Communication and Networking

1. What is data communication?

Ans. The transferring of data signals from one place to another through the use of computers is called data communication. It is a popular use of Information Technology. In this process, the data is sent from the sender, the data travels from the medium or paths or channels and receiver receives the signals. Generally, the data signals can be stored, replied and forwarded to many locations. For this purpose different media like wired or wireless media are used.

2. What is a computer network?

Ans. The collection or group of computers inter-connected together to share the hardware and software resources is called computer network.

They are of different types:
i) LAN ii) MAN iii) WAN

3. What are the components required for computer network?

Ans. The components required are:
i) Hardware (Computer set)
ii) Wired or wireless medium
iii) Internetworking devices
iv) Networking software
v) Protocols

4. What are the network services?

Ans. The network services are:
i) File services
ii) Print services
iii) Message services
iv) Application services
v) Database services

5. What are the communication media or medium?

Ans. The medium or the path where data can flow from one computer to

another is called the communication media. Specially, they are classified into two groups. They are:

i) Guided/Wired/Bounded media

ii) Unguided/Wireless/Unbounded media

6. What are wired/guided/bounded communication media?

Ans. The communication channel made by the use of wires or cables in a small geographical area is called wired communication media. Example: STP and UTP cables, coaxial cables and fiber optic cables.

7. What do you understand by wireless communication media?

Ans. The path or the medium used for data communication without the use of wires or cables or other means of communication which do not use such wires and cables are wireless

communication media. For example: Satellite, Microwave, Infrared, etc.

8. What is communication mode? Write the types of it.

Ans. Communication mode is the way of transferring the data signals in between sender and receiver. They are of three types:

i) Simplex mode communication

ii) Duplex mode communication (Half Duplex and Full Duplex mode)

9. What is Simplex mode communication?

Ans. This is a way of communication, in which data is transferred only from one side or communication is done from only one side. Eg. Newspaper, TV, Radio, etc.

10. What is Duplex mode communication?

Ans. This is a way of communication in which data is transferred from both sides or communication is done from both sides. They are also of two types:

i) Full Duplex Mode communication:

In this mode, communication is done from both sides in the same time. Telephone, Internet, Videoconferencing, Chatting, etc. are some examples of it.

ii) Half Duplex Mode communication:

In this mode, communication is done from both sides but only one side at a time. Walkie Talkie, CB (Citizen Band) radio, etc.

11. What is Bandwidth?

Ans. The amount of data which can be transmitted through a communication channel or the range of the data amount in between high and low level range, is called bandwidth. It is

measured in bps (bits per second), KBPS (Kilo Bytes Per Second) or in MBPS (Mega Bytes Per Second).

12. What are the Network Connectors?

Ans. The small devices, which are used for connecting computers with the cables to form a computer network, are called connectors. RJ (Registered Jack), BNC (British Novel Connector), Fiber Optic connector are some examples of it.

13. What is Twisted Pair cable?

Ans. It is a closed path for the electrical data signals, which is popularly known as the means of Guided Communication media. It contains two insulated copper wires twisted each-other or in a spiral. It is of two types:

i) STP (Shielded Twisted Pair)

ii) UTP (Unshielded Twisted Pair)

14. What is STP cable?

Ans. STP refers to Shielded Twisted Pair cable, which is more reliable for data transmission in comparison of UTP cable. STP cable is covered or shielded with a foal material so that they are safer for data transfer. The capacity of STP is 16 Mbps (Mega bits per second) to 5000 Mbps.

15. What is UTP cable?

Ans. UTP stands for Unshielded Twisted Pair cable, which is used for a low bandwidth data transfer. It is less safe in comparison of STP. It does not have cover for protection. The capacity of it is up to 100 Mbps.

16. What are co-axial cables?

Ans. These are one of the popular guided transmission media, usually used for TV cables. They are consist of different parts like the central conductor in the inner-most part, after this insulator is kept and also outer conductor and outer covering jacket known as insulating sheath are covered respectively. The capacity is 500 Mbps or 1500 voice calls.

Picture, Page 88

17. What is a fiber optic cable?

Ans. It is one of the best bounded paths for the guided media. It is made up of very thin glass filaments. It consists of thousands of such thin filaments of the glass. It is capable of very high bandwidth data transfer per

second, more than 1400 MBPS (Mega Bytes Per Second). For the data transmission, the transmitter changes the electrical signals into light wave. The data travels in the form of light and again receiver receives the data into electrical signals.

Picture (Page 88)

18. What is microwave system?

Ans. Microwave system is the most popular means of communication, which transmits the data in a line of sight. Due to this reason, microwave dish-antenna are kept in higher places, so that they will have no any obstacles while transferring the signals. The signals in the microwave cannot bend. Capacity is 16 GB/sec, and can support 2,50,000 voice channels.

Picture (Page 89)

19. What is Satellite communication?

Ans. The communication done through the satellites is called satellite communication. For the communication purpose, the satellites are kept in the Geo-stationary orbit, above 36000 Km from the earth surface. They receive the great no. of signals per second and can transmit them. They are just the transponder or combination of transmitter and receiver.

Picture (Page 90)

20. What are Infrared and Bluetooth?

Ans. Infrared is a kind of wireless transmission medium, which is one of the seven sun lights. It is very low in comparison of human visibility. It has

been widely used in remote, LAN connection, and for wireless connection among various peripherals.

Bluetooth is also one of the wireless communication media, which works on very low radio frequency. The capacity of coverage is higher than Infrared. It can cover 10 meter to 32 ft.

21. What are the types of computer network?

Ans. They are of three types:

i) LAN ii) MAN iii) WAN

Brief note:

LAN (Local Area Network)

LAN is the collection of computers interconnected to each other for sharing the hardware and software resources within a small geographical area like a building, compound or

within a room. Generally wired media are used for the connection.

MAN (Metropolitan Area Network)

MAN is the connection of computers to form a network, generally within a city. It covers larger area than LAN. It is connected through the radio frequency or infrared signals. It uses the microwave system.

WAN (Wide Area Network)

WAN is a group of computers connected together all over the world using the wired and wireless means of communication. As the name implies, it covers wide area and uses satellite communication for the data transmission.

22. What is computer network architecture? Write the types of it.

Ans. Network architecture is the way of working of computers in a network according to its formation. It is the base principle of data sharing and manipulating the data in the various networks. They are basically of two types:

i) Peer-to-Peer Architecture: It is a network architecture, in which all the computers are independent or stand alone for data sharing. Each computer can be server and client both. A computer can be a Server while giving data to others and same computer can be client while making request with others. Thus, they will have equal access.

ii) Client/Server Architecture: In this architecture, one main and powerful

computer controls the other computers, which is known as Server computer. In this architecture, client computers make request for data sharing to the server computers.

iii) Apple-Talk Network Architecture

This Architecture is used for apple computers. The apple computers do have their own design and own software. Similarly they use their own network architecture, too.

23. What is computing model?

Ans. It is a way of computing or processing the raw data using computers. It can be classified into three groups:

i) Centralized Computing model: This model is used for Mini and Mainframe computers, in which all the processing is done in a main machine received through the various terminals (set of a monitor, keyboard and mouse). One main machine can process the data from more than 50 or 100 terminals at once.

ii) Distributed Computing model: This model is used in networks of micro computers. A Server computer controls the client computers or standalone workstations but the processing is done independently in them or in a distributing model without any interference by the server.

iii) Collaborative Computing model: Unlike the distributed computing model (in which individual PCs carry

out independent tasks), collaborative computing involves two or more computers working together in combine effort.

24. What is topology or LAN topology?

Ans. Topology is the pattern or layout of computers while connecting in a LAN. It is done only in LAN, so known as LAN topology, too. They are of different types:

i) Bus Topology
ii) Ring Topology
iii) Star Topology
iv) Tree Topology
v) Mesh Topology
vi) Hybrid Topology
vii) Cellular Topology

25. What is Bus Topology? Draw a figure of it.

Ans. It is one of the common topologies, in which a cable called bus connects all the computers and the message is sent along the bus. The connected computers can hear the message and determine whether it is for them or not. The broadcasting of message, where one computer transmits and all other computers can listen simultaneously until it is received by a workstation or a NIC. The failure of Bus cable causes to fail whole network. Each computer can have equal access.

Picture (Page 82)

Advantages

i. Easy to connect.

ii. Very low data traffic due to the less number of computers or nodes.
iii. Less expensive.
iv. Very high speed of data transmission.
v. Easy to maintain the network.

Disadvantages

i. Not suitable for the large connection.
ii. Data travels from the both direction in the same path, so data collision rate is very high.
iii. Difficult to detect the errors.
iv. The failure of main cable (bus cable) causes to fail the whole network.
v. Runs under the control of server computer.

26. What is Ring Topology?

Ans. It is one of the different LAN topologies, in which all the computers are connected in a circular loop of point-to-point links. In it, any computer can communicate with any other by sending a signal (token) around the ring. Each message is tagged with its destination. As the message proceeds around the ring, each computer determines whether it is the recipient of the message or not. If not, the message is sent to the next computer. A message goes from station to station making a ring. Each workstation takes an active role in transferring the message.
Picture (Page 83)

Advantages

i. All computers and nodes have equal access facility.

ii. The chance of data collision is very less because data travels only in one direction, either clockwise or anti-clockwise.
iii. Easy to setup.
iv. Easy to remove or add the node.
v. Terminators are not required like in the Bus topology.
vi. Higher capacity than the Bus topology.

Disadvantages

i. The failure of ring cable causes to fail whole network.
ii. Difficult to setup than Bus topology.
iii. The failure of one node affects the whole network.
iv. The reconfiguration of network is difficult.
v. More expensive than Bus topology.

27. What is Star Topology?

Ans. It is a topology, in which all the computers are connected with the help of a Hub or Switch to share the information with server computer. It is the best example of client server architecture. When a message is sent from one to another, first it goes to server and then it is transmitted to its destination. As the name implies, it looks like a star. The failure of a Hub or Switch fails the whole network.

Picture (page 83)

Advantages

i) It is very flexible for the large connection of computers in the network.

ii) Easy for the connecting and removing the devices.
iii) Easy to expand the network up to the capacity of router, hub and switch.
iv) Secure data transmission under control of Server computer.
v) Easier to trouble shoot the problem.
vi) Failure of any one node does not affect others.

Disadvantages

i) The failure of central hub or switch causes to fail whole network.
ii) The capacity of network depends up on the capacity of hub or switch.
iii) Expensive than the ring and bus topology.
iv) All the client computers should depend up on the server computer.
v) Data collision rate is higher.

28. What is a Tree Topology?

Ans. Tree Topology is the combination of two or more than two star topologies in a bus cable so that it looks like a tree structure. In the formation of it, generally switch or bridge devices are used.

Picture (page 84)

Advantages

i) Easy to expand the network.

ii) Due to the hub to hub connection, data traffic is less.

iii) Easy to troubleshoot than the bus topology.

iv) Large number of computers can be connected.

v) The removing of any one node or branch does not affect other node and branch.

Disadvantages

i) If the main connector fails to operate, the entire network fails.
ii) More difficult to configure or setup.
iii) Requires more number of cables and hub, which makes it more expensive.
iv) All the disadvantages of other topologies consist in this topology because it is the combined form of two or more than two other topologies.

29. What is Mesh Topology?

Ans. It is a topology, in which all the computers are connected each other up to the possible node in a bi-directional way. This is the most reliable topology but generally not used due to expensive and difficult configuration.

Picture (85)

<u>Advantages</u>

i) It is the most reliable and fastest connection of computers due to direct connection among them.
ii) Fault tolerance facility as data traffic can be diverted to the destination using either of the multiple paths or ways of data transmission.
iii) Less data collision.
iv) The failure of one node doesn't affect other.
v) Suitable for the wide range connection like Internet (Public network) and Intranet (The Private network).

Disadvantages

i) Wiring is more complex.
ii) The most expensive network because it requires more cables for the point-point to connection.
iii) Difficult to manage.

29. What is Hybrid Topology?

Ans. It is the combination of different topologies like various star to star, star to ring, bus to star, etc. In the Hybrid Topology, the advantages and disadvantages of combined (integrated) topologies remain the same. Tree topology is also an example of Hybrid Topology.

30. What is Cellular Topology?

Ans. A Cellular Topology combines wireless point-to-point and multipoint designs to divide a geographical area into cells. Each cell represents the portion of the total network area in which a specific connection operates. Devices within the cell communicate with a central station or hub.

31. What is communication protocol?

Ans. Protocol is a set of rules to transmit the data over communication medium. There are different types of protocols. Some of them are HTTP, FTP, TCP/IP, SMTP, etc.

32. Short Notes:

a) TCP/IP: It contains two subsets TCP and IP. TCP (Transmission Control Protocol) is responsible to control the transmission of data over the network path. Also, it is used to ensure correct data transmission and gives the message, if data is transmitted or received from the designing points.

Another part is IP (Internet Protocol) is responsible to detect the IP address of the receiver. IP address is made by the eight digits. Each node in a network has different IP address.

b) FTP: FTP (File Transfer Protocol) is a common protocol used in the data transmission which is used to exchange the data files over the Internet or a network.

c) HTTP: HTTP (Hyper Text Transfer Protocol) is a popularly used protocol for the Internet. It is used by the client software (browsers) to send the request to the server computer and server computer sends the data requested by the client software.

d) SMTP: SMTP (Simple Mail Transfer Protocol) is used to transfer the mails from one computer to another. For this purpose, it uses MIME (Multipurpose Internet and Mail Extension) protocol.

e) POP: POP (Post Office Protocol) acts as the Post Office, which is used to receive or retrieve the mails from the

server computer and to download in our client computer.

f) ARP: It stands from Address Resolution Protocol), which is used by IP to find the hardware address of computer network card based on the IP address.

g) IPX/SPX:

It stands for Inter-network Packet Exchange/Sequenced Packet Exchange). IPX divides any message into different small packets, gives the numbering and timing for them. After this, it sends the data finding the shortest path for the destination.

In the same way, SPX is used to supervise for making all the small packets in a sequence and help in a data transmission.

33. What are internetworking devices?

Ans. All the peripheral devices, connectors and other hardware parts, which are used to form (make) a network and to connect one network to another network, are called internetworking devices. File server, workstations, NIC, Hub, Switch, Router, Gateway, Bridge, etc. are some examples of it.

34. What is network software?

Ans. The software, which is specially used for network formation is called network software. NOVELL, UNIX, LINUX, etc. are some examples.

35. What is a device driver?

Ans. This is just a collection of software which is specially made for the particular device. Without this, hardware parts do not work in computer. We must install the related driver using CD/DVD or pen driver

first to make a proper functioning of hardware.

36. Computer network reduces the cost of operation. Justify it.

Ans. Computer network reduces the cost of operation by sharing hardware and software resources. In the network, we buy any one device for all the computers. For example we have twenty computers in a network. Then we can use a single printer, CD/DVD drive, scanner and single expensive software for all the computers. Thus the investment for extra nineteen printers, scanners, or other software will be saved. In this way, computer network reduces the cost of operation.

37. What is OSI Reference Model?

OSI stands for Open System Interconnection, which was set by International Standard Organization (ISO) in 1984. It is a set of protocols to standardize the data communication process. It defines the way of communication process. It has seven layers. They are:

i. Physical Layer
ii. Data Link Layer
iii. Network Layer
iv. Transport Layer
v. Session Layer
vi. Presentation Layer
vii. Application Layer

38. Write short notes:

a) NIC: Network Interface Card is an internetworking device, which is usually used to connect the network cable in clients or server computers to

form a network. It is kept inside the casing box.

b) Hub: It is a central connector or a multi-port device, which is kept in the center of the server and workstations. The networking cables come from the server computer to this device and all the workstations come to connect here with the help of cable. The failure of a hub causes to fail whole network system. It is popularly used in star topology.

c) Switch: It is same of Hub but it is more intelligent device than Hub. It is an advanced form of Hub. It is also a multi-port device and used for star, hybrid and tree topologies.

d) Router: This is an internetworking device, which is used to detect (find) the best and shortest path for the tagged data to go its destination. It is

very important to forward the data signals in a high traffic path.

e) Bridge: It is used to connect two different networks having the same communication protocol. It is generally used in LAN and MAN.

f) Gateway: It is used to connect two different networks but having different communication protocol. It is usually used in WAN.

g) Repeaters: It copies the weak data signals from the communication path, strengthen them and forward to their destination. It is used in WAN in which, data signals should travel very long distance. In this process, they become very weak due to the external interference like air, heat, cold, water drops etc. and repeater copies them, amplifies them again and forwards.

h) MODEM: It stands for Modulator and Demodulator, which is used to change the digital signal into analog and analog signal into digital. The process of converting digital signal into analog is called Modulation and the process of changing analog signal to digital is called Demodulation. This is mostly used in Dial-up network.

i) Multiplexers: It is a device to transmit two or more than two frequencies (channels) into one transmission media. TV cable is an example of it, where many channels are transmitted through a single cable.