UNIQUE NOTES

UNIT 03

NETWORKS

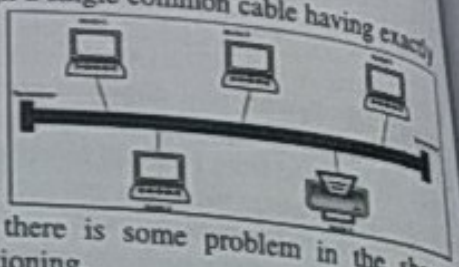
Q.1 What is network Topology? Describe Bus, Star, Ring and Mesh Topologies with a diagram of each.

Ans: Network Topologies

Topology of a network is a geometric representation of the relationship among the interconnected devices.

1. Bus Topology

A bus topology connects all devices of the network through a single common cable having exactly two end points as shown in Figure. This cable is called backbone of the topology. Bus topology offers a simple way to connect devices. All of the devices of the network are connected to a common transmission medium which has exactly two endpoints. In this simple form of networking, failure of any single device does not affect other devices connected with the cable. However, if there is some problem in the shared communication cable, then all other devices can stop functioning.



Advantages of Bus Topology

- It is simple and reliable for every small network.
- It is easy to install.
- Easy to add new computers.
- It requires minimum length of communication cable.

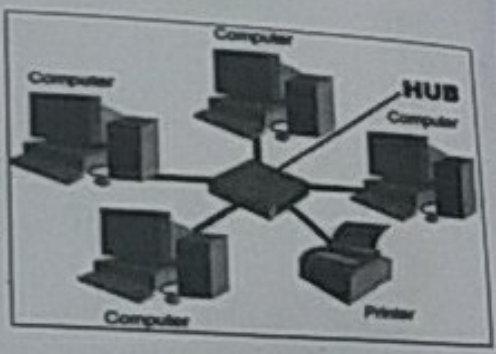
Limitations of Bus Topology

- It can support only a small numbers of computers.
- Difficult to detect and fix faults.
- If bus is damaged at any point, the entire network stops working.

2. Star Topology

In star topology all devices are connected to a central device called switch or hub as shown in Figure.

Each computer on star networks communicates with the central hub. The hub then sends data to the destination computer or computers. The central device controls all the traffic. Therefore, devices can transfer data to each other only through the central point.



Advantages of Star Topology

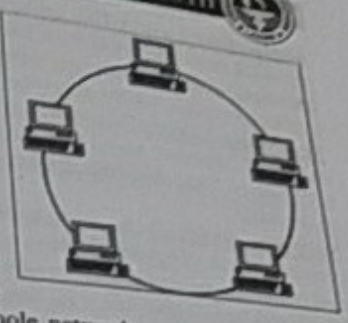
- It is easy to modify a star network. New computers can be added to the central hub or any computer can be removed without affecting the network.
- Easy to detect and fix faults.
- Failure of one computer cable does not affect the function of the entire network.

Limitation of Star Topology

- If the central hub fails, the whole network breaks down.
- Lengthy cable is required to connect the entire computer to the switch.

3. Ring Topology

A ring topology connects a computer with exactly two other computers forming a ring of computers as shown in figure. A computer can send data to its immediate neighbor. A ring can be unidirectional or bidirectional.



Unidirectional Ring Topology: In a unidirectional ring topology, data is sent either clockwise or anticlockwise.

Bidirectional Ring Topology: In a bidirectional ring topology, data can travel in any direction.

Upon receiving data, a computer may pass data to its next neighbor. In this way, data reaches the desired destination. A failure of connection between two computers may down the whole network.

Main difference with Star Topology:

Unlike star topology, it does not require a central device (hub or switch) to manage the connectivity between the devices.

Advantages of Ring Topology

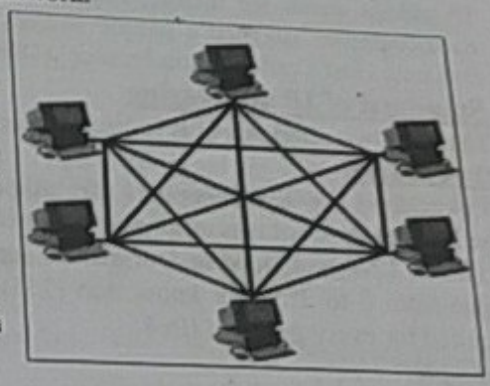
- All computers on the ring have equal access to the network.
- Server or switch is not required to manage the network.

Limitations of Ring Topology

- Failure of one computer can affect the whole network.
- Detect of fault is difficult.

4. Mesh Topology

Mesh topology connects all devices with each other through a direct link as shown in Figure. Message sent on a mesh network, can take any possible path from source to destination. It is not commonly used since it is costly and difficult to implement.



Advantages of Mesh Topology

- It is the most reliable network topology.
- Alternative paths are available in case a path is broken from source to destination.

Limitations of Mesh Topology

- It is most expensive topology to be implement. It required more cable than other topologies.
- Difficult to implement as compared to other topologies.

Q. 2 What is TCP/IP Model? Describe its five layers with their functions. 09583002

Ans: There are two computer network models i.e. OSI Model and TCP/IP Model on which the whole data communication process relies.

TCP/IP Model: The whole communication process is carried out in different layers, where each layer performs one or more specific tasks. The Internet also uses a layered communication model called the Transmission Control Protocol/Internet Protocol (TCP/IP) model. The TCP/IP is a suit of protocols that provides end-to-end connectivity between devices.

It consists of five layers as shown in Table

Application Layer
Transport Layer
Network Layer
Data Link Layer
Physical Layer

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Application Layer: The application layer manage how two applications work with each other. It provides network service to user application. While chatting you are concerned only about the message without bothering about the kind of network, i.e., wireless or wired. This is called application layer where you type a message and send on the network.

Transport Layer: Transport layer control the flow of data . It ensure that data or messages are delivered without any error. It Establishes connections between a client and a server. If the network is fine, then the application trusts the transport layer that the message will reach at its destination.

Network layer: It is responsible for establishing, maintaining and terminating the network connection. A program running on the network layer moves the data to the other network. So, a chat message is transferred to other Wi-Fi router of your friend from where it is delivered to your friend and he/she can see it on screen.

Data Link Layer: It sends a message to the server connected with sender. If you are chatting at home with a Wi-Fi connection, then the data link layer sends message from your computer to the Wi-Fi router.

Physical Layer: Physical layer is about the physical medium used in communication, like cabling etc.

Q.3 What are the sizes of IPv4 and IPv6? Explain the method to calculate the size of these both standards. 09/2020

Ans: IP Addressing

IP address stands for Internet Protocol address. To identify individual computers on a network, each computer assigned a unique address called an IP address. An IP address is assigned by a Dynamic Host Configuration Protocol (DHCP) server.

Standard of IP addressing

There are two standards of IP addressing i.e., IPv4 and IPv6.

IPv4 address

IPv4 address is a 32 bit numbers that uniquely identifies a network interface on a machine. When the Internet Protocol was originally designed, the standard was known as Internet Protocol Version 4 (IPv4). IPv4 is divided in four groups separated by '.' where each group can contain a decimal value from 0 to 255. We know that $(255)_{10} = (11111111)_2$. It shows that maximum 8 bits are required for every group of IPv4.

Example:

- IPv4 address is like: 172.16.54.1

Due to more and more devices connecting to the Internet, IPv4 address are running out. To accommodate the increase in devices, another standard of IP addressing is introduced which is called Internet Protocol Version 6 (IPv6).

IPv6 address

IPv6 address is a 128 bits numbers that uniquely identifies a network interface on a machine. In IPv6, there are 8 groups separated by '.'. Each group can contain 4 hexadecimal digits. To store one hexadecimal digit, we need 4 bits. So, for a group in IPv6 we need 16 bits and for 8 groups total 128 bits are required.

- 1 hexadecimal digit requires 4 bits
- 4 hexadecimal digits requires 16 bits
- 1 group has 4 hexadecimal digits, so each group requires $4 \times 4 = 16$ bits
- 8 groups require $8 \times 16 = 128$ bits.

Example:

IPv6 address is like: 2001:db8:0:1234:0:567:8:1

Q.4 What is need and importance of addressing in data communication. 09/2004

Ans: Some importance of addressing are following.

- Every computer connected to internet has a unique address. A computer is on network is accessed by its address.
- Before sending a message, source must know the destination address. Devices on a network need addresses in order to communicate with each other.
- A packet is the unit of data sent from one device to another. It requires its destination address.
- An application running on the recipient side accepts packets and assembles them to show a meaningful information.
- Giving an address to a message is the first step and the second step is to transmit the packet to its intended recipients.

Q.4 Explain Client and Server. 09503005

Ans: **Client:** A Client is a less powerful computer as compared to server computer. It relies on server for resources, such as files, devices, and even processing power. It is important to know whether a client is hardware or software. But in particular the software running on that hardware is the process which makes it a client.

Server: Server is a powerful computer that facilitates the whole network by providing variety of services to the computer or devices, connected to the network. A server is a physical computer dedicated to run services to serve the needs of its clients. Depending on the service that is running, it could be a file server, database server, print server, or a web server.

Communication between Server and Client

Server is a main computer in a network which is used to manage network resources and facilities for other computers. Clients and servers exchange message in a request – response messaging pattern. Client is a program or machine that sends requests to the servers. While a server is a program or a machine that waits for incoming requests from the client and response according to the request of client. When we access a website, we get contents on our screen served by a server.

Example: To check email we use web browser as a client. The client provides a user interface to carry out actions, like giving username and password. It forwards requests to the server, which in return provides the requires service.

Q.5 What is data communication? Explain main components of a communication system. 09503006

Ans: Data communication refers to exchange of messages between sending and receiving devices through some communication medium.

These messages are actually the information which can be presented in many forms like text, numbers, images, audio and video.

Components of a Communication System

A data communication system is a collection of hardware and software arranged to communicate information from one location to another.

Example: If you want to send your picture from your computer or cell phone to someone else, you need a communication system. Following are the components of data communication system.

1. **Sender:** It is the device which sends the message. In other words, it is the source of message that can be a computer, telephone handset, Laptop etc. It is also called transmitter.
2. **Receiver:** It is the device which receives the message. In other words it is the destination of message that can be a computer, radio, telephone handset, printer etc. It is also called sink.
3. **Message:** It is the data to be transmitted. It can be text, graphics, image, sound or video.

Packets: In a data communication system, a message is sent in the form of packets.

Parts of Packets: Each message had two parts

(i) Payload (ii) Control information.

(i) Payload: It is the actual content of a message.

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(iii) **Control information:** It contains information about the sender and the receiver. Control information is also called **header of a message**. It is just like writing a letter where we write the information about its sender and receiver.

4. **Transmission Medium:** Transmission Media is the channel or path through which the data is transferred from one place to another in a computer network. Some examples of transmission media are coaxial cable, fiber optic cable, microwaves, etc.

5. **Protocol:** A protocol is a formal agreement between two parties. A network protocol is a formal agreement between two computers to send and receive information. Network protocol defines a set of rules and procedures for communication between a sender and a receiver.

Q.7 What is computer networking? Describe need or use of computer network. [2020/2021]

Ans: Computer Networking:

A number of computers connected together to communicate with each other through communication medium or channel is called the computer network. The computer connected in a network can exchange information and data. A computer in a network can also use resources of other computers connected to the network.

Need or Use of Networks

In our daily life, we use computers to browse the Internet, send/receive emails, play online games, watch online videos, download music, take online courses, read daily newspapers, etc.

The following are some common uses of networks:

Information Security

Network provides security of data. The data security ensures that the data is accessed only by the authorized users.

Hardware Sharing

Hardware sharing is one of the most popular uses of computer networks in various fields. Networks allows sharing of computer hardware such as hard disk, printer and scanner etc.

Example: A printer can also be connected to a computer to share it with all the other computer users across the network. Every user on network can use it for printing documents and there is no need to buy a printer for every user.

Example: A hard disk can be attached to a server to share it with other network users. A single hard disk can provide storage space to many users.

Application Sharing

Applications can be installed on a server and shared over the network. It means that more than one users may use the same application.

Example: In a bank cashier manager, ATM (Automated Teller Machine) users use same application over the network. Bank balance updated at one point is updated for all branches immediately.

File Sharing

A user of a network can easily share files with other users over the network. A user can place a file in a shared location on one computer and make it available to other users. Users can access, view and modify information stored on another computer in the network.

Example: If all your school teachers want to prepare a combined result using computers, they can share files over a school network or the Internet.

Internet Sharing

A single high speed internet connection can be shared with all the users over a network. There is no need to provide a separate internet connection to every user on the network.

User Communicating

Network allows the users to communicate using e-mail, newsgroups, and video conferencing etc. Communication with many people sitting on different locations is possible due to a network.

Example: A video conference comprises the technologies for the reception and transmission of audio-video signals by users at different locations.

Increasing Storage Capacity

Storage capacity means the limit to store data in a computer. If we connect our computer to another computer having more storage, then we can also use the disk space of that computer. In this way, we can store and access files stored remotely. In this setup, a computer providing the storage is called file server and the computer accessing that space is called a workstation.

Q.8 What are different types of physical structure of networks. 09503008

Ans: Physical structure of networks can be classified in terms of type of connection and topology.

1. Types of connection

Two devices can communicate with each other when they are connected in some way to the same link at the same time. Point to point and multipoint are two possible types of connections.

Point-to-point connection:

A point-to-point connection is a direct link only between two devices, i.e., a sender and a receiver.

Example: Point to point connection between a remote control and a TV.

Multipoint connection:

In multipoint connection, there is a link between a sender and multiple receivers. So, more devices can share a single link.

Example: In a Wi-Fi based network a single link is shared among multiple devices.

2. Network topologies

Topology of a network is a geometric representation of the relationship among the interconnected devices.

Q.9 What is protocol? Describe Some of the most widely used application layer protocols. 09503009

Ans: A protocol is a formal agreement between two parties. A network protocol is a formal arrangement between two computers to send and receive information. Network protocol defines a set of rules and procedures for communication between a sender and a receiver.

Each layer of TCP/IP model has its own protocol(s). Every protocol is designed to perform some specific task. Some of the most widely used application layer protocols are discussed below:

FTP (File Transfer Protocol)

File Transfer Protocol is the standard TCP/IP protocol which is used for the purpose of transferring files from one computer to another.

Example: If we want to transfer a document file to a remote computer, then we can use this protocol.

HTTP (Hypertext Transfer Protocol)

Hypertext Transfer Protocol is a protocol used by Word Wide Web (WWW) to transfer web pages between a client and a web server. A web server is also called an HTTP server. We use this protocol while browsing Internet.

SMTP (Simple Mail Transfer Protocol)

Simple Mail Transfer Protocol is a standard protocol to transmit emails.

Q.10 What is router? Explain routing process in the internet. 09503010

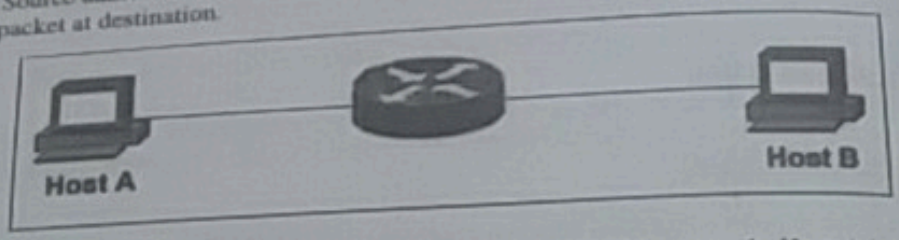
Ans: Router is intelligent device which routes data to destination computers. A router is a networking device that forwards data packets from one network to another. They send information from one network to another by selecting the best pathway available.

A router analyses the destination IP address of an incoming data packet, determines the best route to forward the packet, and then sends it accordingly.

Routing in the Internet: We get the Internet service from some Internet Service Provider (ISP). When we send a request from a device it reaches an ISP where router is installed. A router is usually placed at the meeting point of two or more networks. The router forwards our request

according to header of our message. For communication over the Internet, there may be hundreds of networks between the source and the destination. Hundreds of routers might forward a single packet as it moves from one network to the next on the way to its final destination.

Routing Process: Routing is a process of taking data from one device and sending it to another device on a different network. Every data packet has two addresses; source and destination address. Source address is used to identify the sender device. Destination address is used to deliver the data packet at destination.



Example

Host A wants to communicate with host B, but host B is on another network. Host A is configured to send all packets destined for remote networks to the router. The router receives the packets, checks the routing table to see if it has an entry for the destination address. A routing table is used by routers to determine the path to the destination network. If the entry exists for the destination address, the router forwards the packet out of the appropriate interface port. If the router doesn't find the entry, it discards the packet.

Q.11 Compare Postal system and Layered network system . 09503011

Ans: The concept of layering can be explained with post office example. Suppose you are in Lahore and want to write a letter to your friend in Islamabad. After writing the letter, you insert it in an envelope, write address of your friend on it and drop it in a mailbox. As there may be many people living at the same address, so you write the name of your friend on the envelope. Your nearest post office takes the letter to general post office in Lahore which sends the same to general postal office in Islamabad. Ultimately, the letter reaches at the address and then to your friend. Then, he/she can read the message and write a reply. Here we relate this example with the layered network model of TCP/IP. Assume that two persons are chatting using a computer network.

Postal System	Layered Network
In writing a letter, you consider only writing proper message without concerning about the names of the post office staff who will handle the envelope. Moreover, you do not need to know the details of the mail delivery system. You simply put it in an envelope and write the street address.	While chatting you are concerned only about the message without bothering about the kind of network, i.e., wireless or wired. This is called **application layer** where you type a message and send on the network. The address of the receiving device is provided in the form of header before message content.
You write sender and receiver information over the envelope and put it in the letterbox. If the address is incomplete, you may get your letter back. If everything is fine, you simply trust on the postal system.	**Transport layer** establishes connection between a client and a server. It tries to send message but if there is some error like your computer is disconnected from the network then it informs the application program. If the network is fine, then the application trusts the transport layer that the message will reach at its destination.
The name of the specific person is mentioned who can open and read the letter.	At this stage, port number is added with message header for indication of specific

Postal System	Layered Network
	application at destination. A port number is used to identify the application which can accept a message.
A letter is moved to other city (Islamabad in this example) by road or air.	A program running on the **network layer** moves the data to the other network. So, a chat message is transferred to other Wi-Fi router of your friend from where it is delivered to your friend and he/she can see it on screen.
Handling of letters is same either if they are letters with photographs, Eid card, or containing text, etc.	A network handles all messages in the same way either if they are emails, pictures, or voice messages etc.
Bikes or vans may carry your letter from branches to general post office.	**Data link layer** sends a message to the server connected with sender. If you are chatting at home with a Wi-Fi connection, then the data link layer sends message from your computer to the Wi-Fi router.
For your letter delivery, there is usage of roads, train tracks and may be airlines.	**Physical layer** is about the physical medium used in communication, like cabling etc.

SHORT QUESTIONS

Q.1 Describe computer network? 09503012

Ans: A number of computers connected together to communicate with each other through communication medium is called the computer network.

Q.2 What is network of networks? OR What is internet? 09503013

Ans: Networks are connected together to make a larger network which is called network of networks or internet.

Q.3 Why do we need computer network? Give name of reasons. 09503014

Ans: The main need of computer network is sharing resources. The computer connected in a network can exchange information and data. A computer in a network can also use resources of other computers connected to the network. Some examples of resource sharing given below:

- File sharing.
- Hardware sharing.
- Application sharing
- Sharing a single Internet connection
- User communication

Q.4 What is Client? 09503015

Ans: A Client is a less powerful computer as compared to server computer. It relies on servers for resources, such as files, devices, and even processing power. Clients are computers in a network that access services made available by a server.

Q.5 What is a Server? 09503016

Ans: Server is a powerful computer that facilitates the whole network by providing variety of services to the computer or devices, connected to the network. Server is a main computer in a network which is used to manage network resources and facilitate other computers.

Q.6 How client and server communicate with each other? 09503017

Ans: Clients and servers exchange message in a request – response messaging pattern. Client is a program or machine that sends requests to the servers. While a server is a program or a machine that waits for incoming requests from the client and response according to the request of Client. When we access a website, we get contents on our screen served by a server.

Q.7 In a client server model, is client software or hardware? Give reasons to support your answer. 09503018

Ans: In general, a client is a hardware like phone, laptop and desktop computers, but in particular the software running on that hardware is the process which makes it a client.

Q.8 What is Network Topology? Mention its types. 09503019

Ans: Topology of a network is a geometric representation of the relationship among the interconnected devices.

Types: Four types of network topologies are:

- Bus topology
- Ring topology
- Star topology
- Mesh topology

Q.9 What is Bus topology? 09503020

Ans: In Bus topology, all devices are connected to a common communication medium or central cable. The central physical cable that connects the computers is called bus.

Q.10 How bus topology work? 09503021

Ans: A computer sends a message on the bus. The computer to whom the message is sent receives it while others ignore it. At each end of bus a device called terminator is attached so that the signals do not bounce back on the bus causing errors.

Q.11 What is terminator or endpoints in Bus topology? 09503022

Ans: In bus topology all of the devices of the network are connected to a common transmission medium which has exactly two endpoints called terminator.

Q.12 What is backbone in bus topology? 09503023

Ans: A bus topology connects all devices of the network through a single common cable having exactly two end points. This cable is called backbone of the topology.

Q.13 What is star topology? 09503024

Ans: A star topology connect all devices using point to point connections via cables to a central point. The central point is known as a Hub or Switch. The central device controls all the traffic. Therefore, devices can transfer data to each other only through the central point.

Q.14 What is ring topology? 09503025

Ans: A ring topology connects a computer with exactly two other computers forming a ring of computers. A computer can send data to its immediate neighbor. A ring can be unidirectional or bidirectional.

Q.15 What is unidirectional bidirectional in ring topology?

Ans: A ring can be unidirectional bidirectional

Unidirectional: In a unidirectional ring topology, data is sent either clockwise or anti clockwise.

Bidirectional: In a bidirectional ring topology, data can travel in any direction. Upon receiving data, a computer may pass data to its next neighbor.

Q.16 What is mesh topology?

Ans: Mesh topology connects all devices with each other through a direct link. Message sent on a mesh network, can take any possible path from source to destination. It is not commonly used since it is costly and difficult to implement.

Q.17 What are the advantages and disadvantages of star topology over bus topology?

Ans: Advantages

1. Star topology is more reliable and support large numbers of computers than bus topology.
2. It is easy to detect and fix errors than bus topology.

Disadvantages

1. Lengthy cable is required as compared to bus topology.
2. Star topology is expensive as compared to bus topology.

Q.18 What happens if failure of connection between two computers in ring topology?

Ans: In ring topology, a failure of connection between two computers may down the whole network.

Q.19 What is data communication? Mention its components.

Ans: Data communication refers to exchange of messages between sending and receiving devices through some communication medium. Following are the main components of data communication.

- Sender
- Receiver
- Message
- Protocol
- Transmission Medium

Q.20 What is sender (transmitter) and receiver (sink)? 09503031

Ans: Sender: Sender is a device that initiates the communication process. It sends messages consisting of text, numbers, picture etc. It is also called transmitter.

Receiver: Receiver is a device that receives a message. It is also called sink. The receiver can be a computer, printer or another device. The receiver must be capable of accepting a message.

Q.21 What is message and packets? 09503032

Ans: Message: Message is the data or information to be communicated. It may consist of text, number, pictures, sound, video or any combination of these.

Packets: In a data communication system, a message is sent in the form of packets. It is unit of data sent from one device to another.

Q.22 What is payload and control information in a message? 09503033

Ans: Each message has two parts, i.e., payload and control information.

Payload: Payload is the actual contents of a message.

Control information: It contains information about the sender and the receiver. Control information is also called header of a message.

Q.23 What is protocol? 09503034

Ans: A protocol is a formal agreement between two parties. A network protocol is a formal arrangement between two computers to send and receive information. Network protocol defines a set of rules and procedures for communication between a sender and a receiver.

Q.24 What is transmission medium or communication channel? 09503035

Ans: Transmission medium is a path or channel through which message is transmitted or received from one location to another in a communication system. It is also called a communication channel. For example copper wire, a fiber optic cable, microwaves etc.

Q.25 How telephone addressing is related with network addressing? 09503036

Ans: When you call your friend you need telephone number of your friend. On the Internet, the telephone number corresponds to an IP address (Internet Protocol). Like a telephone number, all IP addresses are unique.

Q.26 What is the difference between static and dynamic IP? 09503037

Ans: If an IP address of a device is fixed in a network, it is called static IP address. Otherwise if each time a new connection is made a new IP address is assigned, it is called dynamic IP address.

Q:27 Describe the working of web browser. 09503038

Ans: A Web browser is software that enables users to retrieve information on the Web. Information on the Web is accessed by the URLs. Web browser and web servers function together as a client-server system.

Q.28 What is the difference between point-to-point and multipoint connection? 09503039

Ans: <u>Point-to-point connection:</u>

A point-to-point connection is a direct link only between two devices, i.e., a sender and a receiver. **Example:** There is a point to point connection between a remote control and a TV.

<u>Multipoint connection:</u>

In multipoint connection, there is a link between a sender and multiple receivers. So, more devices can share a single link.

Example: In a Wi-Fi based network a single link is shared among multiple devices.

Q.29 What is application sharing? Answer with the help of an example. 09503040

Ans: Application software can be installed on a server and shared over the network. It means that more than one users may use the same application.

Example: For example, in a bank; cashier manager, ATM (automated teller machine) users use same application over the network. Bank balance updated at one point is updated for all branches immediately.

Q.30 Why file sharing is helpful? 09503041

Ans: Networking of computers helps a network user to share files. Sharing files with others who are living in a different city or

even country is also much helpful and is done in the same way.

Example: If all your school teachers want to prepare a combined result using computers, they can share files over a school network or the Internet.

Q.31 Why hardware sharing is important? 09503042

Ans: Hardware sharing is important where less number of printers and scanners than the available computers. Users can share devices such as printers, scanners, CD-ROM drives, hard disk drives etc.

Q.32 What is advantage of sharing a single Internet connection among different users. 09503043

Ans: A single high speed Internet connection can be shared with all the users over a network. There is no need to provide a separate Internet connection to every user on the network.

Q.33What is advantage of user communication on networks? 09503044

Ans: Networks allow users to communicate using e-mail, newsgroups, and video conferencing etc. So, communication with many people sitting on different locations is possible due to a network.

Example: A video conference comprises the technologies for the reception and transmission of audio-video signals by users at different locations.

Q.34 Why do you mean by storage capacity on network? 09503045

Ans: Storage capacity means the limit store data in a computer. If we connect our computer to another computer having more storage, then we can also use the disk space of that computer. In this way, we can store and access files stored remotely.

In this setup, a computer providing the storage is called **file server** and the computer accessing that space is called a **workstation**.

Example: We can use services like DropBox and Google Drive to store our files remotely.

Q.35 What is data transmission? 09503046

Ans: Data transmission is the process of sending data from one device to another. It consists of sender, receiver and the medium which carries the information.

Q.36 Is a device use multiple channels at the same time? 09503047

Ans: Yes, A device may use multiple channels at the same time. For example, if a cell phone is connected with the Internet, it uses a data channel (3G/4G/LTE) for using the Internet services, and a voice channel for calling purpose.

Q.37 What is network model? 09503048

Ans: Computer network models are responsible for establishing a connection among the sender and receiver. There are two computer network models i.e. OSI Model and TCP/IP Model on which the whole data communication process relies.

Q.38 What are the layers in network models? 09503049

Ans: The whole communication process is carried out in different layers, where each layer performs one or more specific tasks. The Internet also uses a layered communication model, called the Transmission Control Protocol/Internet Protocol (TCP/IP) model.

Q.39 What is TCP/IP model? 09503050

Ans: The Internet also uses a layered communication model, called the Transmission Control Protocol/Internet Protocol (TCP/IP) model. The TCP/IP is a suit of protocols that provides end-to-end connectivity between devices.

Q.40 What is application Layer? 09503051

Ans: It provides network service to user application. It is responsible for exchanging information between program running on machine. While chatting you are concerned only about the message without bothering about the kind of network, i.e., wireless or wired. This is called application layer.

Q.41 What is transport layer? 09503052

Ans: A transport layer establishes connection between a client and a server. It tries to send message but if there is some error like your computer is disconnected from the network then it informs the application program.

Q.42 What is network layer? 09503053

Ans: A program running on the network layer moves the data to the other network. So,

a chat message is transferred to other Wi-Fi router of your friend from where it is delivered to your friend and he/she can see it on screen.

Q.43 What is Data Link Layer and physical layer? 09503054

Ans: Data Link Layer: Data link layer sends a message to the server connected with router. If you are chatting at home with a Wi-Fi connection, then the data link layer sends message from your computer to the Wi-Fi router.

Physical Layer: Physical layer is about the physical medium used in communication, like cabling etc.

Q.44 What is FTP? 09503055

Ans: File Transfer Protocol is the standard TCP/IP protocol which is used for the purpose of transferring files from one computer to another. For example, if we want to transfer a document file to a remote computer.

Q.45 Define HTTP and SMTP. 09503056

Ans: HTTP: Hypertext Transfer Protocol is a protocol used by Word Wide Web (WWW) to transfer web pages between a client and a web server. A web server is also called an HTTP server. We use this protocol while browsing Internet.

SMTP: Simple Mail Transfer Protocol is a standard protocol to transmit emails.

Q.46 Why addressing is important in network? 09503057

Ans: Before sending a message, source must know the destination address. Devices on a network need addresses in order to communicate with each other. So, giving an address to a message is the first step and the second step is to transmit the packet to its intended recipients.

Q.47 Why IPv6 have importance than IPv4? 09503058

Ans: IPv6 can allow up to 2^{128} address which is 7.9×10^{28} times more than the number of addresses in IPv4.

Q.48 What is port number? 09503059

Ans: If there are more than one applications ready to accept a packet, then a number called port number distinguishes the targeted application from the other applications.

Q.49 What is IP address? 09503060

Ans: IP stands for Internet Protocol. It is a method of identifying each computer on the internet. All IP addresses are unique. Each device gets its own unique IP address when its gets connected to the Internet. There are two types of IP address:

1. Static IP address 2. Dynamic IP address

Q.50 Describe Sending HTTP Requests and Receiving HTTP Responses over the Internet. 09503061

Ans: The World Wide Web (WWW) is a system of Internet servers. Client send request to the servers, servers serve a request sent by a client. This request is called HTTP request. Servers give response on the request of client. This is called HTTP response. So, the communication between a server and a client is based on requests and their respective responses.

Q.51 What is Web Browser? 09503062

Ans: A Web Browser or simply Browser is software that allows the internet users to find retrieve, view and send information on the internet. It acts as an interface between the user and the internet.

Q.52 What are two standard of IP addressing? Give examples. 09503063

Ans: An IP address is assigned by a Dynamic Host Configuration Protocol (DHCP) server. There are two standards of IP addressing, i.e., IPv4 and IPv6.

Example:

- IPv4 address is like: 172.16.54.1
- IPv6 address is like: 2001:db8:0:1234:0:567:8:1

Q.53 What is IPv4 addressing? 09503064

Ans: IPv4 address is a 32 bit numbers that uniquely identifies a network interface on a machine. When the Internet Protocol was originally designed, the standard was known as Internet Protocol Version 4 (IPv4). IPv4 is divided in four groups separated by '.'

Example:

- IPv4 address is like: 172.16.54.1

Q.54 What is IPv6 addressing? 09503065

Ans: IPv6 address is a 128 bits numbers that uniquely identifies a network interface on a

machine. In IPv6, there are 8 groups separated by ':'.

Q.55 What is router?

Ans: Router is intelligent device which routes the data to destination computers. A router is a networking device that forwards data packets from one network to another. They send information from one network to another by selecting the best pathway available.

Q.56 What is the use of routing table in routing process?

Ans: A routing table is used by routers to determine the path to the destination network. If the entry exists for the destination address, the router forwards the packet out of the appropriate interface port. If the router doesn't find the entry, it discards the packet.

Q.57 Define header, payload, encapsulation.

Ans: Header: Each layer adds some information called header.

Payload: The actual content of message called payload.

Encapsulation: The actual content of message called payload, is hidden under a header at each layer. This is called encapsulation.

Q.58 What is header of a message?

Ans: Payload is the actual content of a message whereas the control information contains information about the sender and receiver. Control information is also called header of a message.

MULTIPLE CHOICE QUESTIONS

Choose the correct answer.

1. The IPv4 address is made up of _____ binary bits. 09503070
   (a) 31 (b) 29
   (c) 32 (d) 30
2. Routing is process of taking data from one device and sending it to another device in different _____. 09503071
   (a) Channel (b) Network
   (c) Path (d) Area
3. DHCP stands for: 09503072
   (a) Data Hosting Computer Protocol
   (b) Dynamic Host Computer Protocol
   (c) Dynamic Host Configuration Protocol
   (d) None of the above
4. Communications protocols cover____. 09503073
   (a) Authentication
   (b) Error detection
   (c) Correction
   (d) All of these
5. The receiver must be capable of accepting the _____. 09503074
   (a) Protocol (b) Message
   (c) Address (d) Information
6. A _____ is a computer device that accesses a service made available by a server. 09503075
   (a) Client (b) Server
   (c) Device (d) Machine
7. Which allow users to communicate using e-mail, newsgroups, etc.?
   (a) Terminal (b) Mail server
   (c) Browser (d) URL
8. Web browser and web servers function together as a _____ system.
   (a) Client/server (b) Mail
   (c) Internet (d) Chrome
9. A protocol defines _____ _____ for communication between a sender and a receiver.
   (a) Rules, Regulation
   (b) Problem, Regulation
   (c) Center, Over
   (d) Information
10. Routers connect multiple _____ together.
    (a) Protocol (b) Rules
    (c) Networks (d) Computers
11. Every data packet has _____ address.
    (a) IP (b) Random
    (c) Sequence (d) Fustily
12. IP addressing must be understood as part of the _____ for conversations on the Internet.
    (a) Protocol (b) Center
    (c) Networks (d) Machine

13. Email stands for:
(a) Electronic Mail (b) Mail electronic
(c) Center (d) Problem 09503082

14. In a computer network, devices are connected through communication: 09503083
(a) Channels (b) Source
(c) Logo (d) Target

15. How many types of IP address? 09503084
(a) 2 (b) 3
(c) 4 (d) 5

16. A ____is a digital telecommunication network which allows nodes to share resources. 09503085
(a) Protocol
(b) Rules
(c) Computer networks
(d) Computers

17. A _____ computer is an individual computer that accesses the information and programs stored on a server as part of a network environment. 09503086
(a) Client (b) Server
(c) Device (d) Machine

18. A _____is a computer program or a device that provides functionality for other programs or devices, called "clients". 09503087
(a) Client (b) Server
(c) Device (d) Machine

19. Which is a device that initiates the communication process? 09503088
(a) Sender (b) Center
(c) Networks (d) Machine

20. _____is a device that receives message, it a also known as sink. 09503089
(a) Receiver
(b) Rules
(c) Computer networks
(d) Computers

21. The _____ is the data or information to be communicated. 09503090
(a) Sender (b) Center
(c) Networks (d) Message

22. Rules are defined for the communication between sender and receiver called:
(a) Protocol 09503091
(b) Rules
(c) Computer networks
(d) Computers

23. _____ is the physical path connects sender and receiver.
(a) Sender (b) Center
(c) Networks (d) Medium

24. IP stands for Internet Protocol and is _____used for identifying number that is associated with a specific computer when it connects to the Internet. 09503093
(a) Address (b) Center
(c) Networks (d) Machine

25. IP address may be static or ___ 09503094
(a) Dynamic (b) Rules
(c) Computer networks
(d) Computers

26. ____ is a process of taking data from one device and sending it to another device on a different network. 09503095
(a) Server (b) Routing
(c) Device (d) Machine

27. Which is the physical arrangements of devices and connecting lines? 09503096
(a) Procedure
(b) Network topology
(c) Computer
(d) Network

28. A_____ is used to identify an application going to receive a message.
(a) LPT (b) Port 09503097
(c) Network port (d) Parallel

29. TCP/IP is a stack of protocols and it has _____layers. 09503098
(a) 1 (b) 2
(c) 3 (d) 5

30. Which is used to transfer file over a network? 09503099
(a) HTML (b) HTTP
(c) FTP (d) ALP

31. Which directs messages on the Internet?
(a) IP (b) Router 09503100
(c) Cable (d) Media

32. For home user, the Internet service is provided by: 09503101
(a) ISP (b) Sender
(c) HTML (d) ALP

33. A communication medium connecting multiple computers is also called a:
(a) Source 09503102
(b) Communication channel
(c) Target (d) Wire

34. A _____ is a group of computer systems and other computing hardware devices linked together through communication channels. 09503103
(a) Computer
(b) Computer network
(c) System (d) Devices

35. Which is considered as the most well-known example of network of networks? 09503104
(a) Machine (b) Printers
(c) Internet (d) Devices

36. A computer network is established for the purpose of: 09503105
(a) Sharing resources
(b) Manipulation
(c) Mode (d) Computing

37. In network a computer providing the storage is called file server and the computer accessing that space is called a: 09503106
(a) Station (b) Server
(c) Computer (d) Workstation

38. A _____ provides a service and a client gets that service. 09503107
(a) Client (b) Server
(c) Station (d) Computer

39. A _____ is a process that access a service provided by a server. 09503108
(a) Server (b) Computer
(c) Station (d) Client

40. A _____ is a physical computer dedicated to run services to serve the needs of its clients. 09503109
(a) Server (b) Client
(c) Station (d) Computer

41. Physical structure of networks can be classified in terms of type of connection and___. 09503110
(a) Ring (b) Star
(c) Topology (d) Machine

42. How many types of connection? 09503111
(a) 1 (b) 2
(c) 3 (d) 5

43. A _____connection is a direct link only between two devices. 09503112
(a) Point-to-point (b) Multiple
(c) Center (d) Topper

44. Remote control and a TV is an example of connection. 09503113
(a) Many (b) Point-to-point
(c) Single (d) Double

45. In _____connection, there is a link between a sender and multiple receivers.
(a) Multipoint (b) Client
(c) Station (d) Computer

46. In a Wi-Fi based network a single link is shared among _____ devices.
(a) Double (b) Triple
(c) Single (d) Multiple

47. Which of a network is a geometric representation of the relationship among the interconnected devices?
(a) ring (b) Star
(c) Topology (d) Machine

48. How many basic topologies?
(a) 1 (b) 2
(c) 3 (d) 4

49. Which topology connects all devices of the network through a single common cable having exactly two end points?
(a) Ring (b) Bus
(c) Topology (d) Machine

50. In bus topology single common cable is also called:
(a) Backbone (b) Normal
(c) Hard (d) Simple

51. In which topology connect all devices using point to point connections via cables to a central point is known as a Hub or Switch.
(a) Ring (b) Star
(c) Topology (d) Machine

52. In which topology connects a computer with exactly two other computers forming a ring of computers:
(a) Ring (b) Star
(c) Topology (d) Machine

53. In which topology a computer can send data to its immediate neighbor:
(a) Ring (b) Star
(c) Topology (d) Machine

54. In which topology, data is sent either clockwise or anticlockwise:
(a) Bus (b) Star
(c) Single (d) Ring

55. In a ring topology, a ring can be unidirectional or_____.
(a) Directional (b) Bidirectional
(c) Main (d) Similar

In which topology connects all devices with each other through a direct link:
(a) Ring (b) Star 09503125
(c) Topology (d) Mesh

Which refers to exchange of messages between sending and receiving devices through some communication medium? 09503126
(a) Computer
(b) Data communication
(c) System
(d) Devices

Which is a device that initiates the communication process? 09503127
(a) Sender (b) Center
(c) Networks (d) Message

Receiver is a device that receives a message also called: 09503128
(a) Message (b) Main
(c) Center (d) Sink

How many layers in TCP/IP model? 09503129
(a) 5 (b) 4
(c) 3 (d) 2

In a data communication system, a message is sent in the form of: 09503130
(a) Fragment (b) Packets
(c) Alien (d) Half mode

Which is the actual contents of a message? 09503131
(a) Payload (b) Control
(c) Message (d) Simple mode

Which contains information about the sender and the receiver? 09503132
(a) Rule
(b) Control information
(c) Message (d) Simple

Which is also called header of a message?
(a) Message
(b) Control information
(c) Message (d) Simple

Which is a formal agreement between two parties? 09503134
(a) Protocol
(b) Rules
(c) Computer networks
(d) Computers

Which is the physical path connects a sender and receiver? 09503135
(a) Destination (b) Source
(c) Medium (d) Sink

The whole communication process is carried out in different: 09503136
(a) Layers (b) Main
(c) Center (d) Sink

The ____ also uses a layered communication model, called the Transmission Control Protocol/Internet Protocol (TCP/IP) model. 09503137
(a) ASCII (b) IP
(c) Network (d) Internet

The _____ is a suit of protocols that provides end-to-end connectivity between devices. 09503138
(a) IP (b) TCP/IP
(c) Rules (d) Meaning

While chatting you are concerned only about the message without bothering about the kind of network, i.e., wireless or wired. This is called: 09503139
(a) Physical layer (b) Postal layer
(c) Application layer (d) Internet

Which layer establishes connection between a client and a server? 09503140
(a) Transport (b) Link layer
(c) Physical layer (d) Network

A program running on the___ layer moves the data to the other network. 09503141
(a) Transport (b) Link layer
(c) Physical layer (d) Network

Which layer sends a message to the server connected with sender? 09503142
(a) Transport (b) Data link
(c) Physical layer (d) Main

Which layer is about the physical medium used in communication, like cabling etc.? 09503143
(a) Application layer
(b) Postal layer
(c) Physical
(d) Internet

Each layer adds some control information called: 09503144
(a) Header (b) Source
(c) Destination (d) Sink

Data received from the layer is hidden inside the header at each layer this is called: 09503145
(a) Application layer (b) Postal layer
(c) Encapsulation (d) Internet

77. Which standard TCP/IP protocol which is used for the purpose of transferring files from one computer to another? 09503146
(a) FTP (b) HTTP
(c) HTML (d) ALP

78. Which is a protocol used by Word Wide Web (WWW) to transfer web pages between a client and a web server? 09503147
(a) HTP (b) HTTP
(c) HTML (d) ALP

79. A web server is also called an: 09503148
(a) HTP server (b) HTTP server
(c) HTML server (d) ALP server

80. Which Protocol is a standard protocol to transmit emails? 09503149
(a) SMTP (b) HTTP
(c) HTML (d) FLP

81. Which is the unit of data sent from one device to another? 09503150
(a) Packet (b) Data
(c) Logo (d) Medium

82. Each devices gets its own unique ____ address when its gets connected to the Internet. 09503151
(a) TC (b) IP
(c) IP (d) CP

83. The World Wide Web (WWW) is a system of Internet: 09503152
(a) Servers (b) Machine
(c) Computer (d) Network

84. Servers serve a request sent by a client. This request is called: 09503153
(a) HTP server (b) ALP server
(c) HTML server (d) HTTP request

85. Which are used to access the World Wide Web in an easy manner? 09503154
(a) IP (b) Web browsers
(c) Network (d) Mode

86. How many components of data communication? 09503155
(a) 6 (b) 5
(c) 7 (d) 8

87. An ____ address is assigned by a Dynamic Host Configuration Protocol (DHCP) server. 09503156
(a) IP (b) TC
(c) ALP (d) CP

88. How many standards of IP addressing?
(a) Two (b) Three 09503157
(c) Four (d) Five

89. When the Internet Protocol was originally designed, the standard was known as Internet Protocol Version? 09503158
(a) IPv4 (b) IPv5
(c) IPv6 (d) IPv7

90. IPv4 is divided in _____ groups by '.'
(a) 2 (b) 3 09503159
(c) 4 (d) 5

91. In IPv4 each group can contain a decimal value from: 09503160
(a) 1 to 255 (b) 0 to 255
(c) 2 to 255 (d) 3 to 255

92. IPv6 consists of: 09503161
(a) 200 bits (b) 300 bits
(c) 128 bits (d) 127 bits

93. In IPv6, there are ____ groups separated by '.' 09503162
(a) 1 (b) 2
(c) 8 (d) 5

94. IPv6 can allow up to ___ address. 09503163
(a) 2^{128} (b) 2^{127}
(c) 2^{126} (d) 2^{125}

95. How many times IPv6 is faster than IPv4 09503164
(a) 7.9×10^{28} (b) 2^{127}
(c) 2^{126} (d) 2^{125}

96. A _____is a networking device that forwards data packets from one network to another. 09503165
(a) Medium (b) Modem
(c) Logo (d) Router

97. A router analyses the destination ___ address of an incoming data packet. 09503166
(a) IP (b) TC
(c) ALU (d) CP

98. The router forwards our request according to___ of our message. 09503167
(a) Destination (b) Source
(c) Header (d) Sink

99. A _____is used by routers to determine the path to the destination network. 09503168
(a) Routing table (b) Medium
(c) Logo (d) Source

100. A _____ is a networking device that forwards data packets from one network to another. 09503169
(a) Router (b) Server
(c) Device (d) Machine

ANSWERS

1.	c	2.	b	3.	c	4.	d	5.	b	6.	a	7.	b		
8.	a	9.	a	10.	c	11.	a	12.	a	13.	a	14.	a		
15.	a	16.	c	17.	a	18.	b	19.	a	20.	a	21.	d		
22.	a	23.	d	24.	a	25.	a	26.	b	27.	b	28.	c		
29.	d	30.	c	31.	b	32.	a	33.	b	34.	b	35.	c		
36.	a	37.	d	38.	b	39.	d	40.	a	41.	c	42.	b		
43.	a	44.	b	45.	a	46.	d	47.	c	48.	d	49.	b		
50.	a	51.	b	52.	a	53.	a	54.	d	55.	b	56.	d		
57.	b	58.	a	59.	d	60.	a	61.	b	62.	a	63.	b		
64.	b	65.	a	66.	c	67.	a	68.	d	69.	b	70.	c		
71.	a	72.	d	73.	b	74.	c	75.	a	76.	c	77.	a		
78.	b	79.	b	80.	a	81.	a	82.	b	83.	a	84.	d		
85.	b	86.	b	87.	a	88.	a	89.	a	90.	c	91.	b		
92.	c	93.	c	94.	a	95.	a	96.	d	97.	a	98.	c		
99.	a	100.	a												

ACTIVITIES

Activity 3.1: Suppose your school receives 4 printers and 2 scanners. School administration is planning to install them over the network so that all school teachers and students can access them. Use