4132COMPUTER COMMUNICATION AND NETWORKS

Module I

PART A

Answer all questions in one word or one sentence.

1. Which data communication method is used to send data over a serial communication link?

   Full duplex
2. The OSI model consists of _____ layers

   Seven
3. _____ is a network that connects machines and people within a small area

   LAN
4. OSI stands for _____

   Open system interconnection
5. List Layers in TCP/IP model

   Application Layer
   Transport Layer (TCP/UDP)
   Network/Internet Layer (IP)
   Data Link Layer (MAC)
   Physical Layer
6. List any 4 topologies

   Bus, Star, Ring, Mesh
7. Define a network

   A network is a group of two or more computers or other electronic devices that are interconnected for the purpose of exchanging data and sharing
8. Define topology

   A network topology is the physical and logical arrangement of nodes and connections in a network.
9. List the components of data communication

   Message
   Sender
   Receiver
   Transmission Medium
   Protocol
10. List any two network types

    LAN, MAN, WAN, SAN, CAN
11. List different dataflow modes in communication

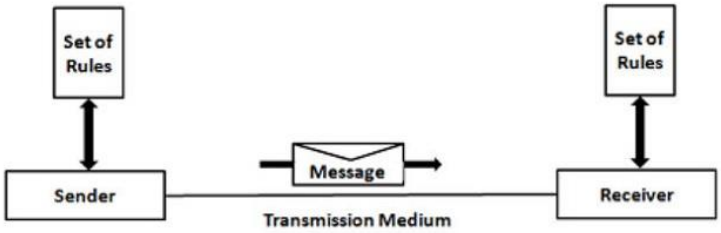
    Simplex, half duplex, full duplex

Questions& Answers

12. What are the elements of data communication?

    The elements of data communication are:

    - *Message:* The message is the information (data) to be communicated. Popular forms of information include text, numbers, pictures, audio, and video.



- *Sender:*The sender is the device that sends the data message. It can be a computer, workstation, telephone handset, video camera, and so on.
- *Receiver:*The receiver is the device that receives the message. It can be a computer, workstation, telephone handset, television, and so on.
- *Transmission medium:*The transmission medium is the physical path by which a message travels from sender to receiver. Some examples of transmission media include twisted-pair wire, coaxial cable, fiber-optic cable, and radio waves.
- *Protocol:* A protocol is a set of rules that govern data communications. It represents an agreement between the communicating devices. Without a protocol, two devices may be connected but not communicating.

13. Compare LAN, MAN and WAN

Basis	**LAN**	**MAN**	**WAN**
Full-Form	LAN stands for local area network.	MAN stands for metropolitan area network.	WAN stands for wide area network.
Geographic Span	Operates in small areas such as the same building or campus.	Operates in large areas such as a city.	Operates in larger areas such as country or continent.
Transmission Speed	The transmission speed of a LAN is high.	While the transmission speed of a MAN is average.	Whereas the transmission speed of a WAN is low.

14. What are the Characteristics of Data Communications?

The effectiveness of a Data Communication and Computer Networks system depends on four fundamental characteristics: delivery, accuracy, timeliness, and jitter.

- Delivery**:** The system must deliver data to the correct destination. Data must be received by the intended device or user and only by that device or user.

- **Accuracy:** The system must deliver the data accurately. Data that have been altered in transmission and left uncorrected are unusable.
- **Timeliness:** The system must deliver data in a timely manner. Data delivered late are useless. In the case of video and audio, timely delivery means delivering data as they are produced, in the same order that they are produced, and without significant delay. This kind of delivery is called real-time transmission.
- **Jitter:** Jitter refers to the variation in the packet arrival time. It is the uneven delay in the delivery of audio or video packets. For example, let us assume that video packets are sent every 3D ms. If some of the packets arrive with 3D-ms delay and others with 4D-ms delay, an uneven quality in the video is the result.

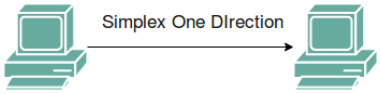
15. Explain different data flow modes in communication

The way in which data is transmitted from one device to another device is known as data flow.

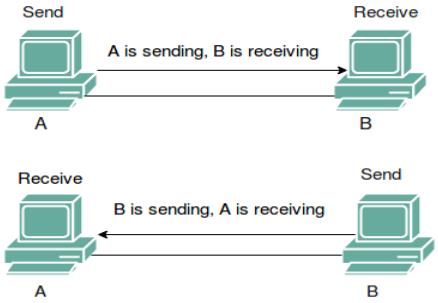
The flow of data is divided into three categories:

Simplex mode
Half-duplex mode
Full-duplex mode

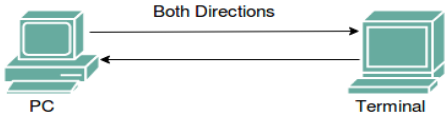
In Simplex mode, the communication is unidirectional, i.e., the data flow in one direction.



In a Half-duplex channel, direction can be reversed, i.e., the station can transmit and receive the data as well.



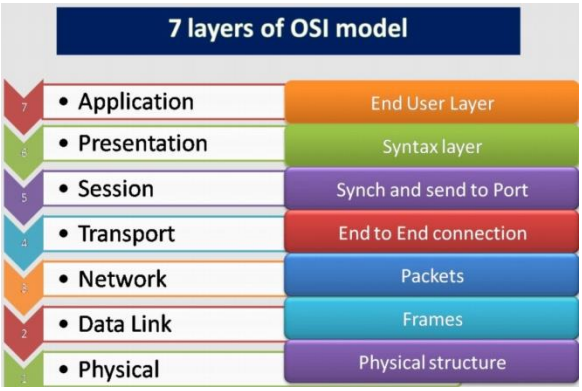
In Full duplex mode, the communication is bi-directional, i.e., the data flow in both the directions.



16. Summarize OSI model architecture

OSI (Open Systems Interconnection) is a reference model for how applications communicate over a network.

This model focuses on providing a visual design of how each communications layer is built on top of the other, starting with the physical cabling, all the way to the application that's trying to communicate with other devices on a network.



17. Compare OSI model and TCP/IP model

OSI	**TCP/IP**
OSI represents Open System Interconnection.	TCP/IP model represents the Transmission Control Protocol / Internet Protocol.
OSI is a generic, protocol independent standard. It is acting as an interaction gateway between the network and the final-user.	TCP/IP model depends on standard protocols about which the computer network has created. It is a connection protocol that assigns the network of hosts over the internet.
The OSI model was developed first, and then protocols were created to fit the network architecture's needs.	The protocols were created first and then built the TCP/IP model.
The OSI model represents defines administration, interfaces and conventions. It describes clearly which layer provides services.	It does not mention the services, interfaces, and protocols.
It provides both connection and connectionless oriented transmission in the network layer; however, only connection-oriented transmission in the	It provides connectionless transmission in the network layer and supports connecting and connectionless-oriented transmission in the

OSI	TCP/IP
transport layer.	transport layer.
It uses a horizontal approach.	It uses a vertical approach.
The smallest size of the OSI header is 5 bytes.	The smallest size of the TCP/IP header is 20 bytes.

18. Write notes on TCP/IP protocol suit

    TCP/IP stands for Transmission Control Protocol/Internet Protocol and is a suite of communication protocols used to interconnect network devices on the internet. The TCP/IP protocol suite functions as an abstraction layer between internet applications and the routing and switching fabric.

    TCP/IP functionality is divided into four layers, each of which includes specific protocols:

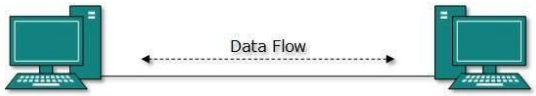
    - Application layer
    - Transport layer
    - Network layer
    - Physical layer

19. Explain various network topologies

    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.

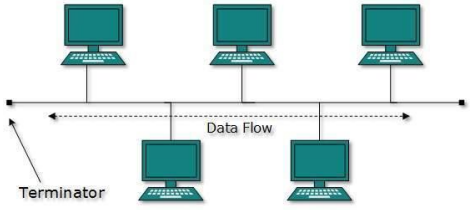
    Point-to-Point

    Point-to-point networks contains exactly two hosts such as computer, switches or routers, servers connected back to back using a single piece of cable.



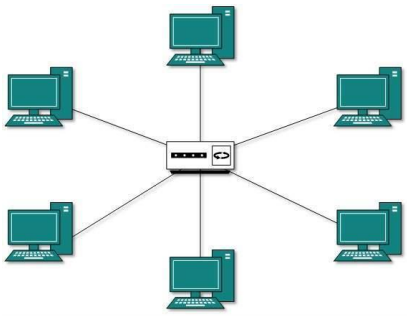
    Bus Topology

    In Bus topology, all devices share single communication line or cable. It is one of the simple forms of networking where a failure of a device does not affect the other devices.



    Star Topology

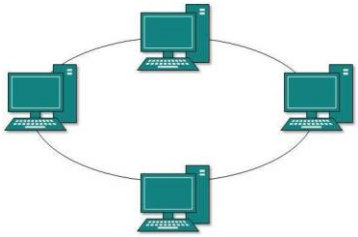
    All hosts in Star topology are connected to a central device, known as hub device, using a point-to-point connection.



Every communication between hosts, takes place through only the hub.

Ring Topology

In ring topology, each host machine connects to exactly two other machines, creating a circular network structure. When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts..



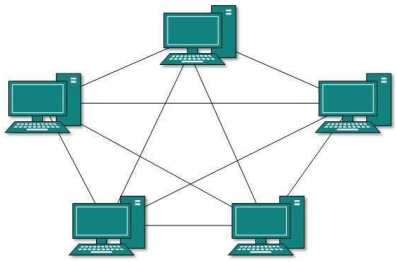
Failure of any host results in failure of the whole ring.

Mesh Topology

In this type of topology, a host is connected to one or multiple hosts.

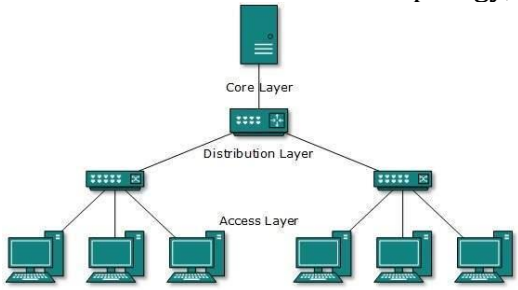
Mesh technology comes into two types:

- **Full Mesh**: All hosts have a point-to-point connection to every other host in the network. 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



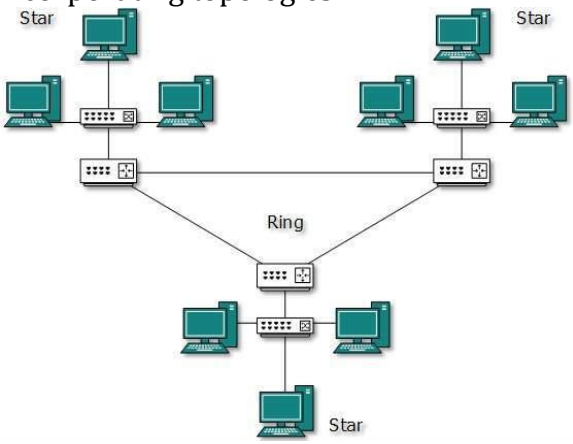
Tree Topology

Also known as Hierarchical Topology, this is the most common form of network.



Hybrid Topology

A network structure whose design contains more than one topology is said to be hybrid topology. Hybrid topology inherits merits and demerits of all the incorporating topologies.



The above picture represents an arbitrarily hybrid topology. The combining topologies may contain attributes of Star, Ring, and Bus topologies.