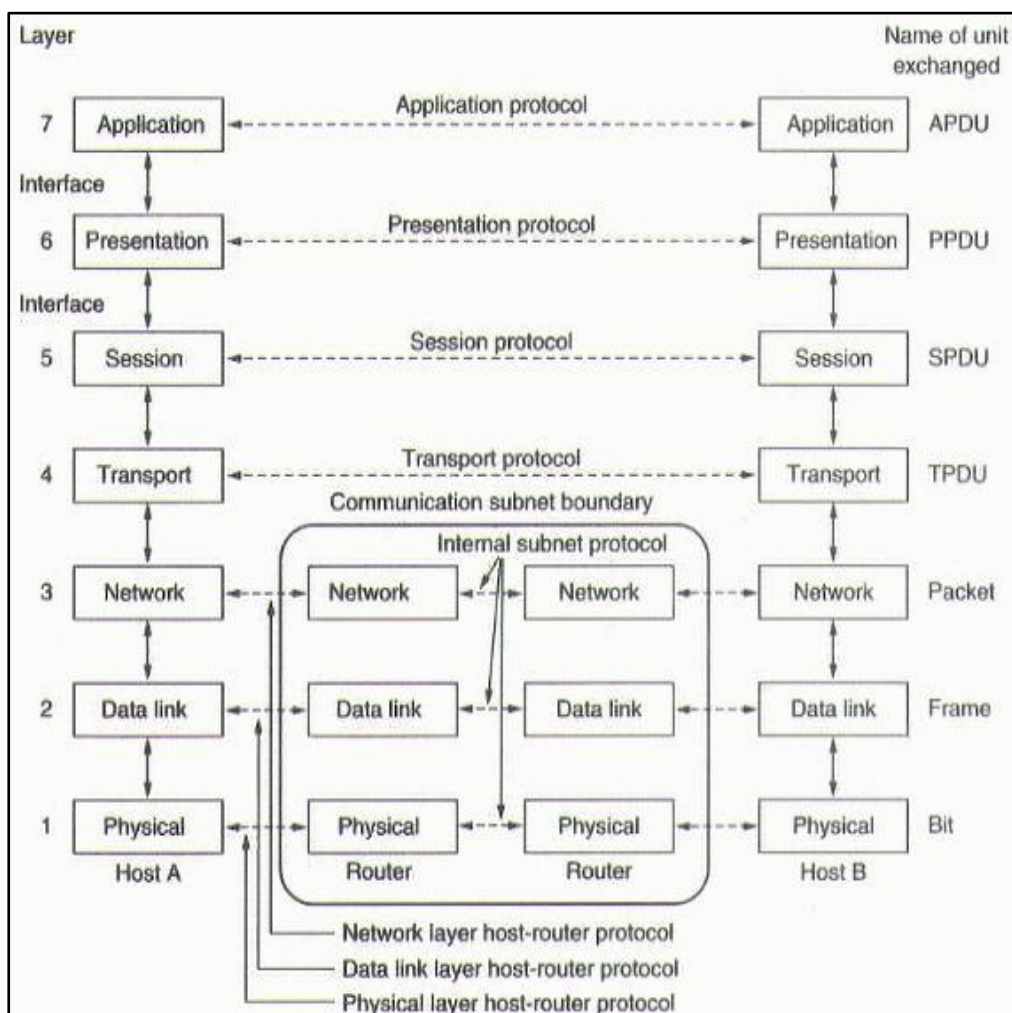Subject Title: Computer Networks   Subject Code: 12110

Disadvantage- Because redundant paths require more cable than is needed in other topologies, a mesh topology can be expensive.

e. **With neat diagram, explain horizontal communication.**
    (Diagram 2marks, explanation 2 marks)
    Horizontal communication In OSI model (*Diagram 2marks*)

Data communication in OSI model=
OSI model was developed by ISO(International standard Organization).
OSI provides way to understand how internetwork operate.
OSI has 7 Layers as shown in figure.

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OSI layers are – Application layer, Presentation layer, Session Layer, Transport layer, Network Layer, data link Layer, Physical layer.

Each layer supportthe layers above it and offers services to the layersbelow

Each layer performs unique and specific task.A layer has knowledge of its neighbour layers only.

In horizontal communication, programs or processes on different machines communicate.

Application layer of Host A machine communicates with Application layer Of Host B machine.

Presentation layer of Host A machine communicates with presentation layer Of Host B machine.Session layer of Host A machine communicates with Session layer Of Host B machine.Transport layer of Host A machine communicates with Transport layer Of Host B machine. and so on.

f. Compare between TCP and UDP w.r.t following characteristics:
   Comparison of TCP and UDP (4 points -4 marks, 1 mark each point)

Comparison of TCP and UDP

Factors		TCP	UDP
i)	Protocol connection s/w	It is connection oriented. Connection must be established before sending data.	It is connectionless. Data sent without connection setup.
ii)	Data interface to application	Lost data is Retransmitted automatically.	Auto –retransmission is not performed. Application must detect lost of data and retransmit it by its own.
iii)	Reliability	Reliable because data is delivered with acknowledgment	Unreliable because data is delivered without acknowledgement
iv)	Overhead	Overhead is low, but higher than UDP	Overhead is Very low

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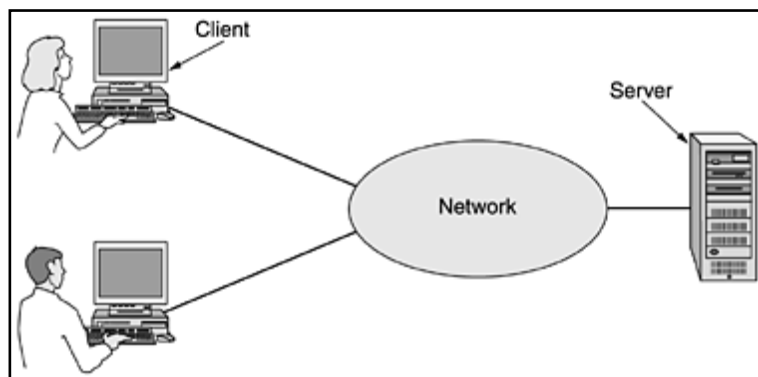**Q.3.**   **Attempt any __TWO__ of following:**   MARKS **16**

a) **With neat diagram, explain client server network along with its advantages and Disadvantages.**
Answer:

(Fig. – 1 Mark, Explanations – 3 Marks, Advantages – 2 Marks, Disadvantages – 2 Marks)

clients server network:

Client server networks are defined by presence of servers on a network that provide security and administration of the network.
Client server networks divide processing tasks between clients and servers. Clients request services such as file storage and servers deliver them.
Client: Individual workstation in the network
Server: Central computer which is more powerful than the clients and which allows the clients to access its softwares and database
No user can access the resources of the servers until he has been authenticated by server
Applications:
1- Email system
2- Web browsers
3- ftp clients

Advantages:
1- Strong ventral security
2- Central storage, which allows user to work from the sane of data and provide easy backup of critical data
3- Reduces cost because of the ability of server to share available hardware and software.
4- It can have dedicated servers which can speed up sharing of resources
5- Frees the user from the task of managing the sharing of resources

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Disadvantages:
1- Expensive dedicated hardware
2- Expensive network operating system software and client licenses
3- A dedicated network administrator require

b) What are routers? With neat diagram explain operation of router in OSI model.
   Routers
   Answer:

   (Fig. – 2 Marks, Router – 2 Marks, Explainations– 4 Marks)

   Routers are devices that connect 2 or more networks. They consist of hardware and software.Hardware includes the physical interfaces to the various networks in the interne twork. Software in a routers are OS and routing protocols, management softwares.

1- Routers use logical and physical addressing to connect 2 or more logically separate networks.
2- They accomplish this connection by organising the large network into logical network called subnets
3- Each of the subnet is given a logical address. This allows the networks to be separate but still access to each other and exchange data.
4- Data is grouped into packets. Each packets has physical device address and logical network address
5- When a packet comes into a router, the frame header and trailer are stripped off and the packet located in the frame's payload field (shaded in Fig. 2 b) is passed to the routing software. This software uses the packet header to choose an output line
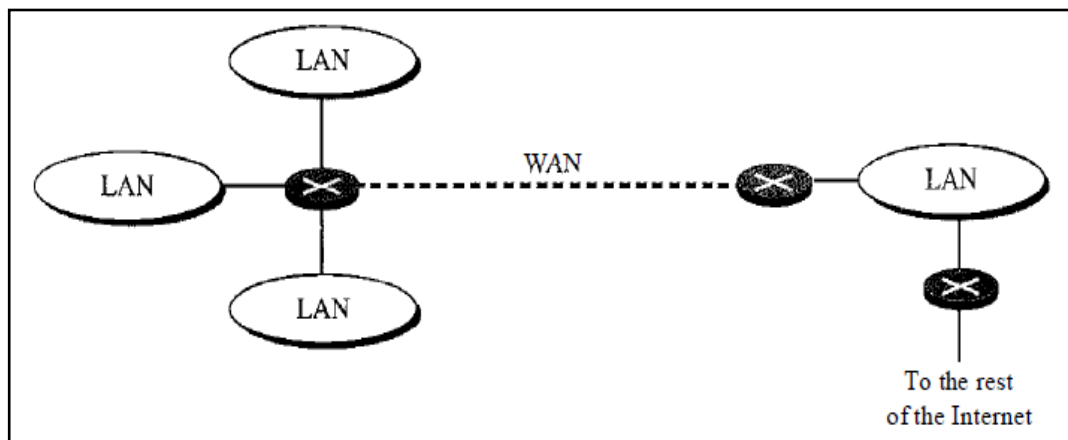

Figure .1 *Routers connecting independent LANs and WANs*

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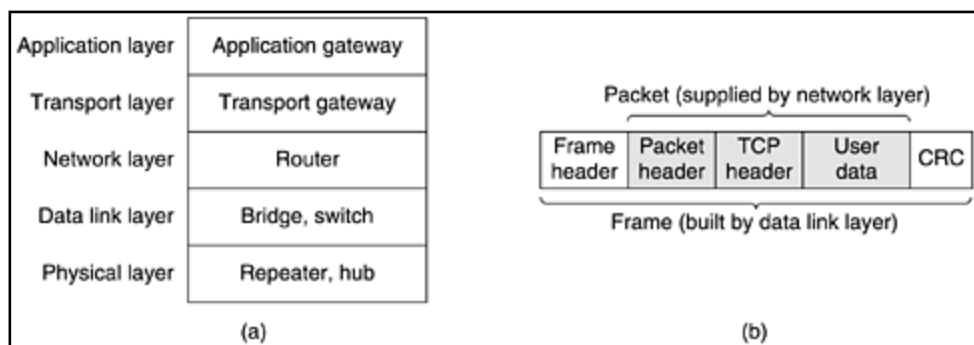Subject Title: Computer Networks   Subject Code: 12110

Figure 2. (a) Which device is in which layer. (b) Frames, packets, and headers.

C) Explain two cases related to calls using mobile phones

   i) Call initiated by mobile phone i.e. MOC Mobile originating call
   (Fig. 1 marks, Procedure to connect – 3 marks)

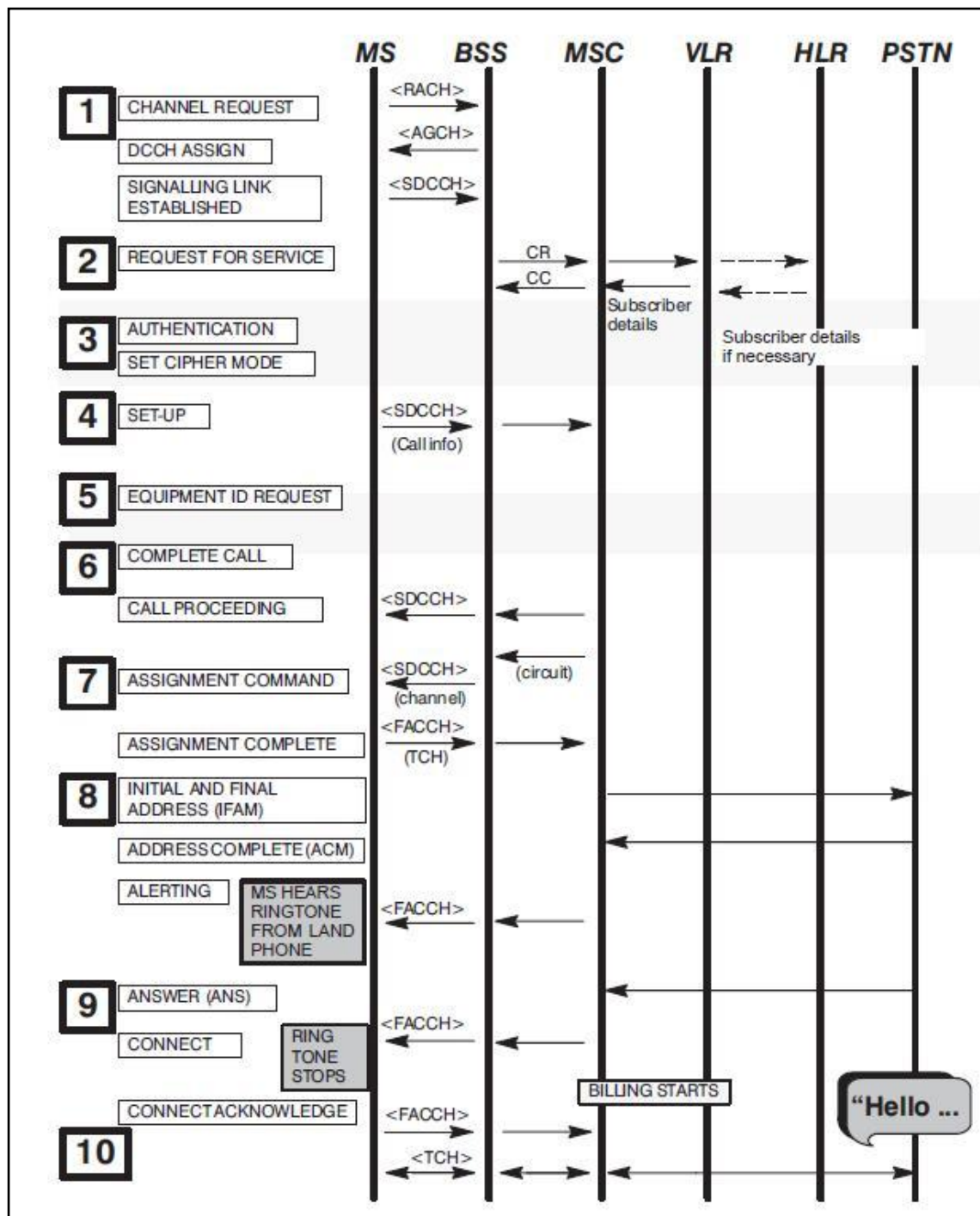MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION
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1.**BTS**-BTS stands for **Base Transceiver Station**.It is nothing but your Tower which radiates the signal to your mobile.It is the first player in this operation which always have a touch with the mobile.

2.**BSC**-BSC stands for **Base Station Controller**.It is a large unit which controls all the BTS(Towers).We can say that a number of BTS are controlled by a single BSC.There are so many BSCs present in an area depending on the number of users and all are inter connected.

3.**MSC**-MSC stands for **Mobile Switching Center**.It is responsible for switching the call to the called subscriber.A number of BSCs are connected to the MSC and it controls the BSC.

4.**HLR**-HLR stands for **Home Location Register**.It is the server which stores the details of the all the subscribers permanently.

5.**VLR**-VLR stands for **Visitor Location Register**.It is the server which stores the details of the all the visiting subscribers temporarly.

All the above said units are interconnected and plays a vital role in call connection.

Call Setup

1.When a subscriber initiates a call by dialling a number in his mobile it directly send a request to the BTS which he comes under.

2.BTS there by sends the request to the BSC to which it is connected.

3.From the BSC the request is made to the MSC to which it is connected.

4.Then MSC sends a request to the HLR to check the information about the caller like account balance(if pre paid),live user,area of the caller etc.

5.After checking all the details the HLR sends a acknowlegement message to the MSC that the caller is O.K. to make a call or not.

6.If that message is O.K. the operation continues or else the MSC sends a NOT O.K. message to the BSC which has made the request and BSC to the BTS and BTS to the Mobile.At the next instance the call get disconnected.

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7.If the message recieved by the MSC is O.K. then it again sends a request to the HLR to find the called party(the subscriber to whom call is made).

8.The called party and the caller may comes under the same MSC or different MSC.If both comes under the same MSC then the HLR finds the subsciber easily and informs the MSC that to which area the called party belongs.The MSC therefore establishes a air link between the both parties.Thus the call gets connected.

9.If both parties comes under different MSC then the HLR again search for the MSC to which the called party belongs and inform the same to the MSC of the caller.Thus the MSC of the caller establishes a air link between the both parties.Thus the call gets connected.

ii) A land phone call mobile phone
(Fig. 2 marks, Explanations – 2 marks)
Mobile-terminating Call (MTC)
The process for a MTC is very similar to a MOC. The BTS initiates the transaction by sending a *RR Paging Request* message on the PCH. In reply, the MS transmits a *RR Channel Request* message on the RACH. An *Immediate Assignment* message with the SDCCH number is the response sent by the BTS on the AGCH. The MS replies with a *RR Paging Response* message containing its mobile identity (IMSI or TMSI). The remainder of the call setup is then identical to the Mobile Originating Call as explained in earlier. As with the MOC, the TCH+FACCH assignment can happen at any time.
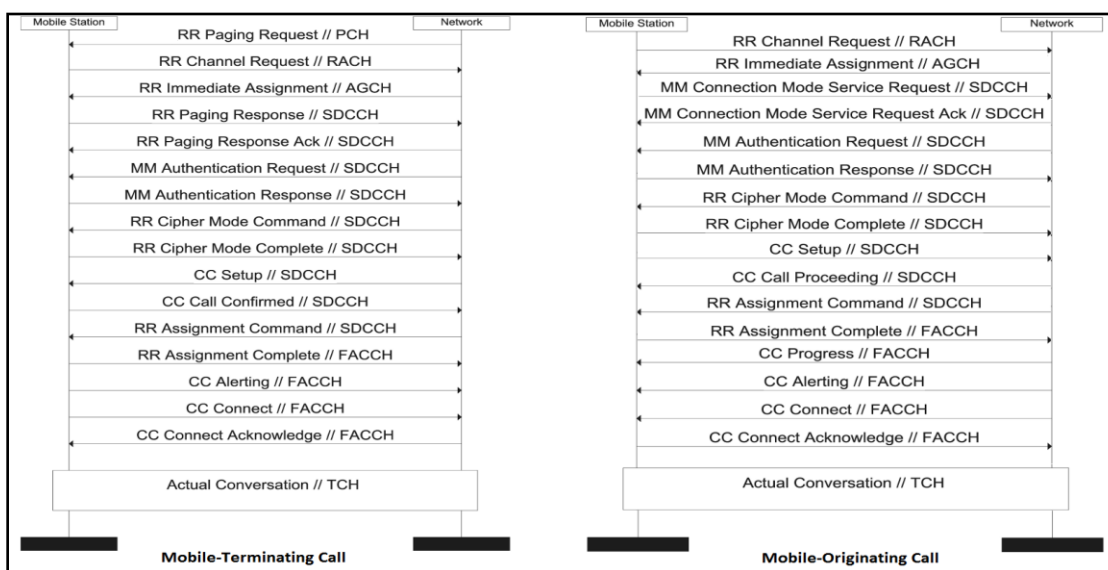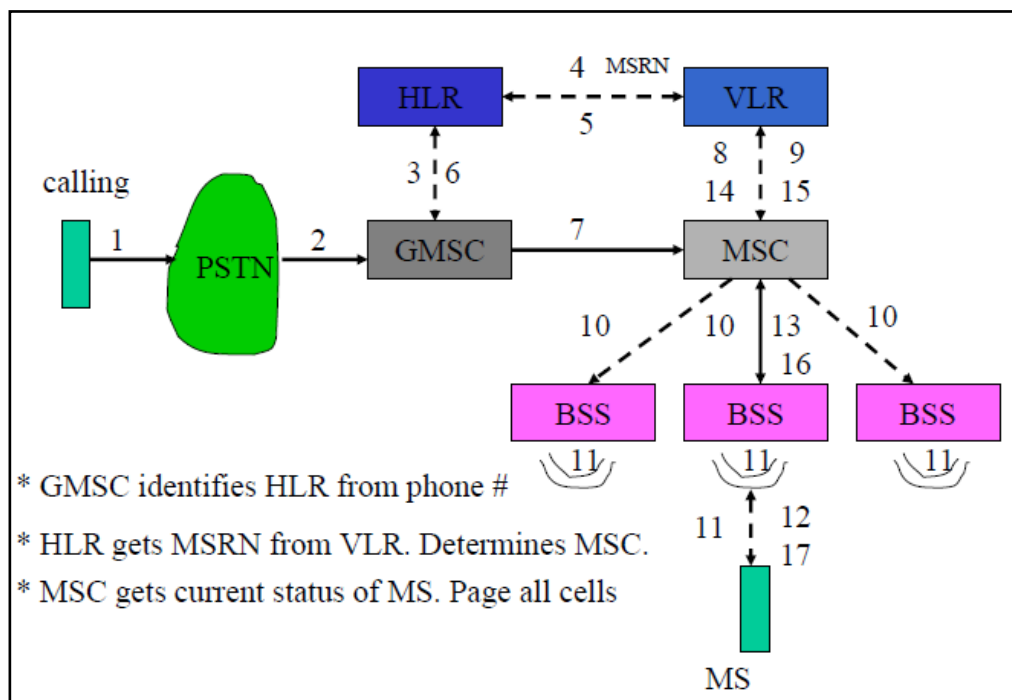

Fig. Message Flows in a MTC and MOC

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Fig. Mobile-terminating Call (MTC)

Q.4.   Attempt any <u>FOUR</u> of following: MARKS **16**

a) Distinguish between LAN & WAN (4 pts.) *(1 Mark each point,* **Any 4 Points***)*

Answer:
1-A local area network (LAN) is usually privately owned and links the devices in a single office, building, or campus.
A WAN can be as complex as the backbones that connect the Internet or as simple as a dial-up line that connects a home computer to the Internet

2- LAN are easy to design and maintain
WAN'S are not easy to design and maintain

3- LANs are restricted in size, which means that the worst-case transmission time is bounded and known in advance. So that propagation delay does not exist. LAN can be used for time critical applications.
In wide area network spans a large geographical area so propagation delay exist. WAN can not be used for time critical applications

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4- LAN will use only one type of transmission technology consisting of a cable to which all the machines are attached

In WAN the hosts are connected by a communication subnet. In most wide area networks, the subnet consists of two distinct components: transmission lines and switching elements like routers, hubs etc.

5- LAN can operate on very high data rates
       WAN operates on low data rates

6- LAN operates on principle of broadcasting
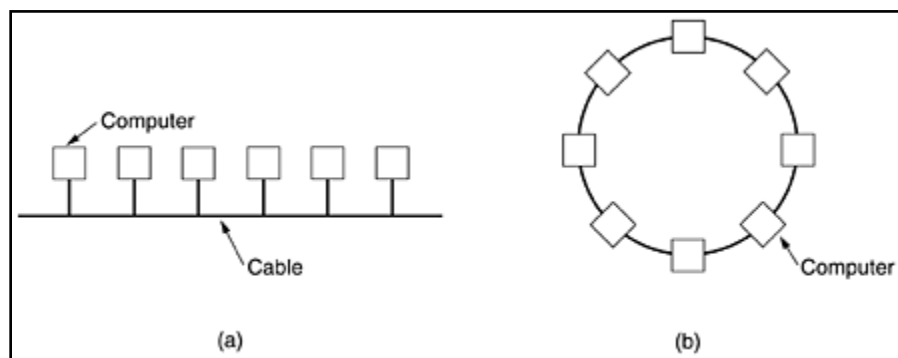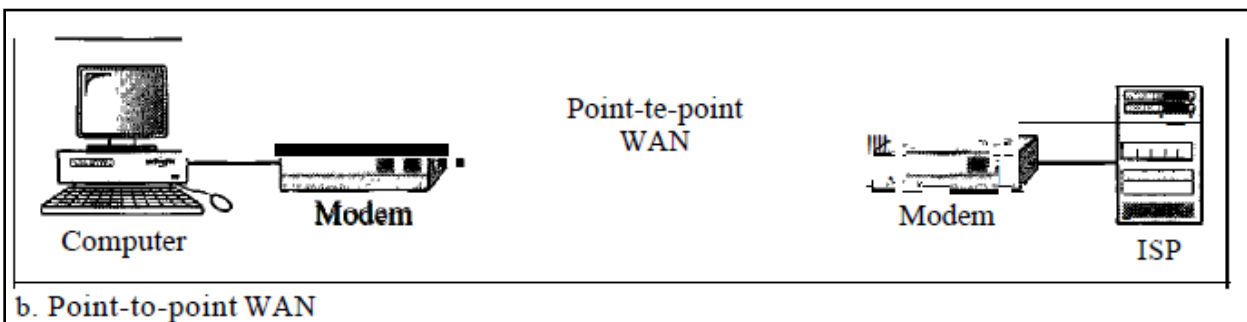   WAN operates on principle of packet switching.

Diagram of LAN

Diagram Of WAN

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b) Explain:
i) Passive hubs   ii) Active hubs
Answer:

Passive Hubs (2 Marks)

a) A passive hub is just a connector. It connects the wires coming from different branches.

b) In a star-topology Ethernet LAN, a passive hub is just a point where the signals coming from different stations collide; the hub is the collision point.

c) This type of a hub is part of the media; its location in the Internet model is below the physical layer.

d) Passive hub can not regenerate signals.

Active Hubs(2 Marks)

e) An active hub is actually a multipart repeater. It is normally used to create connections between stations in a physical star topology.

f) We have seen examples of hubs in some Ethernet implementations (lOBase-T, for example). However, hubs can also be used to create multiple levels of hierarchy, as shown in Figure 1.

g)   The hierarchical use of hubs removes the length limitation of 10Base-T (100 m).
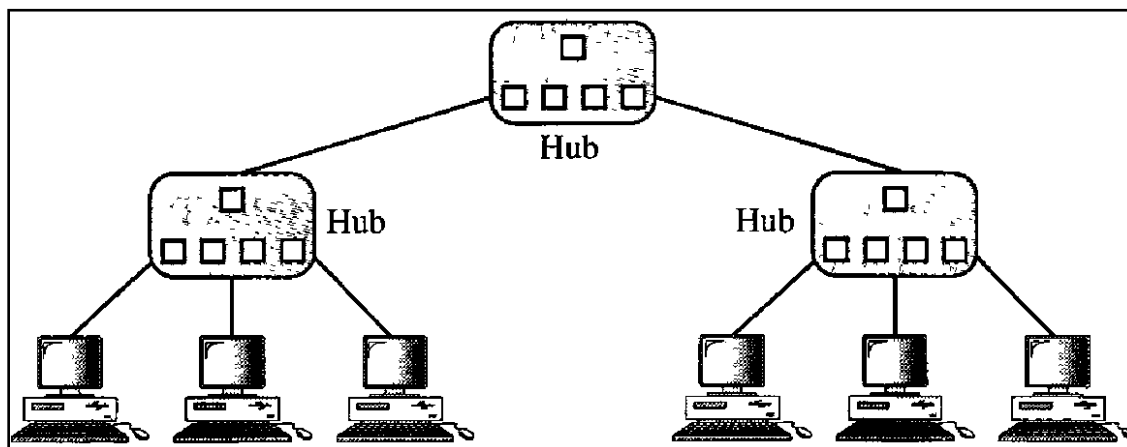
h) Active hub can regenerates signal

Figure 1 A hierarchy of hubs

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c) **For following situation which type of network architecture is appropriate?**

   ANS: – *(1 Mark each)*
   i)   Number of user 10:- **Client Server**
   ii)   Data & resourses need to be restricted: **Client Server**
   iii)   Network administrator required:- **Client Server**
   iv)   Users with equal priority:- Peer to peer

d) **Draw neat labelled sketch of star-bus topology connecting 3 star network having 2 Computers in one star and 3 computers in two star** *(Neat labelled sketch - 4 Marks)*
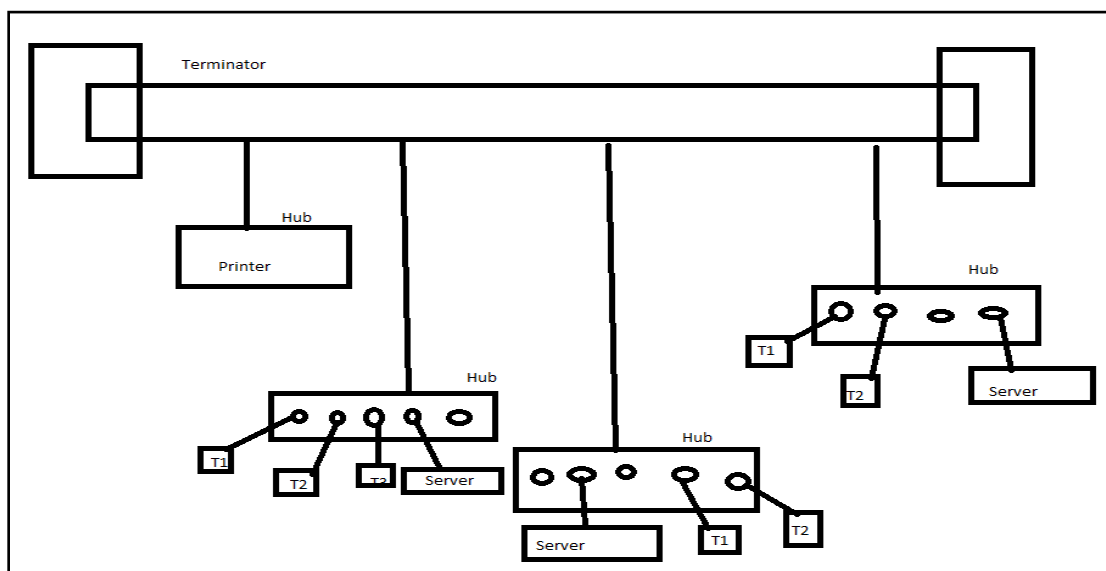

Fig. Star Bus topology connecting 3 star networks

e) **Write any four functions performed by modem at transmitting end.**

   Answer: *(1 Mark each function)*
   1- Take the data from RS-232 interface
   2- Convert data into appropriate analog signals
   3- Perform the line control and signaling to the other end of phone lines
   4- Send dialing signals if the modem is designed to dial without the presence of user

f) **Explain advantages of fiber optic cable**.

   Answer: *(1/2 Mark each advantage)*
   Advantages:
   1- Small size and light weight
   2- Easily available and low cost

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3- No electrical or electromagnetic inerterference
4- Larger bandwidth
5- No cross talk
6- Signal can be sent upto 100 times faster
7- Ground loops are absent
8- Installation is easy as these cables are flexible
9- Not affected by drastic environmental conditions

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Q.5. **Attempt any __TWO__ of the following**   MARKS16

a) **With a neat diagram explain satellite communication system.**
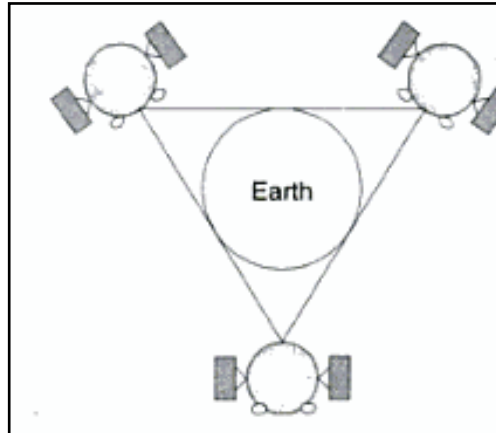*(Diagram 2m, explanation 6marks)*

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
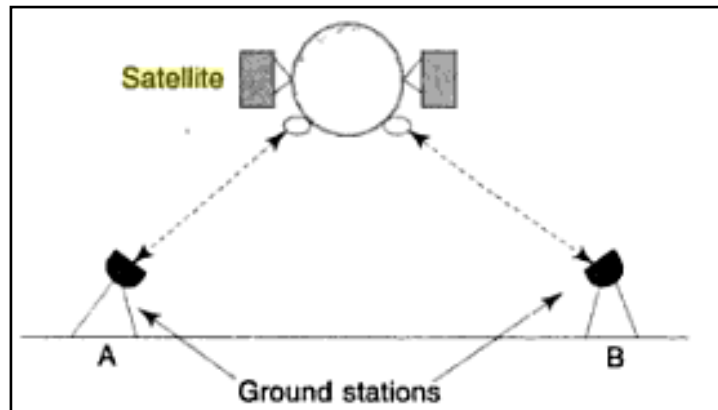
Satellite communication (Diagram)

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 geostationary 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. How ever 3 satellites are needed to cover earth's surface entirely.

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3 Satellites to cover the planet

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

There are 3 methods for satellite communication system:
            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

b.   Explain functions of following layer in OSI model

   i) Data link layer: *(Any 2 functions 2marks)*

   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

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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: data link layer divides the stream of bits received from network layer into frames.
2) Physical addressing: headers and trailers are added containing the physical addresses of adjacent nodes and removed on successful delivery. If frames have to be transmitted to system outside the senders network then receivers address is of the device that connects the network to the next one.
3) Flow control: if the rate at which data is absorbed by the receiver is less that the rate which is produced by the sender then data link layer imposes flow control mechanism to avoid overwhelming of the receiver.
4) Error control: it provides mechanisms to detect and retransmit damaged or lost frames. Duplicate frames are also recognised. Error control is achieved by the trailer added to end of frame. CRC is used to ensure correctness of frame.
5) Media access control: when 2 or more devices are added to the same medium data link layer protocols are needed to determine which device has control over the link at any given time. It decides who can send data when and how much.
6) Node to node delivery: data link layer is responsible for error free delivery of the entire frame to the next adjacent node called as node – to –node delivery.

ii) Network layer: *(Any 2 functions 2marks)*

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: if the packet is passing on the network boundary then network layer adds header to packet coming from upper layer that contains logical address of sender and receiver(ip address)

2) Routing: when networks are connected to form a large network, the connecting devices are used(routers or switches) to route or switch packets to final destination. Mechanism of routing and switching is provided by network layer.

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3) Congestion control: network layer handles congestion problem at a node when there are too many packets stored at a node to be forwarded to the next node.

4) Accounting and billing:Billing has to be done based on how many packets are routed, when etc..

5) Address transformation: interpreting logical address to get their physical equivalent address like ARP (address resolution protocol)

6) Source host to destination host error free delivery of packet.

iii) Transport layer: *(Any 2 functions 2 marks)*

Responsibility of process to process delivery of message

Ensure that whole message arrives in order.

1) service point addressing:Several programs are run at a time on a computer. Delivery is not only from one computer to another but also from specific process on computer to specific process on another computer. for this transport layer uses port addresses. Transport layer delivers entire message to the correct process on that computer.
2) Segmentation and reassembly:Each segment of a message contains a sequence number which is used to reassemble the message correctly upon arriving at destination and to identify and replace packets that are lost in transmission.

3) Connection control: logical connection is created between source and destination for the duration of complete message transfer.

4) Flow control:Flow control is performed end to end

5) Error control: error control is performed process to process. It ensures that entire message arrives at receivers transport layer without error(damage or loss orduplication).error correction is done by retransmission.

iv) Session layer: (Any two functions 2 marks)

Establishes, maintains, synchronises the interaction among communication systems
It is responsible for dialog control and synchronization
1) Dialog control: Allows communication between two process to take place in half duplex(one way at a time) or full duplex(2 ways at a time)

2) Synchronization, session and sub session: session layer decides the order in which the data needs to be passes tp transport layer. Sessions are divided in to sub sessions for avoiding retransmission of entire message by adding check points.

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3)Session closure:
   Ensures that sessions between hosts is closed.

c) **Explain IP address classes. (Diagram 1mark,list of classes 1mark, description of classes 6marks)**

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 Mark)*
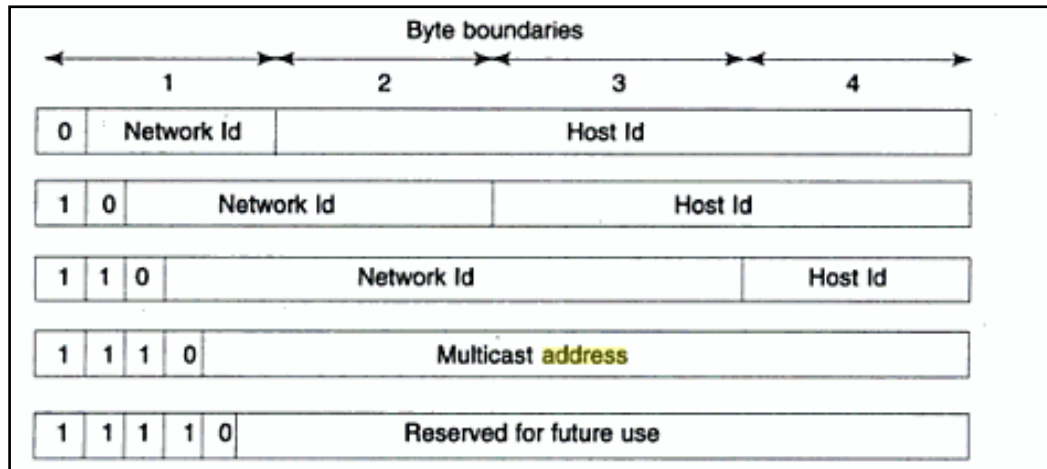
1)class A

2)class B

3)class C

4)class D

5)class E

Classes of IP address

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(or)

Binary notation:

Class A

0			
First byte	2nd byte	3rd byte	4th byte

Class B:

10			
First byte	2nd byte	3rd byte	4th byte

Class C:

110			
First byte	2nd byte	3rd byte	4th byte

Class D:

1110			
First byte	2nd byte	3rd byte	4th byte

Class E:

1111			

(or)

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Dotted decimal notation:

Class A

0-127			
First byte	2nd byte	3rd byte	4th byte

Class B:

128-191			
First byte	2nd byte	3rd byte	4th byte

Class C:

192-223			
First byte	2nd byte	3rd byte	4th byte

Class D:

224-239			
First byte	2nd byte	3rd byte	4th byte

Class E:

240-255			

Class	No. bits for network id	Maximum no. of nwtworks	No. of bits for host id	Maximum no. of hosts
A	7	128	24	16777216
B	14	16384	16	65536
C	21	2097152	8	256

Class A format:

0	network id	host id

1byte   3 bytes(24 bits)
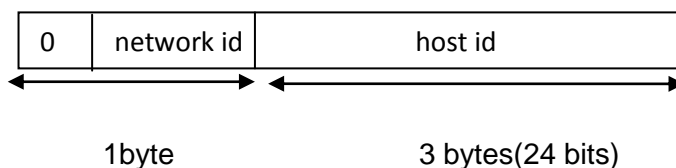
(For first byte)In the first field the first bit '0' indicates that it is class A network address. The next 7 bits are used indicate network id . Rest of the 3 bytes are used to indicate host id.Class A: Minimum value is 0.0.0.0 and maximum value 127.255.255.255

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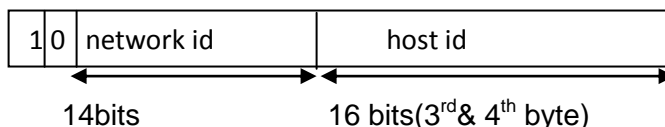**(ISO/IEC – 27001 – 2005 Certified)**

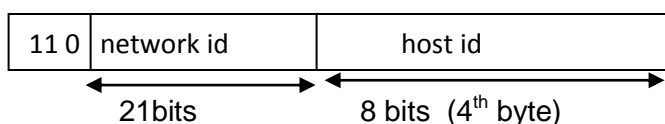**WINTER – 2012 EXAMINATION**

Model Answer

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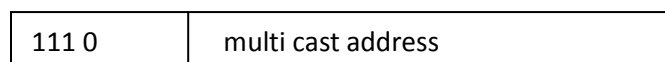
Class B format:

1 0	network id	host id

14bits   16 bits(3rd& 4th byte)

Minimum value is 128.0.0.0 to maximum value 191.255.255.255

Class C format:

11 0	network id	host id

21bits   8 bits (4th byte)

Minimum value 192.0.0.0 to maximum value 223.255.255.255

Class D format:

| 111 0	multi cast address

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 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:

11110	reserved
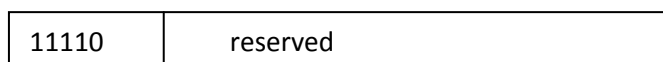
For class E minimum value for reserved address is 240.0.0.0 to 255.255.255.255

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Q.6. **Attempt any <u>FOUR</u> of the following:**   MARKS16
a) **Describe network plan. (Any four points 4 Marks)**

- 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.
- Our plan should show whattypes 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 net work 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.

b) **State two disadvantages of ring. Whether ring network is active or passive network ? Justify your answer. (Any 2 disadvantages 2marks, Identification of active or passive 1 mark, justification 1 mark)**
Disadvantages of Ring:*(Any two 2 Marks)*
1) Node failure causes network failure: if one node fails then it can't pass data to next node. This will result in network failure
2) Adding and removing node is difficult
3) If cable fails then entire network will fail.
4) Difficult to trouble shoot the ring network
   Ring network is active network.
   Justification:

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In an active network, nodes and devices attached to network are responsible for moving data through network. Ring topology is active network because each node regenerates the signal before passing it to the next node.

Ring Topology
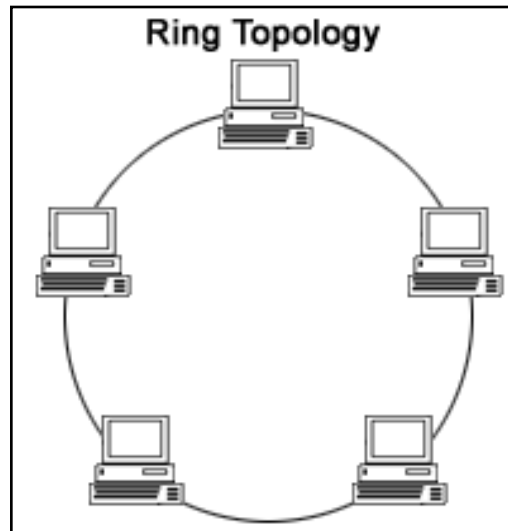
c) **State any four factors considered for cable selection.** *(Any four 4 Marks)*
Factors consider for selection of different transmission medias:-
1. Bandwidth – Higher bandwidth transmission media support higher data rate.
2. Attenuation- After travelling certain distance signal become weak. This is called as attenuation.
3. Noise – It leads to distortion of a signal. noise immunity of transmission media is considered at the time of selecting it for particular n/w
4. Radiation – It is leakage of signal from media caused by undesirable characteristics of media.
5. Life span of media (Durability)-It describes for How many years media can be used.
6. Type of Media- it describes type of media to be used . for e.g. -wired or wireless.

d) **What is token passing? Compare token passing with CSMA/CD**
(Token passing 2marks, any 2 points in comparison of token passing and CSMA/CD 2marks)
Token passing:
A token contains a special bit pattern which is completely different from data frame.
This token is circulated in the network.
When a host in the network wants to transmit data, it can't send data immediately.
Host which want to transmit data has to obtain the token for data transmission. When a host obtains the token it has exclusive access to the transmission medium.

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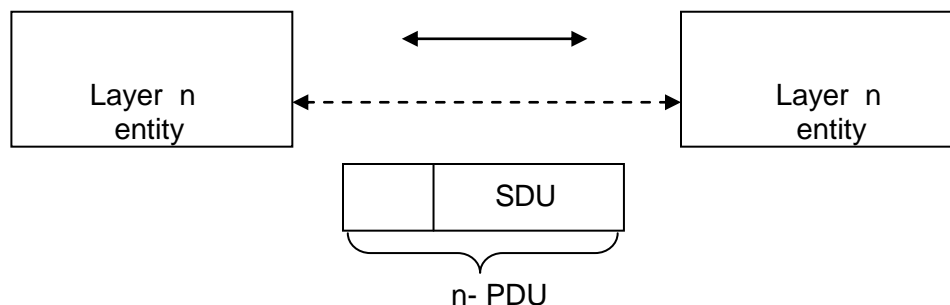<u>**Model Answer**</u>

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No.	Token passing	CSMA/CD
1	When a host obtains the token it has exclusive access to the transmission medium.	In this method when a host has to send data it listens to network cable and if it is idle then it sends data.
2	A token contains a special bit pattern which is completely different from data frame	Token is not used
3	Host which want to transmit data hasto obtain the token for data transmission. Only single host can transmit ,who has a Token.	hosts can transmit simultaneously which results in packet collision.
4	If the token is lost hosts of network can't transfer data.	If collision occurs then data is lost. So, after collision detection data has to be retransmitted.

e)   Describe following terms: *(Protocol data unit 2 Marks,Peer entities 2 Marks)*

   i) Protocol Data Unit (PDU) *(Any 4 points -2 Marks)*

- information that is delivered as a unit among peer entities of a network and that may contain control information, such as address information, or user data *is called Protocol Data Unit*
    - In order to transfer the Service Data Unit (SDU), the entity has to divide it into many smaller pieces.
    - Each piece is given a header and sent as a separate PDU (Protocol Data Unit Such as a packet.

    - The PDU headers are used by the peer entities to carry out their peer protocol.
    - Some PDUs contain data while other PDUs contain the control information. The PDU headers will identify or differentiate between different types of PDUs.
    - They also provide sequence numbers and counts.

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- for example : In OSI MODEL,
  APDU is Application Protocol Data Unit.
  PPDU is Presentation Protocol Data Unit.
  SPDU is Session Protocol Data Unit.
  TPDU is Transport Protocol Data Unit.

  ii) Entities and Peer entities.*(2 Marks)*

- An entity is defined as the active element in each layer. An entity can be either a software entity or a hardware entity.
- The example of software entity is a process and that of a hardware entities is an intelligent I/O chip.
- Entities in the same layer but on different machines are called as peer entities.

f)   **Explain ICMP (Internet control Message Protocol)** *(Explanation 4 Marks)*
- It reports errors and send control messages.

ICMP messages are divided into 2 categories

Error reporting	Query Message
1. Destination Unreachable	1. Echo request and Reply
2. Source quench	2. Time stamp request and reply
3. Time exceeded	3. Router solicitation and advertise
4. Parameter problems	
5. Redirection	

- **Destination Unreachable** – when a router can not forward an IP packet at that time it sends destination unreachable ICMP packet to source

- **Source quench** – It gives warning to source that source should slow down (quench) because congestion has taken place somewhere.

- **Time exceeded**- when all the fragments of data arrive at destination within a certain time limit then time exceeded message is sent back

- **Redirection Message** – If router wants to send the packet to next Network, then it should know the IP address of next router sends redirection message.

- **Echo request and reply** – It determines whether tow system can communicate with each other

- **Time stamp request and reply** – it determine the Round Trip time needed for an IP packet.

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- **Router solicitation and advertisement**

A host (computer) can broadcast a router solicitation message. The router receiving this message can send its routing information using advertisement message.

g) **Explain IP address assignment.** *(Notation 1 Mark, Defination 2 Mark, Example 1 Mark)*

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. IPv4 addresses are unique. They are unique in the sense that each address defines one ,and only one , connection to the Internet. Two devices on the Internet can never have the same address at the same time.

The IPv4 addresses are universal in the sense that the addressing system must be accepted by any host that wants to be connected to the Internet . The IPv4 addresses are unique and universal. IPv4 uses 32-bit addresses, which means that 2^{32}or 4,294,967,296 (more than 4billion) unique addresses can be generated theoretically. IP address contains 3 fields called class, network id and host id. Network id indicates network on internet and host id indicates individual hosts in the network.

Class	network id	host id

Notations:
There are two types of IPv4address notations :
1)binary notation
2)dotted-decimal notation.
Binary Notation:
In binary notation, the IPv4addressis displayed as 32bits.Each IP address consists of 4 bytes. each byte (8 bits) is called as octet.

Example of binary notation: 01110101 10010101 00011101 00000010

Dotted-Decimal Notation:
Internet addresses are usually written in decimal form with a decimal point(dot) separating the bytes.

Example: 117.149.29.2