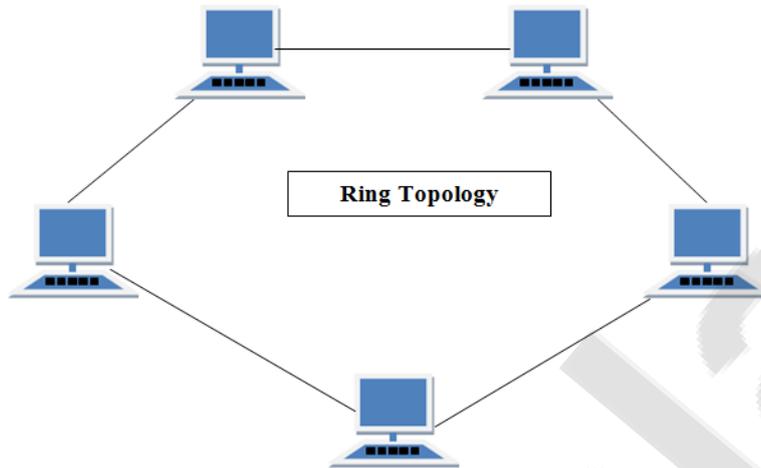


Q.1	Discuss the different type of topology with its advantages and disadvantages?(2014)
Ans	<p>Topology: A Network Topology is the arrangement with which computer systems or network devices are connected to each other. Topologies may define both physical and logical aspect of the network. Both logical and physical topologies could be same or different in a same network.</p> <p>Types of Topology:</p> <div data-bbox="300 584 959 808" data-label="Diagram"> <pre> graph TD Topology[Topology] --> Mesh[Mesh] Topology --> Star[Star] Topology --> Bus[Bus] Topology --> Ring[Ring] </pre> </div> <p>1. Bus Topology Bus topology is a network type in which every computer and network device is connected to single cable. When it has exactly two endpoints, then it is called Linear</p> <div data-bbox="284 994 1289 1335" data-label="Diagram"> </div> <p>Features of Bus Topology</p> <ol style="list-style-type: none"> 1. It transmits data only in one direction. 2. Every device is connected to a single cable <p>Advantages of Bus Topology</p> <ol style="list-style-type: none"> 1. It is cost effective. 2. Cable required is least compared to other network topology. 3. Used in small networks. 4. It is easy to understand. 5. Easy to expand joining two cables together. <p>Disadvantages of Bus Topology</p> <ol style="list-style-type: none"> 1. Cables fails then whole network fails. 2. If network traffic is heavy or nodes are more the performance of the network decreases.

3. Cable has a limited length.
4. It is slower than the ring topology.

2 RING Topology

It is called ring topology because it forms a ring as each computer is connected to another computer, with the last one connected to the first. Exactly two neighbours for each device.



Features of Ring Topology

ring topology, the computers in the network are connected in a circular fashion, and the data travels in one direction.

Each computer is directly connected to the next computer, forming a single pathway for signals through the network. This type of network is easy to install and manage.

Advantages of Ring Topology

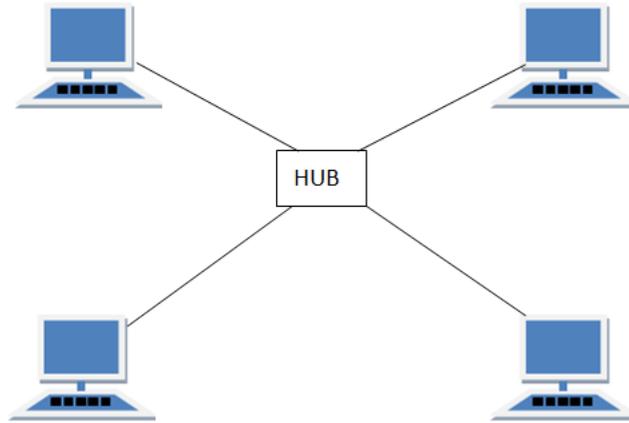
1. Transmitting network is not affected by high traffic or by adding more nodes, as only the nodes having tokens can transmit data.
2. Cheap to install and expand

Disadvantages of Ring Topology

1. Troubleshooting is difficult in ring topology.
2. Adding or deleting the computers disturbs the network activity.
3. Failure of one computer disturbs the whole network.

3 Star topology

In this type of topology all the computers are connected to a single hub through a cable. This hub is the central node and all others nodes are connected to the central node.



Features of Star Topology

1. Every node has its own dedicated connection to the hub.
2. Hub acts as a repeater for data flow.
3. Can be used with twisted pair, Optical Fibre or coaxial cable.

Advantages of Star Topology

1. Fast performance with few nodes and low network traffic.
2. Hub can be upgraded easily.
3. Easy to troubleshoot.
4. Easy to setup and modify.
5. Only that node is affected which has failed, rest of the nodes can work smoothly.

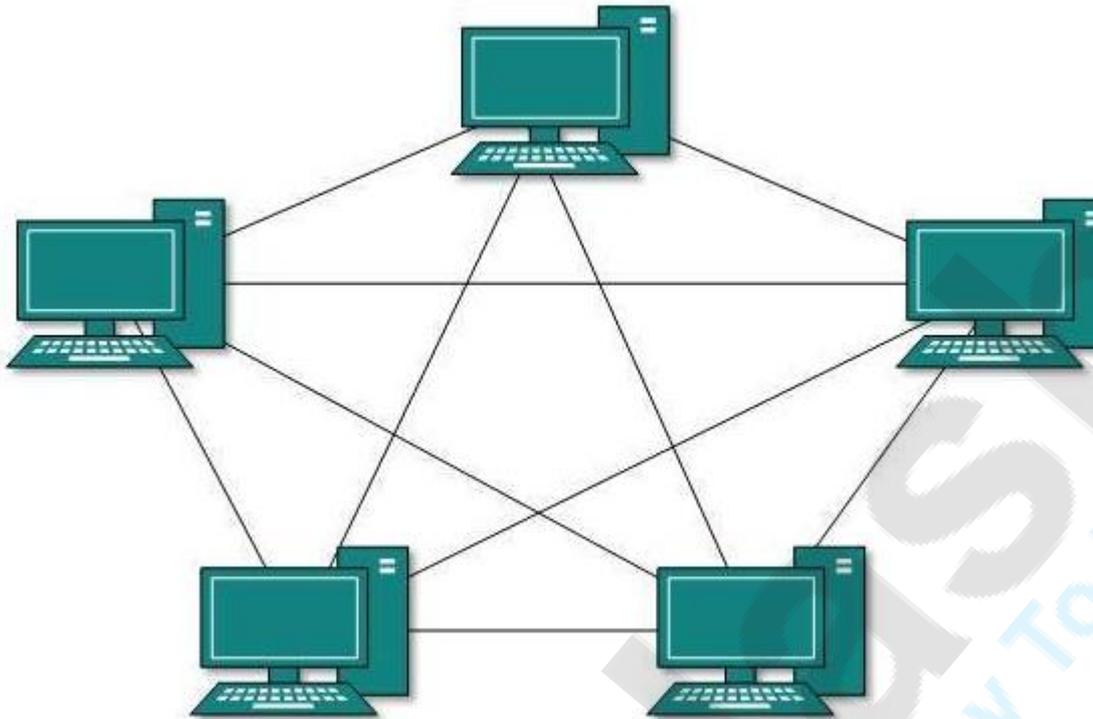
Disadvantages of Star Topology

1. Cost of installation is high.
2. Expensive to use.
3. If the hub fails then the whole network is stopped because all the nodes depend on the hub.
4. Performance is based on the hub that is it depends on its capacity

Mesh Topology:

In this type of topology, a host is connected to one or multiple hosts. This topology has hosts in point-to-point connection with every other host or may also have hosts which are in point-to-point connection to few hosts only.

Hosts in Mesh topology also work as relay for other hosts which do not have direct point-to-point links



Types of Mesh Topology:

1. Full mesh
2. Partial mesh

Full Mesh: All hosts have a point-to-point connection to every other host in the network. Thus for every new host $n(n-1)/2$ connections are required. It provides the most reliable network structure among all network topologies.

Partially Mesh: Not all hosts have point-to-point connection to every other host. Hosts connect to each other in some arbitrarily fashion. This topology exists where we need to provide reliability to some hosts out of all

Advantages of Mesh Topology

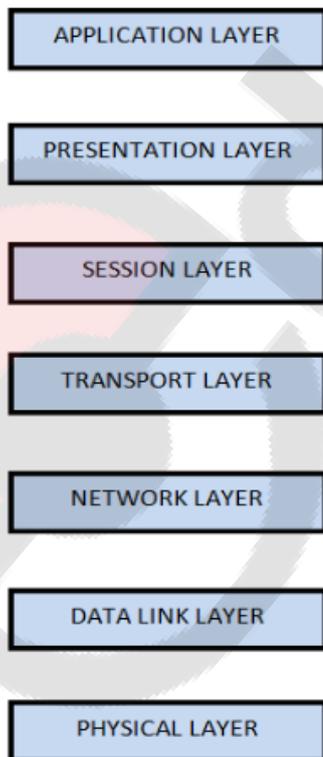
Each connection can carry its own data load.
It is robust.
Fault is diagnosed easily.
Provides security and privacy.

Disadvantages of Mesh Topology

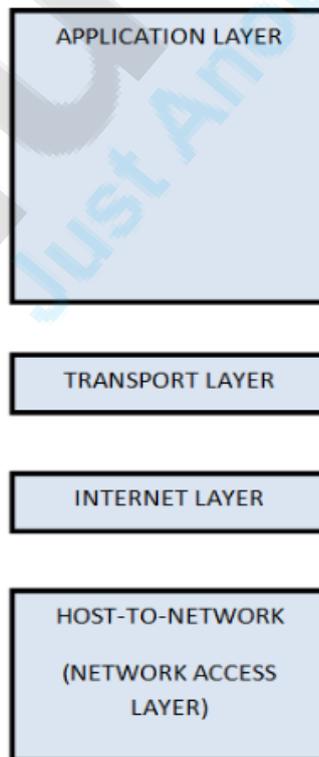
Installation and configuration is difficult.
Cabling cost is more.
Bulk wiring is required

Q2.	<u>difference between OSI and TCP/IP. (2013kt)</u>	
Ans	<p style="text-align: center;">OSI</p> <ol style="list-style-type: none"> 1)It has 7 layers 2)Transport layer guarantees delivery of packets 3)Horizontal approach 4)Seperate presentation layer 5)Seperate session layer 6)Network layer provides both connectionless and connection oriented services 7)It defines the services, interfaces and protocols very clearly and makes a clear distinction between them 8)The protocol are better hidden and can be easily replaced as the technology changes 9)OSI truly is a general model 10)It has a problem of protocol filtering into a model 	<p style="text-align: center;">TCP/IT</p> <ol style="list-style-type: none"> 1)Has 4 layers 2)Transport layer does not gurantees delivery of packets 3)Vertical approach 4)No session layer, characteristics are provided by transport layer 5)No presentation layer, characteristics are provided by application layer 6)Network layer provides only connection less services 7)It does not clearly distinguishes between service interface and protocols 8)It is not easy to replace the protocols 9)TCP/IP can not be used for any other application 10)The model does not fit any protocol stack.

OSI Model



TCP/IP Model



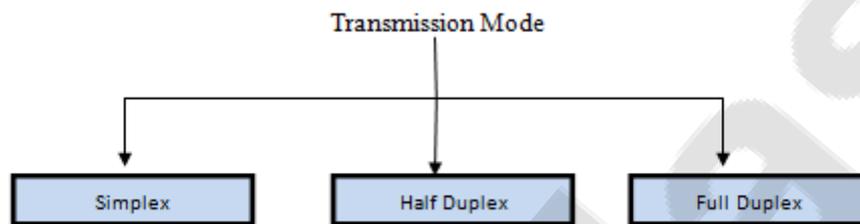
Q.3

Explain Types of communication network.

Transmission Modes in Computer Networks

Transmission mode means transferring of data between two devices. It is also called communication mode. These modes direct the direction of flow of information. There are three types of transmission mode. They are :

- Simplex Mode
- Half duplex Mode
- Full duplex Mode



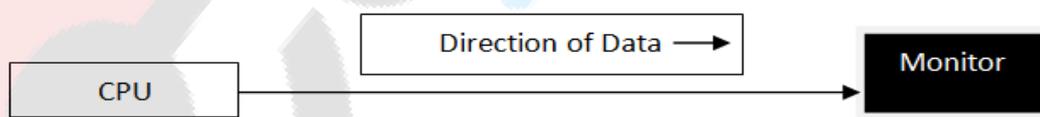
SIMPLEX Mode

In this type of transmission mode data can be sent only through one direction i.e. communication is unidirectional.

We cannot send a message back to the sender. Unidirectional communication is done in Simplex Systems.

A Communication between a [computer](#) and a keyboard involves simplex duplex transmission. A television broadcast is an example of simplex duplex transmission.

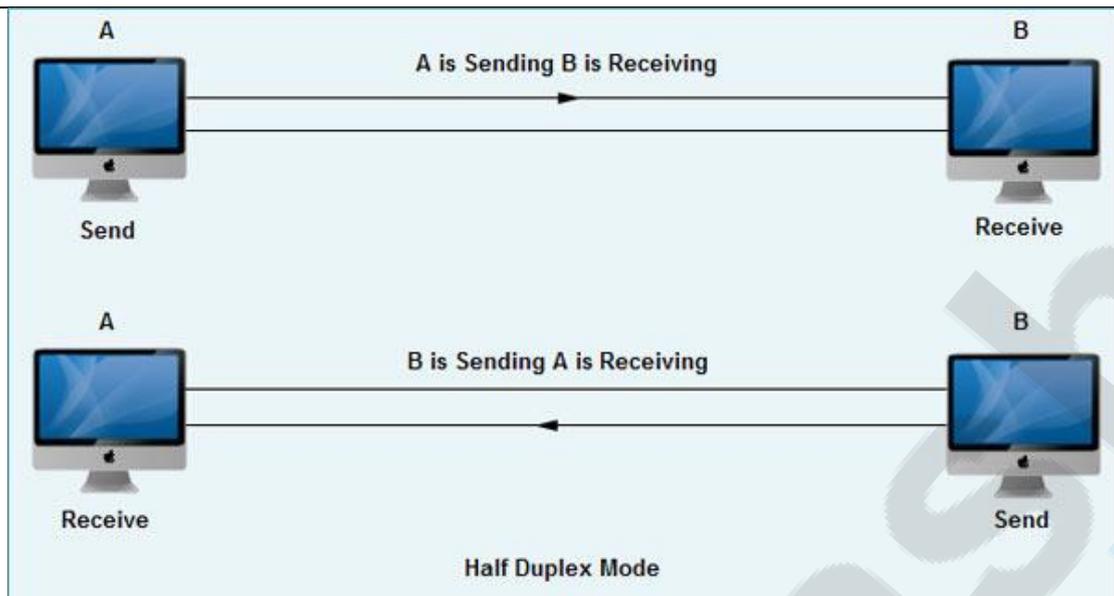
Examples of simplex Mode is loudspeaker, television broadcasting, television and remote, keyboard and monitor etc.



HALF DUPLEX Mode

In half duplex system we can send data in both directions but it is done one at a time that is when the sender is sending the data then at that time we can't send the sender our message. The data is sent in one direction.

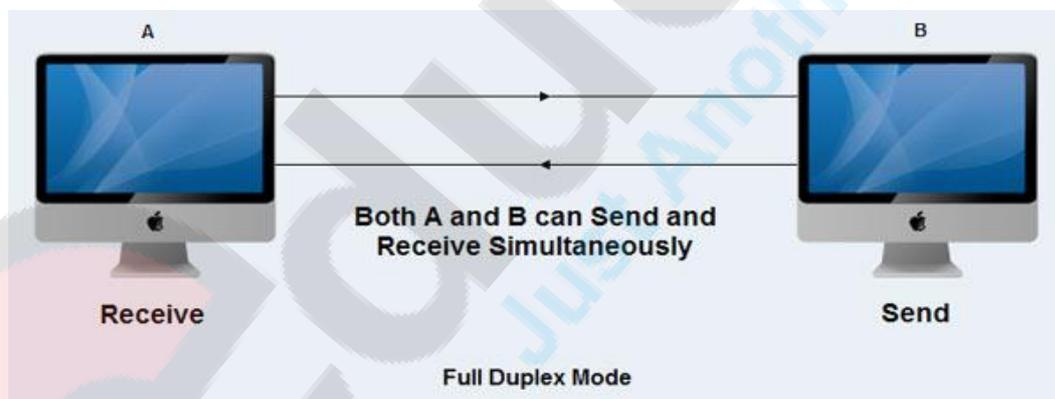
Example of half duplex is a walkie- talkie in which message is sent one at a time and messages are sent in both the directions.



FULL DUPLEX Mode

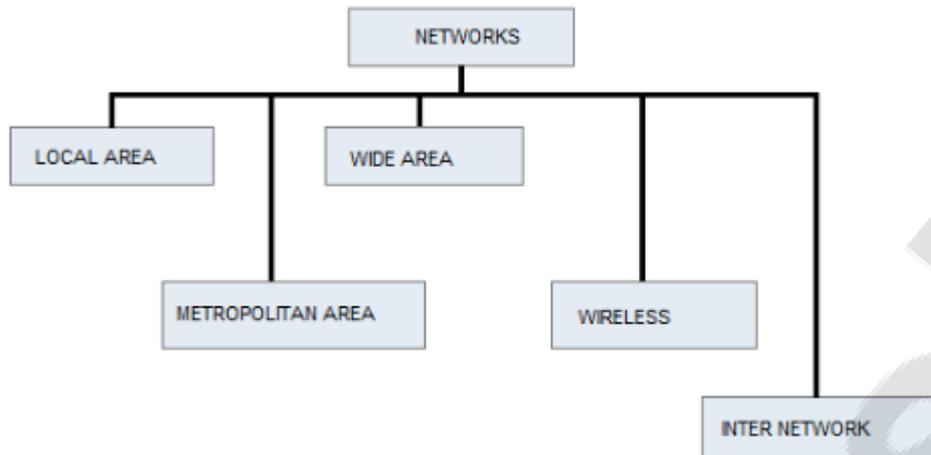
In full duplex system we can send data in both directions as it is bidirectional. Data can be sent in both directions simultaneously. We can send as well as we receive the data.

Example of Full Duplex is a Telephone Network in which there is communication between two persons by a telephone line, through which both can talk and listen at the same time.



Q4

Types of networks

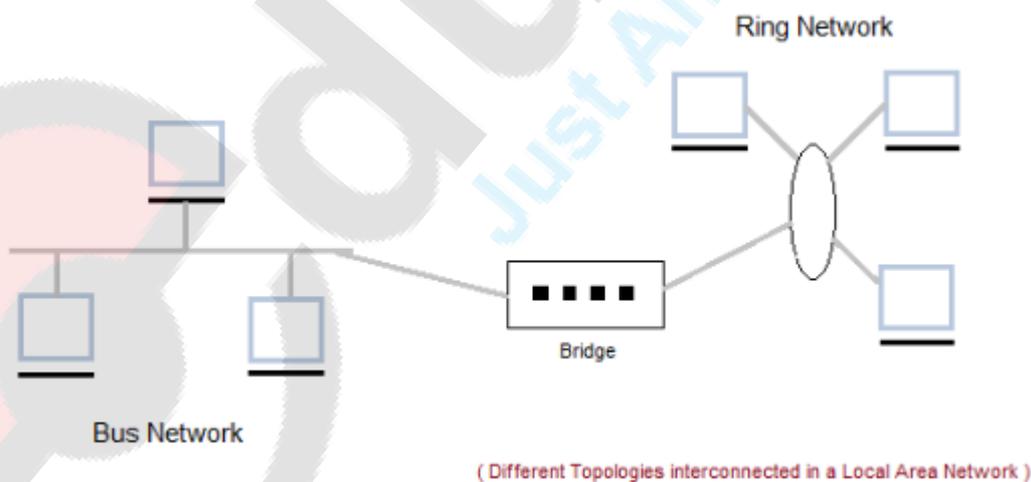


Local Area Network (LAN)

It is also called LAN and designed for small physical areas such as an office, group of buildings or a factory. LANs are used widely as it is easy to design and to troubleshoot. Personal computers and workstations are connected to each other through LANs. We can use different types of topologies through LAN, these are Star, Ring, Bus, Tree etc.

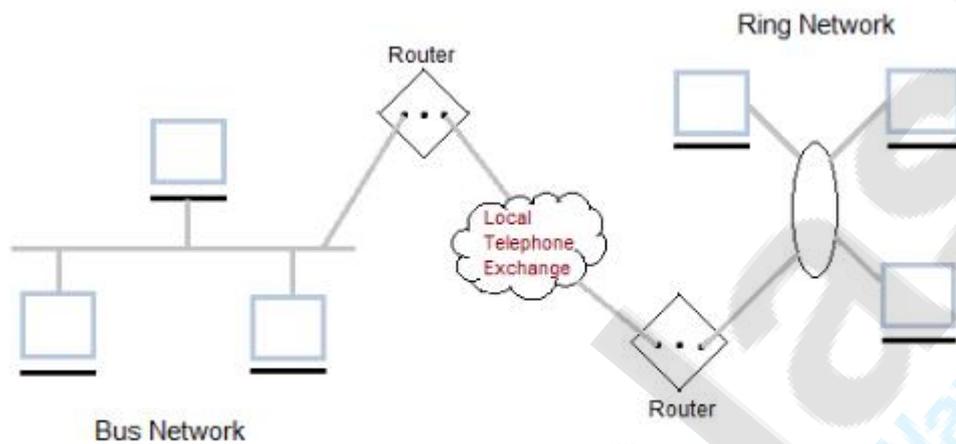
LAN can be a simple network like connecting two computers, to share files and network among each other while it can also be as complex as interconnecting an entire building.

LAN networks are also widely used to share resources like printers, shared hard-drive etc.



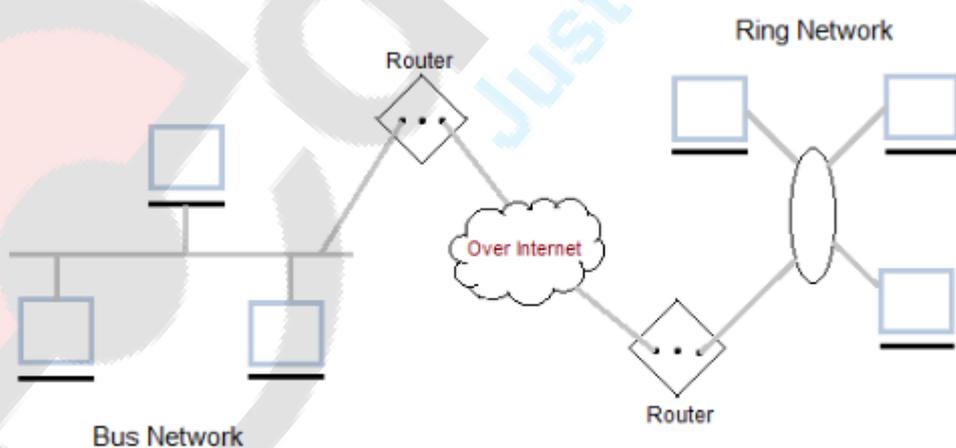
Metropolitan Area Network (MAN)

It is basically a bigger version of LAN. It is also called MAN and uses the similar technology as LAN. It is designed to extend over the entire city. It can be means to connecting a number of LANs into a larger network or it can be a single cable. It is mainly hold and operated by single private company or a public company.



Wide Area Network (WAN)

It is also called WAN. WAN can be private or it can be public leased network. It is used for the network that covers large distance such as cover states of a country. It is not easy to design and maintain. Communication medium used by WAN are PSTN or Satellite links. WAN operates on low data rates.



Wireless Network

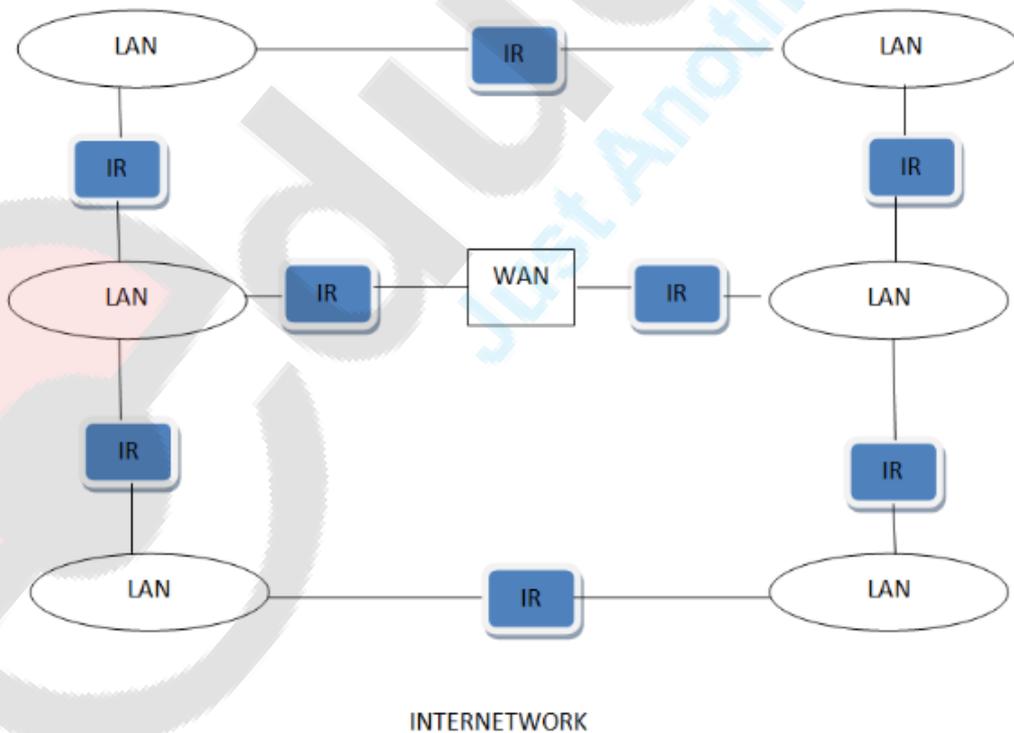
It is the fastest growing segment of computer. They are becoming very important in our

daily life because wire connections are not possible in cars or aeroplane. We can access Internet at any place avoiding wire related troubles.. These can be used also when the telephone systems gets destroyed due to some calamity/disaster. WANs are really important now-a-days.



Inter Network

When we connect two or more networks then they are called internetwork or internet. We can join two or more individual networks to form an internetwork through devices like routers gateways or bridges.



Q4	Explain the term Internet , intranet and extranet(2015)
	<p><u>Internet</u></p> <ul style="list-style-type: none">• Today, the Internet is a public, cooperative and self-sustaining facility accessible to hundreds of millions of people worldwide.• It is a worldwide system which has the following characteristics:• Internet is a world-wide / global system of interconnected computer networks.• Internet uses the standard Internet Protocol (TCP/IP)• Every computer in internet is identified by a unique IP address.• IP Address is a unique set of numbers (such as 110.22.33.114) which identifies a computer's location.• A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.• For example, a DNS server will resolve a name http://www.tutorialspoint.com to a particular IP address to uniquely identify the computer on which this website is hosted.• Internet is accessible to every user all over the world. <p><u>Advantages:</u></p> <ol style="list-style-type: none">1. We can send and receive information across large matrix of computer systems. Through email service, we can send messages for both business and personal purposes. <p><u>Intranet</u></p> <ul style="list-style-type: none">• Intranet is system in which multiple PCs are connected to each other.• PCs in intranet are not available to the world outside the intranet.• Usually each company or organization has their own Intranet network and members/employees of that company can access the computers in their intranet.• Each computer in Intranet is also identified by an IP Address which is unique among the computers in that Intranet.



Extranet

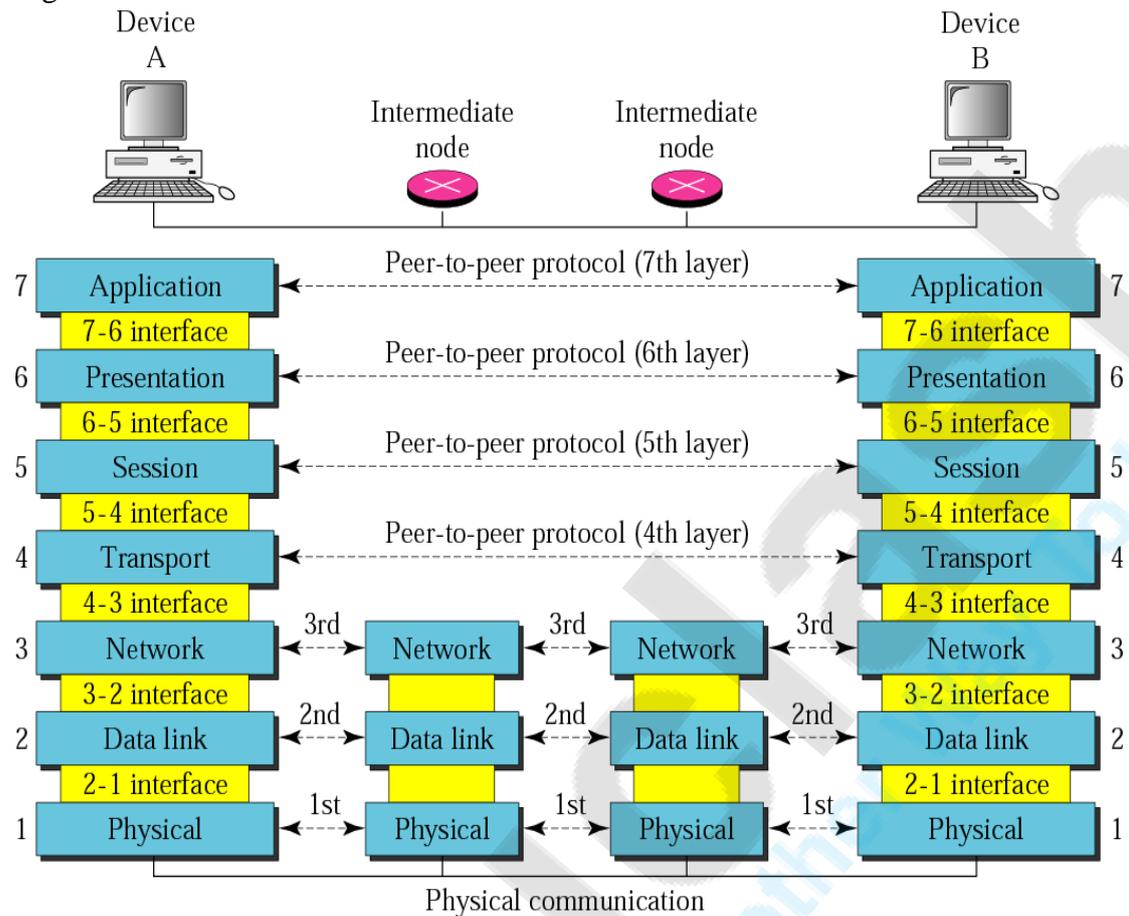
- An extranet is a private network that uses Internet technology and the public telecommunication system to securely share part of a business's information or operations with suppliers, vendors, partners, customers, or other businesses.
- An extranet can be viewed as part of a company's intranet that is extended to users outside the company. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with other companies as well as to sell products to customers

Q 5

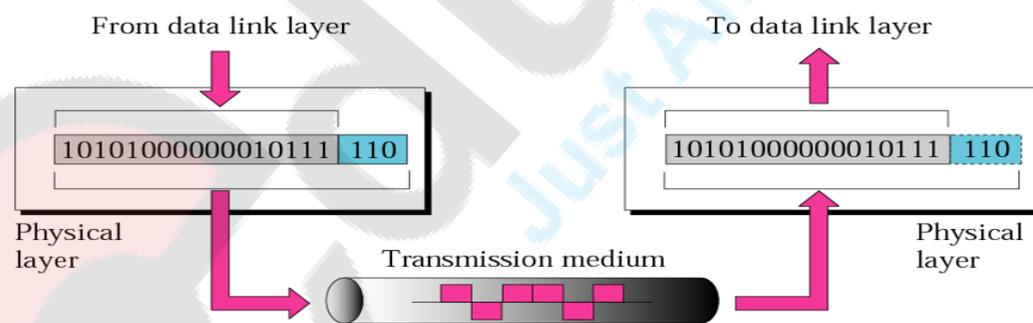
EXPLIAN OSI-ISO REFREANCE MODEL IN DETAIL?(2015)

- There are n numbers of users who use computer network and are located over the world. So to ensure, national and worldwide data communication, systems must be developed which are compatible to communicate with each other. ISO has developed this. ISO stands for **International organization of Standardization**. This is called a model for **Open System Interconnection** (OSI) and is commonly known as OSI model.
- The ISO-OSI model is a seven layer architecture. It defines seven layers or levels in a complete communication system.

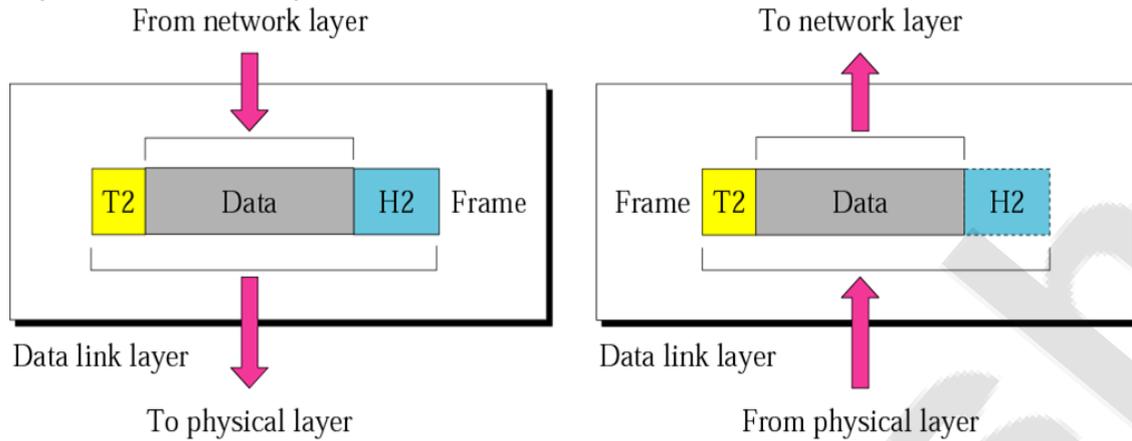
Digram:



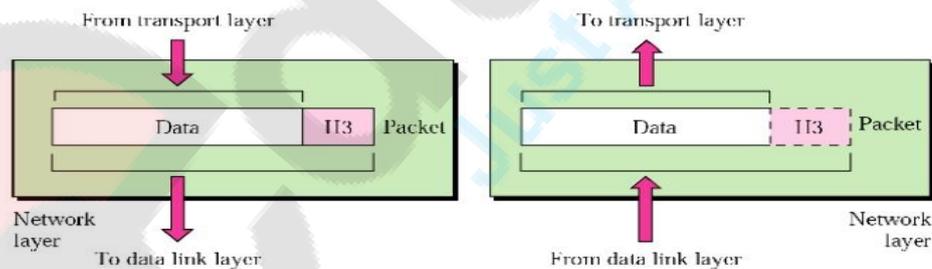
Layer 1: The Physical Layer :



1. It is the lowest layer of the OSI Model.
2. It activates, maintains and deactivates the physical connection.
3. It is responsible for transmission and reception of the unstructured raw data over network.
4. Voltages and data rates needed for transmission is defined in the physical layer.
5. It converts the digital/analog bits into electrical signal or optical signals.
6. Data encoding is also done in this layer.

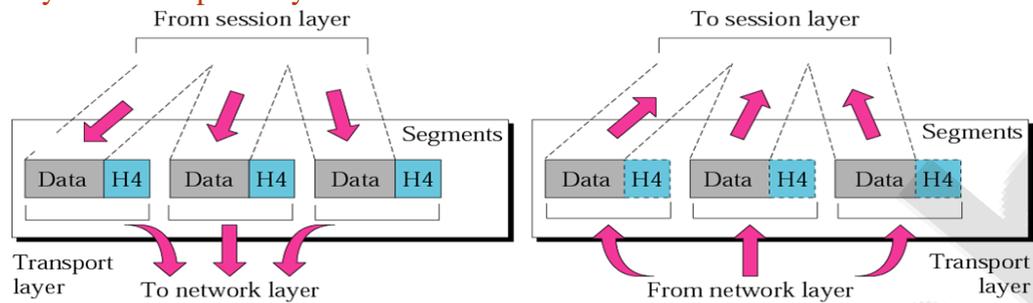
Layer 2: Data Link Layer :

1. Data link layer synchronizes the information which is to be transmitted over the physical layer.
2. The main function of this layer is to make sure data transfer is error free from one node to another, over the physical layer.
3. Transmitting and receiving data frames sequentially is managed by this layer.
4. This layer sends and expects acknowledgements for frames received and sent respectively. Resending of non-acknowledgement received frames is also handled by this layer.
5. This layer establishes a logical layer between two nodes and also manages the Frame traffic control over the network. It signals the transmitting node to stop, when the frame buffers are full.

Layer 3: The Network Layer :**Network Layer**

27

1. It routes the signal through different channels from one node to other.
2. It acts as a network controller. It manages the Subnet traffic.
3. It decides by which route data should take.
4. It divides the outgoing messages into packets and assembles the incoming packets into messages for higher levels.

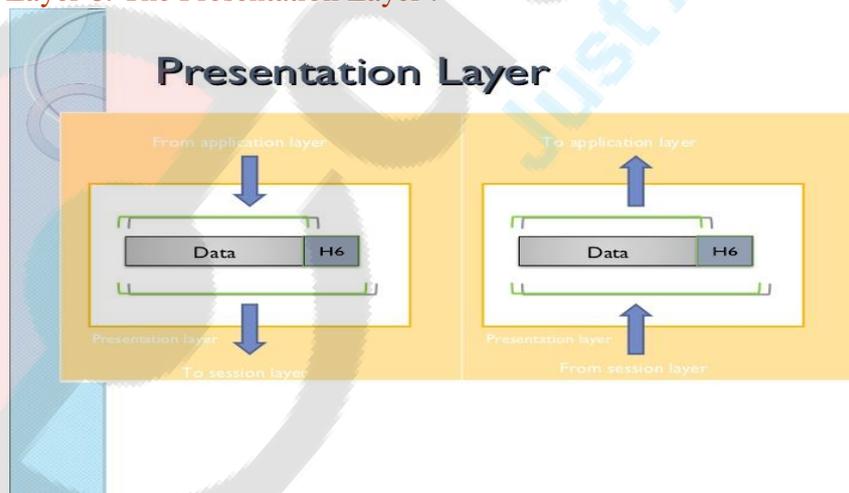
Layer 4: Transport Layer :

1. It decides if data transmission should be on parallel path or single path.
2. Functions such as Multiplexing, Segmenting or Splitting on the data are done by this layer
3. It receives messages from the Session layer above it, convert the message into smaller units and passes it on to the Network layer.
4. Transport layer can be very complex, depending upon the network requirements.

Transport layer breaks the message (data) into small units so that they are handled more efficiently by the network layer.

Layer 5: The Session Layer :

1. Session layer manages and synchronizes the conversation between two different applications.
2. Transfer of data from source to destination session layer streams of data are marked and are resynchronized properly, so that the ends of the messages are not cut prematurely and data loss is avoided.

Layer 6: The Presentation Layer :

Presentation layer takes care that the data is sent in such a way that the receiver will understand the information (data) and will be able to use the data.

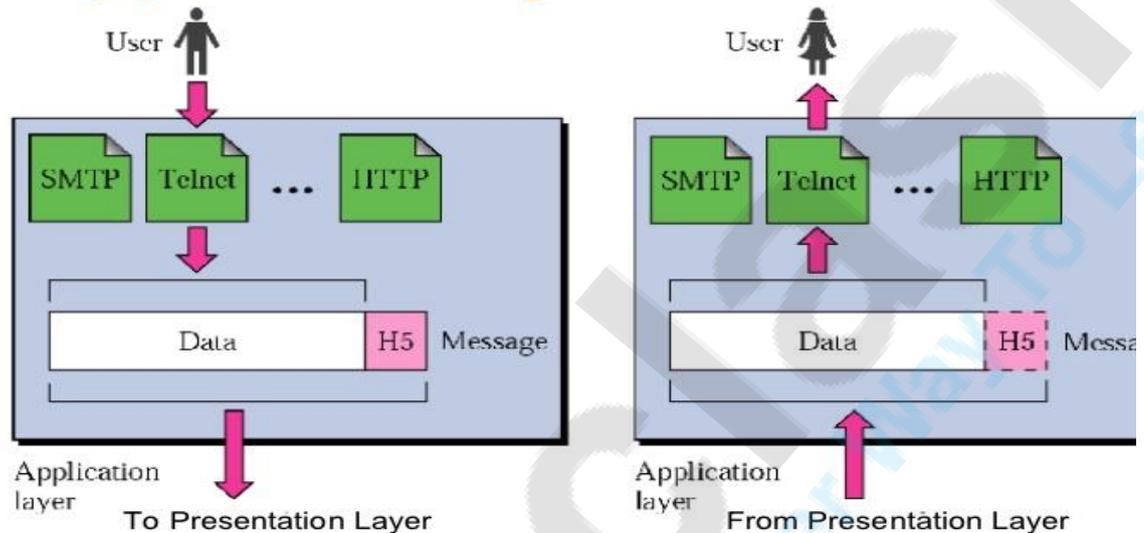
1. While receiving the data, presentation layer transforms the data to be ready for the

application layer.

2. Languages(syntax) can be different of the two communicating systems. Under this condition presentation layer plays a role of translator.
3. It performs Data compression, Data encryption, Data conversion etc.

Layer 7: Application Layer :

Application Layer



1. It is the topmost layer.
2. Transferring of files disturbing the results to the user is also done in this layer. Mail services, directory services, network resource etc are services provided by application layer.
3. This layer mainly holds application programs to act upon the received and to be sent data.

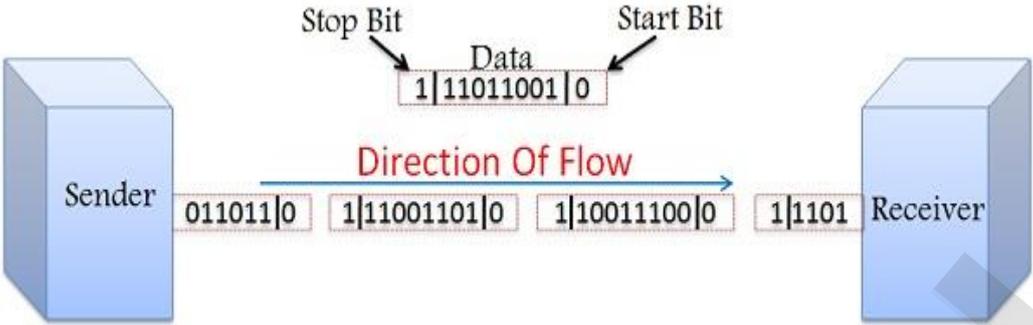
Advantages of OSI reference model:

1. OSI model distinguishes well between the services, interfaces and protocols.
2. Protocols of OSI model are very well hidden.
3. Protocols can be replaced by new protocols as technology changes.
4. Supports connection oriented services as well as connectionless service.

Disadvantages of OSI reference model:

1. Model was devised before the invention of protocols.
2. Fitting of protocols is tedious task.
3. It is just used as a reference model.

Q6	Explain the Type of communication (Synchronous, Asynchronous).
.Ans.	<p><u>SYNCHRONOUS COMMUNICATION</u></p> <p>Sends the data form of block</p> <p>In Synchronous Transmission, data flows in a full duplex mode in the form of blocks or frames.</p> <p>Synchronization between the sender and receiver is necessary so that the sender know where the new byte starts (since there is no gap between the data).</p> <div data-bbox="263 705 1308 996" style="text-align: center;"> <p>The diagram illustrates synchronous communication between a Sender and a Receiver. A blue 3D box on the left is labeled 'Sender' and a blue 3D box on the right is labeled 'Receiver'. A horizontal line connects them, with a blue arrow pointing from the Sender to the Receiver. Above the arrow, the text 'Direction Of Flow' is written in red. Below the arrow, the binary sequence '10011110 11010100 01111010 10101010 1001110' is written, with vertical bars separating the bytes.</p> </div> <p>Synchronous Transmission is efficient, reliable and is used for transferring a large amount of data.</p> <p>It provides real-time communication between connected devices.</p> <p>Chat Rooms, Video Conferencing, telephonic conversations, as well as face to face interactions, are some of the examples of Synchronous Transmission.</p> <p><u>ASYNCHRONOUS COMMUNICATION</u></p> <p>Sends 1 byte or character at a time</p> <p>In Asynchronous Transmission data flows in a half duplex mode, 1 byte or a character at a time.</p> <p>It transmits the data in a continuous stream of bytes. In general, the size of a character sent is 8 bits to which a parity bit is added i.e. a start and a stop bit that gives the total of 10 bits.</p> <p>It does not require a clock for synchronization; rather it uses the parity bits to tell the receiver how to interpret the data.</p>

	 <p>It is simple, fast, economical and does not require a 2-way communication. Letters, emails, forums, televisions and radios are some of the examples of Asynchronous Transmission.</p>
Q7	What are the Design issue of layer?
	<ol style="list-style-type: none"> 1.Addressing 2.Error detection and correction 3.Flow control 4.Sequencing 5.Fragmentation 6.Routing 7.Multiplexing and DE multiplexing <p>1. ADDRESSING In computer network for any reliable data transfer data packets need address of destination and source There are many computer in one network communication is many times between two similar or dissimilar networks so addressing is the main issue in computer networks so addressing is the main issue in computer network to identify each and every computer uniquely</p> <p>2. ERROR DETECTION AND CORRECTION Error control is another design issue of the network in computer because whenever the data is transferred through the transmission media the data may get altered due to transmission or any other reason then receiver will not receive the original data This type of data transfer is as good as no data.so error control is important part of computer network Both sender and receiver should agree with error control protocol and the sender should get some acknowledgment from the receiver about successful data transfer. The sender should get information about bad data also.</p> <p>3.FLOW CONTROL If sender is sending packet continuously with some content transfer rate but the receiver has Slow processor, then in this scenario the receiver cannot receive packet with the same rate and congestion occurs on the network and there is possibility of loss of packets. So flow control is biggest issue of a computer network there must be feedback from receiving computer to provide about the repeatability of the receiving computer .</p>

4.SEQUENCING

At the time of any data transfer whole data packet never travels from sender to Receiver to receiver end but data is divided in number of small packets and it travel through the different network and reaches its destination .
so there is no guarantee that the packets have arrived in the order they were send. Sequence number is important to provide in each packet to reassemble the message correctly.

5.FRAGMENTATION

Transmission media has its own data rate limit based on the characteristics of transmission media long data is divided into number of packets and then transmitted.

This process repeats till receiver's end then the whole data is assemble and the receiver gets the exact message

Assembling and disassembling of dta is another process of computer network

6.ROUTING:

Selection of route for data transfer is very important aspect in communication because parameter data reliability and timely service depend on that Design routing algorithms is another major issue in computer network

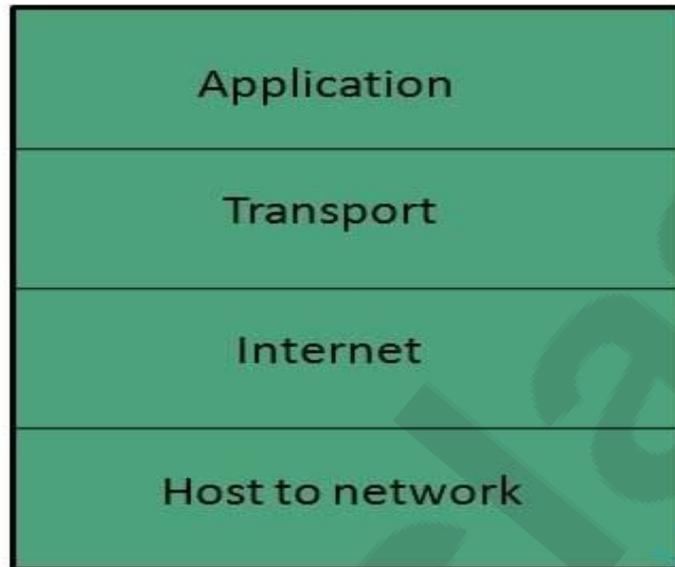
7.MULTIPLEXING AND DEMULTIPLEXING

Multiplexing means using the same connection to send the different messages Are correctly separated which are coming through the same connetion

Demultipulxing means the different messages are correctly separted which are coming through the same connection

Q8	Explain Internet model (TCP/IP)
	<p>TCP/IP model is practical model and is used in the Internet. TCP/IP is acronym of Transmission Control Protocol and Internet Protocol.</p> <p>The TCP/IP model combines the two layers (Physical and Data link layer) into one layer i.e. Host-to-Network layer. The following diagram shows the various layers of TCP/IP model:</p>

TCP/IP Model



Application Layer

This layer is same as that of the OSI model and performs the following functions:

- It provides different services such as manipulation of information in several ways, retransferring the files of information, distributing the results etc.
- The functions such as LOGIN or password checking are also performed by the application layer.

Protocols used: TELNET, FTP, SMTP, DN, HTTP, NNTP are the protocols employed in this layer.

Transport Layer

It does the same functions as that of transport layer in OSI model. Here are the key points regarding transport layer:

- It uses **TCP** and **UDP** protocol for end to end transmission.
- TCP is reliable and **connection oriented protocol**.
- TCP also handles flow control.
- The UDP is not reliable and a **connection less protocol** also

does not perform flow control.

Protocols used: TCP/IP and **UDP** protocols are employed in this layer.

Internet Layer

The function of this layer is to allow the host to insert packets into network and then make them travel independently to the destination.

However, the order of receiving the packet can be different from the sequence they were sent.

Protocols used: Internet Protocol (IP) is employed in Internet layer.

Host-to-Network Layer

This is the lowest layer in TCP/IP model.

The host has to connect to network using some protocol, so that it can send IP packets over it.

This protocol varies from host to host and network to network.

Protocols used: ARPANET, SATNET, LAN, packet radio are the protocols which are used in this layer.

Advantages of TCP/IP model

1. It operated independently.
2. It is scalable.
3. Client/server architecture.
4. Supports a number of routing protocols.
5. Can be used to establish a connection between two computers.

Disadvantages of TCP/IP

1. In this, the transport layer does not guarantee delivery of packets.
2. The model cannot be used in any other application.
3. Replacing protocol is not easy.
4. It has not clearly separated its services, interfaces and protocols.

Q8	What are the Types of protocols?
Ans.	<p>Protocols protocol is the special set of rules that end points in a telecommunication connection use when they communicate. Protocols specify interactions between the communicating entities.</p> <p>Types of protocols</p> <p>Transmission Control Protocol (TCP)</p> <p>TCP is a connection oriented protocol and offers end-to-end packet delivery. It acts as back bone for connection</p> <p>features:</p> <ul style="list-style-type: none">• Transmission Control Protocol (TCP) corresponds to the Transport Layer of OSI Model.• TCP is a reliable and connection oriented protocol.• TCP offers:<ul style="list-style-type: none">○ Stream Data Transfer.○ Reliability.○ Efficient Flow Control○ Full-duplex operation.○ Multiplexing.• TCP offers connection oriented end-to-end packet delivery.• TCP ensures reliability by sequencing bytes with a forwarding acknowledgement number that indicates to the destination the next byte the source expect to receive.• It retransmits the bytes not acknowledged with in specified time period. <p>TCP Services</p> <p>TCP offers following services to the processes at the application layer:</p> <ul style="list-style-type: none">• Stream Delivery Service

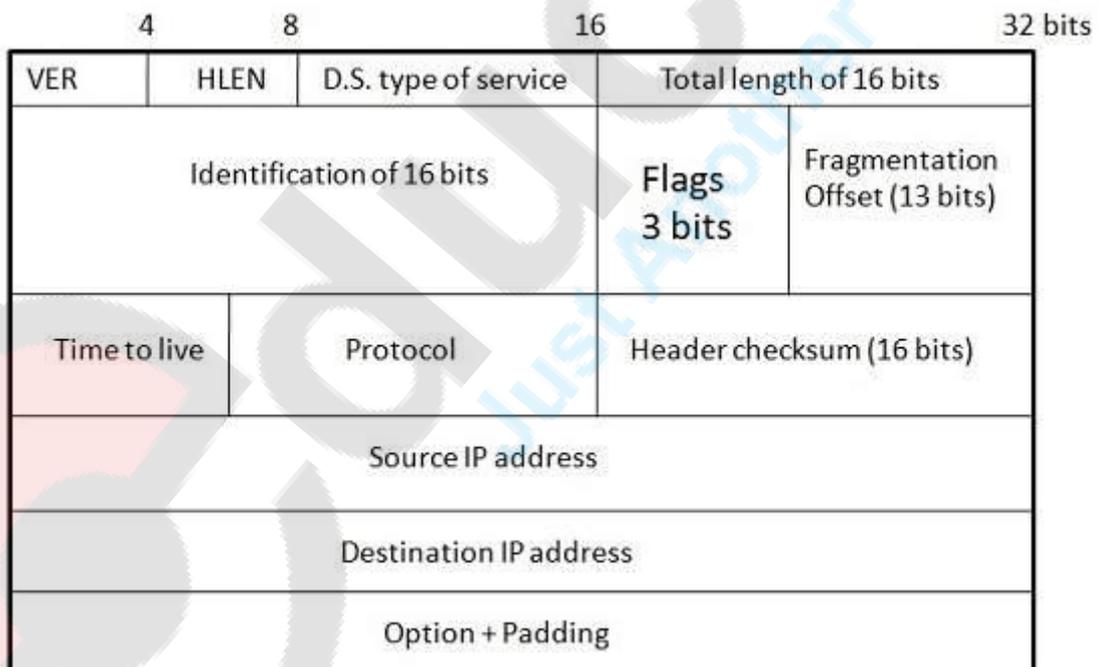
- Sending and Receiving Buffers
- Bytes and Segments
- Full Duplex Service
- Connection Oriented Service
- Reliable Service

Internet Protocol (IP)

Internet Protocol is **connectionless** and **unreliable** protocol. It ensures no guarantee of successfully transmission of data.

In order to make it reliable, it must be paired with reliable protocol such as TCP at the transport layer.

Internet protocol transmits the data in form of a datagram as shown in the following diagram:



Points to remember:

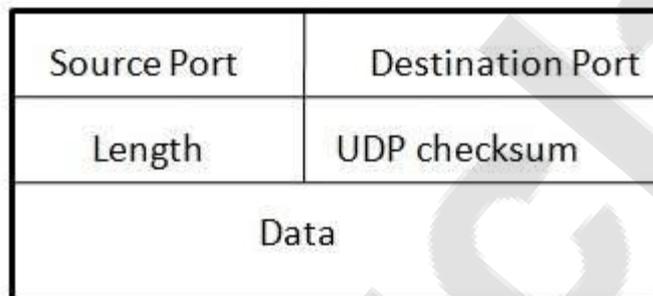
- The length of datagram is variable.
- The Datagram is divided into two parts: **header** and **data**.

- The length of header is 20 to 60 bytes.
- The header contains information for routing and delivery of the packet.

User Datagram Protocol (UDP)

Like IP, UDP is connectionless and unreliable protocol. It doesn't require making a connection with the host to exchange data. Since UDP is unreliable protocol, there is no mechanism for ensuring that data sent is received.

UDP transmits the data in form of a datagram. The UDP datagram consists of five parts as shown in the following diagram:



Points to remember:

- UDP is used by the application that typically transmit small amount of data at one time.
- UDP provides protocol port used i.e. UDP message contains both source and destination port number, that makes it possible for UDP software at the destination to deliver the message to correct application program.

File Transfer Protocol (FTP)

FTP is used to copy files from one host to another. FTP offers the mechanism for the same in following manner:

- FTP creates two processes such as Control Process and Data Transfer Process at both ends i.e. at client as well as at server.
- FTP establishes two different connections: one is for data transfer and other is for control information.

- **Control connection** is made between **control processes** while **Data Connection** is made between
- FTP uses **port 21** for the control connection and **Port 20** for the data connection.

