SYED AMMAL ENGINEERING COLLEGE

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CS6551 COMPUTER NETWORKS

UNIT – I FUNDAMENTALS & LINK LAYER

1. What are the three criteria necessary for an effective and efficient network?

The most important criteria are performance, reliability and security.

Performance of the network depends on number of users, type of transmission medium, and the capabilities of the connected h/w and the efficiency of the s/w.

Reliability is measured by frequency of failure, the time it takes a link to recover from the failure and the network's robustness in a catastrophe.

Security issues include protecting data from unauthorized access and viruses.

2. What are the three fundamental characteristics determine the effectiveness of the data communication system?

The effectiveness of the data communication system depends on three fundamental characteristics:
Delivery: The system must deliver data to the correct destination.

Accuracy: The system must deliver data accurately.

Timeliness: The system must deliver data in a timely manner.

3. What are the advantages of distributed processing?

Advantages of distributed processing include security/encapsulation, distributed databases, faster problem solving, security through redundancy and collaborative processing.

4. Why are protocols needed?

In networks, communication occurs between the entities in different systems. Two entities cannot just send bit streams to each other and expect to be understood. For communication, the entities must agree on a protocol. A protocol is a set of rules that govern data communication.

5. Why are standards needed?

Co-ordination across the nodes of a network is necessary for an efficient communication. If there are no standards, difficulties arise. A standard provides a model or basis for development to which everyone has agreed.

6. For n devices in a network, what is the number of cable links required for a mesh and ring topology?

Mesh topology : n (n-1)/2

Ring topology : n

7. What is the difference between a passive and an active hub?

An active hub contains a repeater that regenerates the received bit patterns before sending them out. A passive hub provides a simple physical connection between the attached devices.

8. Distinguish between peer-to-peer relationship and a primary-secondary relationship.

Peer-to-peer relationship: All the devices share the link equally.

Primary-secondary relationship: One device controls traffic and the others must transmit through it.

9. Assume 6 devices are arranged in a mesh topology. How many cables are needed? How many ports are needed for each device?

Number of cables = n (n-1)/2=6(6-1)/2 = 15

Number of ports per device = n-1 = 6-1 = 5

10. Group the OSI layers by function.

The seven layers of the OSI model belonging to three subgroups. Physical, data link and network layers are the network support layers; they deal with the physical aspects of moving data from one device to another. Session, presentation and application layers are the user support layers; they allow interoperability among unrelated software systems. The transport layer ensures end-to-end reliable data transmission.

11. What are header and trailers and how do they get added and removed?

Each layer in the sending machine adds its own information to the message it receives from the layer just above it and passes the whole package to the layer just below it. This information is added in the form of headers or trailers. Headers are added to the message at the layers 6,5,4,3, and 2. A trailer is added at layer2. At the receiving machine, the headers or trailers attached to the data unit at the corresponding sending layers are removed, and actions appropriate to that layer are taken.

12. The transport layer creates a communication between the source and destination. What are the three events involved in a connection?

Creating a connection involves three steps: connection establishment, data transfer and connection release.

13. What is the DC component?

Direct current is a zero-frequency signal with constant amplitude.

14. How does NRZ-L differ from NRZ-I?

In the NRZ-L sequence, positive and negative voltages have specific meanings: positive for 0 and negative for 1. in the NRZ-I sequence, the voltages are meaningless. Instead, the receiver looks for changes from one level to another as its basis for recognition of 1s.

15. What are the functions of a DTE? What are the functions of a DCE?

Data terminal equipment is a device that is an information source or an information sink. It is connected to a network through a DCE. Data circuit-terminating equipment is a device used as an interface between a DTE and a network.

16. Discuss the mode for propagating light along optical channels.

There are two modes for propagating light along optical channels, multimode and single mode.

Multimode: Multiple beams from a light source move through the core in different paths.

Single mode: Fiber with extremely small diameter that limits beams to a few angles, resulting in an almost horizontal beam.

17. What is refraction?

The phenomenon related to the bending of light when it passes from one medium to another.

18. What are the disadvantages of optical fiber as a transmission medium?

The disadvantages of optical fiber are Very expensive.

Installation and maintenance is difficult.

Fragility.

19. What are the criteria used to evaluate transmission medium? The criteria used to evaluate transmission medium are,

Throughput

Propagation speed

Propagation time

Wavelength

20. Give the relationship between propagation speed and propagation time?

Propagation time = distance / propagation speed The time required for a signal or a bit to travel from one point to another is called **Propagation time**.

Propagation speed is the distance, a signal or a bit travel through a medium in one second.

21. What is SONET?

SONET(Synchronous optical network's) is a fibre optic WAN technology used to deliver voice, data and video at speeds upto 622 Mbps.

22. Differentiate between sentinel based and counting based approach to framing.

Issue : Identifying the start and end of the frame

Sentinel based : Have a special pattern that acts as flag

Counting based : Have a field in the header that specifies the length of the frame

23. What are the responsibilities of data link layer?

Specific responsibilities of data link layer include the following.

a) Framing b) Physical addressing c) Flow control d) Error control e) Access control.

24. Mention the types of errors.

There are 2 types of errors. a) Single-bit error. b) Burst-bit error.

25. Define the following terms.

a) Single bit error:

The term single bit error means that only one bit of a given data unit (such as byte character/data unit or packet) is changed from 1 to 0 or from 0 to 1.

b) Burst error: Means that 2 or more bits in the data unit have changed from 1 to 0 from 0 to 1.

26. What is redundancy?

It is the error detecting mechanism, which means a shorter group of bits or extra bits may be appended at the destination of each unit.

27. List out the available detection methods.

There are 4 types of redundancy checks are used in data communication.

a) Vertical redundancy checks (VRC). b) Longitudinal redundancy checks (LRC). c) Cyclic redundancy checks (CRC). d) Checksum.

28. Write short notes on CRC.

The third and most powerful of the redundancy checking techniques is the cyclic redundancy checks (CRC). CRC is based on binary division. Here a sequence of redundant bits, called the CRC remainder is appended to the end of data unit.

29. Write short notes on CRC generator. A CRC generator uses a modulo-2 division. a) In the first step, the 4 bit divisor is subtracted from the first 4 bit of the dividend. b) Each bit of the divisor is subtracted from the corresponding bit of the dividend without disturbing the next higher bit.

30. Write short notes on CRC checker. A CRC checker functions exactly like a generator. After receiving the data appended with the CRC it does the same modulo-2 division. If the remainder is all

0" s the CRC is dropped and the data accepted. Otherwise, the received stream of bits is discarded and the dates are resent.

31. Define checksum. The error detection method used by the higher layer protocol is called checksum. Checksum is based on the concept of redundancy.

32. What are the steps followed in checksum generator?

The sender follows these steps a) The units are divided into k sections each of n bits. b) All sections are added together using 2's complement to get the sum. c) The sum is complemented and become the checksum. d) The checksum is sent with the data.

33. List out the steps followed is checksum checker side.

The receiver must follow these steps

a) The unit is divided into '**k**' section each of n bits.

b) All sections are added together using 1's complement to get the sum.

c) The sum is complemented.

d) If the result is zero.

34. Write short notes on error correction.

It is the mechanism to correct the errors and it can be handled in 2 ways. a) When an error is discovered, the receiver can have the sender retransmit the entire data unit. b) A receiver can use an error correcting coder, which automatically corrects certain errors.

35. Mention the types of error correcting methods.

There are 2 error-correcting methods. a) Single bit error correction b) Burst error correction.

36. What is the purpose of hamming code? A hamming code can be designed to correct burst errors of certain lengths. So the simple strategy used by the hamming code to correct single bit errors must be redesigned to be applicable for multiple bit correction.

37. Define flow control. Flow control refers to a set of procedures used to restrict the amount of data. The sender can send before waiting for acknowledgment.

38. What is a buffer?

Each receiving device has a block of memory called a buffer, reserved for storing incoming data until they are processed.

39. Mention the categories of flow control.

There are 2 methods have been developed to control flow of data across communication links. a) Stop and wait- send one from at a time. b) Sliding window- send several frames at a time.

40. What is the function of stop and wait flow control?

In this method, the sender sends one frame and waits for an acknowledgement before sending.

41. Mention the advantage and disadvantage of stop and wait flow control.

Advantage: simplicity

Disadvantage: inefficiency.

42. Define ARQ.

Error control in the data link layer is based on Automatic repeat request (ARQ), which means retransmission of data in 3 cases. a) Damaged frame b) Lost frame c) Lost acknowledgment.

43. Mention the function of go-back N-ARQ.

It is the popular mechanism for continuous transmission error control. In the method, if our frame is lost or damaged, all frames sent since the last frame acknowledged are retransmitted.

44. What is selective reject ARQ?

In selective reject ARQ only the specific damaged or lost frame is retransmitted. If a frame is corrupted in transit, a NAK is returned and the frame is resent out of sequence.

45. Define configuration.

The bond configuration refers to the relationship of hardware devices on a link.

46. List the various ways of station configuration.

The stations are configured in 3 ways

a) Unbalanced configuration b) Symmetrical configuration and c) Balanced configuration.

47. What are the different communication modes in HDLC?

HDLC supports 3 modes of communication between stations. a) Normal response mode (NRM) b) Asynchronous response mode (ARM) c) Asynchronous balanced mode (ABM)

48. Mention the types of frames in HDLC.

There are 3 types of HDLC frames. a) Information frames (I-frames) b) Supervisory frames (S-frames) c) Unnumbered frames (U-frames)

49. Give the usage of I, S, U frames.

I frames – used to transport user data and control information relating to user data. S frames – used only to transport control information, primarily data link layer and error controls. U frames – reserved for systems management.

50. Write the types of frame fields contained in HDLC.

Each frame in HDLC may contain up to 6 fields. a) Beginning flag field b) An address field c) A control field d) An information field e) A frame check sequence (FCS) field f) An ending flag field.

51. What is meant by bit stuffing?

Bit stuffing is the process of adding one extra 0 whenever there are 5 consecutive in the data so that the receiver doesn't mistake the data for a flag.

52. What is piggy backing?

Piggy backing means combining data to send and acknowledgement of the frame received in one single frame. Piggy backing can save bandwidth because the overhead from a data frame and an ACK frame can be combined into just one frame.

UNIT II MEDIA ACCESS & INTERNETWORKING

1. **Define LAN.**

   A Local Area Network (LAN) is a data communication system that allows a number of independent devices to communicate directly with each other in a limited geographic area.

2. **Mention the various architecture in a LAN.**

   LAN is dominated by 4 architectures. a) Ethernet b) Token bus c) Token ring d) Fiber distributed data interface (FDDI)

3. **Define a standard 802.3**

   IEEE 802.3 supports a LAN standard originally developed by Xerox and later extended by a joint venture between digital equipment corporations. Intel Corporation and Xerox. This was called 'Ethernet'.

4. **List the most command kinds of Base band 802.3 LAN.**

   a) 10 Base 5

b) 10 Base 2

c) 10 Base T

d) 1 Base 5

e) 100 Base T

5. Mention the different kinds of Ethernet networks.

a) Switched Ethernet

b) Fast Ethernet

c) Gigabit Ethernet

6. Differentiate between bridge and a router.

Bridge: It is a interconnecting device in network that connects two LANs of same type

Router: It maintains a forwarding table that forwards packets to all nodes connected in the destination segment.

7. Differentiate between the early and delayed token release methods in IEEE 802.5

Early release: Immediate after transmitting the packet.

Delayed release: After removing packet when it returns to the sender.

8. What are the types of bridges?

a) Transparent bridge

b) Source routing bridge

9. What are the types of transceiver? Internal:

Installed inside the station and doesn't need an AUI cable

External: Installed close to media and connected via AUI to the station

10. What are the types of CSMA?

a) Non persistent CSMA

b) 1-persistent CSMA

c) P persistent CSMA

11. What is transceiver?

Transceiver is a device which connects host adaptor to Ethernet cable. It receives and sends signals.

12. What is the size of the smallest Ethernet frame?

Size of small Ethernet frame = 64 bytes

13. Differentiate between the early and delayed token release methods in IEEE 802.5.

Early release: Immediately after transmitting packet Delayed release: After removing packet when it returns to the sender

14. What are the types of Ethernet?

- Traditional Ethernet(10 Mbps)
- Fast Ethernet(100 Mbps)
- Gigabit Ethernet(1Gbps)

15. What are the effects of bridges in Ethernet?

- Raise in Bandwidth
- Separate collision domains

16. Explain Monitor stations?

Sometimes stations may neglect to retransmit a token or a token may be destroyed by noise. To handle this situation one station on the ring is designated as monitor station. If the token does not reappear in the allotted time the monitor generates a new token and introduces it into the ring.

17. What are the types of frame formats in IEEE 802.5?

- Data/Command frame
- Token frame
- Abort frame

18. What are the fields in frame control?

- Type of information in PDU
- Special information control

19. What are the uses of bridges?

- It is used to connect network segments
- It checks the source and destination physical addresses present in the frame
- It regenerates the signal it receives

20. What are the types of bridges?

- Transparent bridge
- Source routing bridge

21. Define spanning tree. Spanning tree is a graph with no loop. Using spanning tree, a topology is created in which there is only one path from a LAN to another LAN. Also loops can be eliminated.

22. Mention the categories of frames in wireless LAN?

- Management frames
- Control frames
- Data frames

23. Define BSS.

Basic Service set which normally defines as the building blocks of wireless LAN. It is made of stationary or mobile wireless station and a possible central base station called as access points (AP). BSS without AP called as adhoc architecture.

24. Define ESS and types of station.

Extended Service set which is normally made of two or more BSS with APs. The types of station are normally based on **mobility.**

- No transition
- BSS-Transition mobility
- ESS-Transition mobility

25. Define Media Access method.

It normally refers to the manner in which a computer gains and controls access to the networks physical medium. The common methods are:

- CSMA/CD
- Token passing
- CSMA/CA

26. Define VLAN.

Virtual LAN normally allows a single extended LAN to be partitioned into several separate LANs. Each VLAN has an identifier and packets can only travel from one segment to another if both the segments have the same identifier.

27. Define spread spectrum.

Spread spectrum is a signal generated from a bandwidth and it is spread it to the frequency domain.

28. Define frequency hopping.

It is a spread spectrum technique that involves transmitting a signal over a random sequence of frequencies. ie., first transmitting at one frequency then second and so on

29. Define direct sequence

The second spread spectrum technique is direct sequence. Here the transmission is normally done and it is represented in bits.

30. What are the types of information carried in frame body of Wireless LAN?

- Management (00)
- Control (01)
- Data (10)

31. Explain the various fields of addresses in Wireless LAN?

- Addr 1 – identifies target node
- Addr 2 –identifies source node
- Addr 3 – identifies intermediate destination
- Addr 4 – identifies original source

32. What is the main advantage of FHSS method?

Unauthorized person cannot sense the data because they don't know sequence of subbands in which data arrives.

33. What is RTS?

RTS means Request to send which will normally include the duration of time it occupies the channel.

34. Define NAV

NAV means Network Allocation vector. If other station needs channel it will starts a timer called NAV till which stations does not check idleness, if NAV expired check the channel and if it is free any one station can send its RTS.

35. Define Switch.

It is a mechanism that allows interconnecting the links in order to form a large network.

36. Define header address

The header address will normally tell its final destination is, so the packets know where it should go or move. It also describes the sequence for reassembly at the destination side, so as to arrange the packets in correct order.

37. Define circuit switching

It normally means that a dedicated communication path will be available between the stations.

38. Mention any two advantages of packet switching

- Devices of different speeds can communicate
- Availability ie., do not have to wait for a direct connection to become available

39. Mention the disadvantages of packet switching

- Under heavy use, there can be a delay
- Data packets can be lost or corrupted
- Protocols are needed for reliable transfer

40. Mention some of the advantages of circuit switching

- Dedicated communication path is available
- No interference (or) no sharing will be available
- Guaranteed quality of service maintained

41. Mention some of the disadvantages of circuit switching

- It normally takes a relatively long time to set up the circuit

- During any disaster, the network may become unstable (or) unavailable

42. Define IP address

Internet protocol (or) IP address is 32 bit identifier that uniquely defines a host (or) a router connected to the internet.

43. What are the notations to show an IP address?

- Binary notation
- Dotted decimal notation

44. Define unicast and multicast address

The communication is between one source and one destination is called as unicast address. The communication is from one source to a group of destination is called as multicast address and this address can be used as multicast destinations address and not as source address.

45. Define ARP

Mapping a logical address (IP address) to its physical address (MAC address) is normally called as address resolution protocol (ARP)

46. Define RARP

Mapping a physical address (MAC address) to its logical address (IP address) is normally called as address resolution protocol(RARP)

47. Define Proxy ARP.

A technique called proxy ARP is used to create a subnetting effect. Whenever a router running a proxy ARP receives an ARP request looking for the IP address of one of these hosts, the router sends an ARP reply announcing its own hardware (physical) address. After the router receives the actual IP packet, it sends the packet to the appropriate host or router.

48. Define ICMP.

ICMP defines a collection of error messages that are sent back to the source host whenever a router or host is unable to process an IP datagram successfully. For example, ICMP defines error messages indicating that the destination host is unreachable (perhaps due to a link failure), that the reassembly process failed, that the TTL had reached 0, that the IP header checksum failed etc.,

49. Mention some of the frequent ICMP error messages

- Destination unreachable
- Redirect
- Time exceeded
- Parameter problem

50. Mention some of the subtypes of destination unreachable.

- Network unreachable
- Host unreachable
- Protocol unreachable
- Port unreachable
- Fragmentation needed

51. Define DHCP. DHCP dynamically assigns IP addresses to hosts. That is DHCP allows addresses to be "leased" for some period of time. Once the lease expires, the server is free to return that address to its pool.

52. How can a packet be dropped when a queue becomes full?

Using the drop discipline methods such as tail drop and front drop.

- Tail drop : Drops the newly received packet
- Front drop : Oldest packet has to be dropped

UNIT III ROUTING

1. Define Routing. It is the process of selection paths in a network along which is to be sending network traffic. It normally maintains a routing table.

2. Mention some of the routing table management methods.

- Next hop routing
- Network specific routing
- Host specific routing
- Default routing

3. Differentiate static routing table with dynamic routing table

	Static routing table **table**	Dynamic routing table
i.	Information in routing table can be entered manually by administrator	Information's are updated automatically by using protocols like RIP,OSPF or BGP
ii.	Changes are updated manually	Changes are updated automatically

4. Define Autonomous system. The internet is divided into an autonomous systems.AS is a group of networks and routers which is under an authority of a single administration

5. Explain interior and exterior routing? Interior routing: Routing inside AS and it is done using interior routing protocol Exterior routing: routing between AS and it is done using exterior routing protocol

6. What are the network support layers and the user support layers?

Network support layers: The network support layers are Physical layer, Data link layer and Network layer. These deals with electrical specifications, physical connection, transport timing and reliability.

User support layers: The user support layers are: Session layer, Presentation layer, Application layer. These allow interoperability among unrelated software system.

7. What are the functions of LLC?

The IEEE project 802 model takes the structure of an HDLC frame and divides it into 2 sets of functions. One set contains the end user portion of the HDLC frame – the logical address, control information, and data. These functions are handled by the IEEE 802.2 logical link control (LLC) protocol.

8. What are the functions of MAC?

MAC sub layer resolves the contention for the shared media. It contains synchronization, flag, flow and error control specifications necessary to move information from one place to another, as well as the physical address of the next station to receive and route a packet.

9. What are the responsibilities of network layer?

The network layer is responsible for the source-to-destination delivery of packet across multiple network links. The specific responsibilities of network layer include the following:

Logical addressing.

Routing.

10. What is a virtual circuit?

A logical circuit made between the sending and receiving computers. The connection is made after both computers do handshaking. After the connection, all packets follow the same route and arrive in sequence.

11. What are data grams?

In datagram approach, each packet is treated independently from all others. Even when one packet represents just a place of a multi packet transmission, the network treats it although it existed alone. Packets in this technology are referred to as datagram.

12. What are the two types of implementation formats in virtual circuits?

Virtual circuit transmission is implemented in 2 formats.

1. Switched virtual circuit
2. Permanent virtual circuit.

13. What is meant by switched virtual circuit?

Switched virtual circuit format is comparable conceptually to dial-up line in circuit switching. In this method, a virtual circuit is created whenever it is needed and exits only for the duration of specific exchange.

14. What is meant by Permanent virtual circuit?

Permanent virtual circuits are comparable to leased lines in circuit switching. In this method, the same virtual circuit is provided between two uses on a continuous basis. The circuit is dedicated to the specific uses.

15. Define Routers. Routers relay packets among multiple interconnected networks. They Route packets from one network to any of a number of potential destination networks on internet routers operate in the physical, data link and network layer of OSI model.

16. What is meant by hop count?

The pathway requiring the smallest number of relays, it is called hop-count routing, in which every link is considered to be of equal length and given the value one.

17. How can the routing be classified?

The routing can be classified as,

1. Adaptive routing

2. Non-adaptive routing.

18. What is time-to-live or packet lifetime?

As the time-to-live field is generated, each packet is marked with a lifetime; usually the number of hops that are allowed before a packet is considered lost and accordingly, destroyed. The time-to-live determines the lifetime of a packet.

19. What is meant by brouter?

A brouter is a single protocol or multiprotocol router that sometimes acts as a router and sometimes acts as a bridge.

20. Write the keys for understanding the distance vector routing.

The three keys for understanding the algorithm are

Knowledge about the whole networks

Routing only to neighbors

Information sharing at regular intervals

21. Write the keys for understanding the link state routing.

The three keys for understanding the algorithm are

Knowledge about the neighborhood.

Routing to all neighbors.

Information sharing when there is a range.

22. How the packet cost referred in distance vector and link state routing?

In distance vector routing, cost refer to hop count while in case of link state routing, cost is a weighted value based on a variety of factors such as security levels, traffic or the state of the link.

23. How the routers get the information about neighbor?

A router gets its information about its neighbors by periodically sending them a short greeting packet. If the neighborhood responds to the greeting as expected, it is assumed to be alive and functioning. If it dose not, a change is assumed to have occurred and the sending router then alerts the rest of the network in its next LSP.

24. What are the four internetworking devices?

The four internetworking devices are,

1. Repeaters 2. Bridges 3. Routers 4. Gateway

25. Define IP address.

IP address is the 3-bit number for representing a host or system in the network. One portion of the IP address indicates a networking and the other represents the host in a network.

26. What is Token Bus?

Token Bus is a physical bus that operates as a logical ring using tokens. Here stations are logically organized into a ring. A token is passed among stations. If a station wants to send data, it must wait and capture the token. Like Ethernet, station communicates via a common bus.

27. What is token passing?

Stations may attempt to send data multiple times before a transmission makes it onto a link. This redundancy may create delays of indeterminable length if the traffic is heavy. Token ring resolves this uncertainty by requiring that stations take turns sending data. Each station may transmit only during its turn and may send only one frame during each turn. The mechanism that coordinates this rotation is called token passing.

28. Define Masking?

Masking is the process that extracts the address of the physical network from an IP address.

29. What are the rules of boundary-level masking?

* The bytes in the IP address that corresponds to 255 in the mask will be repeated in the sub network address.

* The bytes in the IP address that corresponds to 0 in the mask will change to 0 in the sub network address.

30. What are the rules of non-boundary-level masking?

* The bytes in the IP address that corresponds to 255 in the mask will be repeated in the sub network address.

* The bytes in the IP address that corresponds to 0 in the mask will change to 0 in the sub network address.

* For other bytes, use the bit-wise AND operator.

31. Define Gateway. A device used to connect two separate networks that we different communication protocols.

32. What is LSP? In link state routing, a small packet containing routing information sent by a router to all other router by a packet called link state packet.

33. What are the different routing techniques available to manage routing table entries?

1.Next hop routing 2.Network specific routing 3.Host specific routing 4.Default routing

34. What is Reliable Flooding?

The process of reliable dissemination of link state information is called reliable flooding.

UNIT IV TRANSPORT LAYER

1. What is function of transport layer?

The protocol in the transport layer takes care in the delivery of data from one application program on one device to an application program on another device. They act as a link between the upper layer protocols and the services provided by the lower layer.

2. What are the duties of the transport layer?

The services provided by the transport layer

End-to- end delivery
Addressing
Reliable delivery
Flow control
Multiplexing

3. What are the four aspects related to the reliable delivery of data?

The four aspects are,

Error control
Sequence control
Loss control
Duplication control

4. What is meant by segment?

At the sending and receiving end of the transmission, TCP divides long transmissions into smaller data units and packages each into a frame called a segment.

5. What is meant by segmentation? When the size of the data unit received from the upper layer is too long for the network layer datagram or data link layer frame to handle, the transport protocol divides it into smaller usable blocks. The dividing process is called segmentation.

6. What is meant by Concatenation? The size of the data unit belonging to a single session are so small that several can fit together into a single datagram or frame, the transport protocol combines them into a single data unit. The combining process is called concatenation.

7. What are the types of multiplexing?

The types of multiplexing are,

1. Upward multiplexing
2. Downward multiplexing

8. What are the two possible transport services?

Two basic types of transport services are,

1. Connection service
2. Connectionless services

9. The transport layer creates the connection between source and destination. What are the three events involved in the connection?

For security, the transport layer may create a connection between the two end ports. A connection is a single logical path between the source and destination that is associated with all packets in a message. Creating a connection involves three steps:

1. Connection establishment
2. Data transfer &
3. Connection release.

10. What are the techniques used in multiplexing?

The three basic techniques of multiplexing are,

Frequency-division multiplexing

Time-division multiplexing
Wave-division multiplexing

11. What is meant by congestion?

Congestion in a network occurs if user sends data into the network at a rate greater than that allowed by network resources.

12. Why the congestion occur in network?

Congestion occurs because the switches in a network have a limited buffer size to store arrived packets.

13. How will the congestion be avoided?

The congestion may be avoided by two bits

BECN - Backward Explicit Congestion Notification

FECN - Forward Explicit Congestion Notification

14. What is the function of BECN BIT?

The BECN bit warns the sender of congestion in network. The sender can respond to this warning by simply reducing the data rate.

15. What is the function of FECN?

The FECN bit is used to warn the receiver of congestion in the network. The sender and receiver are communicating with each other and are using some types of flow control at a higher level.

16. What is meant by quality of service?

The quality of service defines a set of attributes related to the performance of the connection. For each connection, the user can request a particular attribute each service class is associated with a set of attributes.

17. What are the two categories of QoS attributes?

The two main categories are, User Oriented and Network Oriented

18. List out the user related attributes? User related attributes are,

SCR – Sustainable Cell Rate

PCR – Peak Cell Rate
MCR- Minimum Cell Rate
CVDT – Cell Variation Delay Tolerance

19. What are the networks related attributes?

The network related attributes are,

Cell loss ratio (CLR)
Cell transfer delay (CTD)
Cell delay variation (CDV)
Cell error ratio (CER)

20. What is frame?

A frame consists of one complete cycle of time slots, including one or more slot dedicated to each sending device.

21. What is interleaving?

The switch moves from device to device at a constant rate and fixed order. This process is called interleaving.

22. What is framing bits?

One or more synchronization bits are usually added to the beginning of each frame. These bitts are called framing bits.

23. Define Jitter

Jitter is the variation in delay for packets belonging to the same flow.

Example:2 ms delay for 1st packet.

24. What is the use of integrated services?

Integrated services is a followed based QOS model where the user creates a flow from source to direction and inform all the routers of the source requirements.

25. What is the unit of data transfer in UDP and TCP?

In UDP, the unit of data transfer is called datagram In TCP,Unit of data transfer is called segments.

26. List the timers used by TCP

1. Retransmission timer

2. Persistence timer

3. Keep alive timer

4. Time waited timer

27. What is traffic shaping?

It is a mechanism to control the amount and rate of traffic sent to the network

28. What are the techniques in traffic shaping?

1. Leaky bucket 2. Token bucket

29. What is a socket? and Define socket address

Socket is the endpoint of a bidirectional communication flow across IP based network.

Socket address is the combination of an **IP address and a port** into a single entity.

30. How to control congestion?

The amount of data passes through network congestion can be controlled using two techniques: 1. Open loop congestion control (Prevention) 2. Closed loop congestion control (Removal)

31. What is the use of integrated services?

An integrated service is a followed based QOS model where the users creates a flow from source to direction and inform all the routers of the resource requirement.

32. What is the unit of data transfer in UDP and TCP?

In UDP, the unit of data transfer is called **datagram.**

In case of TCP, the unit of data transfer is called **records.**

33. What is silly window syndrome?

Sending fewer amounts of data which is lesser than header size is called silly window syndrome. Here the capacity of network is used inefficiently.

34. What are the strategies created by sender TCP to avoid congestion?

1. Slow start and additive increase 2. Multiplicative decrease

35. What are the algorithms for adaptive retransmission?

1.Simple algorithm 2.Kern / Petridge algorithm 3. Jacobson/Karels algorithm

36. What are the tools for error control in TCP?

1.Checksum 2.Acknowledgement 3.Time out

37. Define Acknowledgement and discarding policy?

Acknowledgement policy Instead of sending ACK for each of the packets that have been sent, just we can send an ACK for a set of packets or segments that have been send. Discarding policy if the set of packets that have been used are found to have congestion it can be discarded.

38. Differentiate back pressure and choke packet.

Back pressure: It is a node to node congestion control also the node that is congested is denoted as "congested node" and next backward to that node is called "upstream node".

Choke packet: It is sent from the congested node to the source directly to inform and warn it about congestion occurrence. Intermediate nodes do not take any congestion control actions.

39. What are the types of messages in BGP?

1.OPEN 2.UPDATE 3.KEEPALIVE 4.NOTIFICATION

40. What are the services offered by TCP?

1. Stream delivery service 2.Full Duplex service 3.Connection oriented service 4. Reliable service 5. Flow control, Error control and Congestion control.

UNIT – V APPLICATION LAYER

1. **What is the purpose of Domain Name System?**
   Domain Name System can map a name to an address and conversely an address to name.
2. **Discuss the three main division of the domain name space.**
   Domain name space is divided into three different sections: generic domains, country domains & inverse domain.
   Generic domain: Define registered hosts according to their generic behavior, uses generic suffixes.
   Country domain: Uses two characters to identify a country as the last suffix.
   Inverse domain: Finds the domain name given the IP address.
3. **Discuss the TCP connections needed in FTP.**

FTP establishes two connections between the hosts. One connection is used for data transfer, the other for control information. The control connection uses very simple rules of communication. The data connection needs more complex rules due to the variety of data types transferred.

4. **Discuss the basic model of FTP.**

   The client has three components: the user interface, the client control process, and the client data transfer process. The server has two components: the server control process and the server data transfer process. The control connection is made between the control processes. The data connection is made between the data transfer processes.

5. **What is the function of SMTP?**

   The TCP/IP protocol supports electronic mail on the Internet is called Simple Mail Transfer (SMTP). It is a system for sending messages to other computer users based on e-mail addresses. SMTP provides mail exchange between users on the same or different computers.

6. **What is the difference between a user agent (UA) and a mail transfer agent (MTA)?**

   The UA prepares the message, creates the envelope, and puts the message in the envelope. The MTA transfers the mail across the Internet.

7. **How does MIME enhance SMTP?**

   MIME is a supplementary protocol that allows non-ASCII data to be sent through SMTP. MIME transforms non-ASCII data at the sender site to NVT ASCII data and deliverers it to the client SMTP to be sent through the Internet. The server SMTP at the receiving side receives the NVT ASCII data and delivers it to MIME to be transformed back to the original data.

8. **Why is an application such as POP needed for electronic messaging?**

   Workstations interact with the SMTP host which receives the mail on behalf of every host in the organization, to retrieve messages by using a client-server protocol such as Post Office Protocol , version 3(POP3). Although POP3 is used to download messages

from the server, the SMTP client still needed on the desktop to forward messages from the workstation user to its SMTP mail server.

9. Give the format of HTTP request message.

Request Line
Headers
A Blank Line
Body

10. Give the format of HTTP response message.

Status Line
Headers
A Blank Line
Body

11. Write down the three types of WWW documents.

The documents in the WWW can be grouped into three broad categories: static, dynamic and active.

Static: Fixed-content documents that are created and stored in a server.

Dynamic: Created by web server whenever a browser requests the document.

Active: A program to be run at the client side.

12. What is the purpose of HTML?

HTML is a computer language for specifying the contents and format of a web document. It allows additional text to include codes that define fonts, layouts, embedded graphics and hypertext links.

13. **Define CGI**.

CGI is a standard for communication between HTTP servers and executable programs. It is used in crating dynamic documents.

14. List some of the popular application protocols

- SMTP
- HTTP
- DNS
- SNMP

15. Define E-mail. E mail is used for sending a message that includes text, voice, video or graphics to one or more recipients. SMTP is used for Email.

16. Define UA UA is a program that handles mail boxes, composes, reads, reply and forwarded messages.

17. What are the types of UA?

1. Command driven 2. GUI

18. What are the types of messages in MIME? 1.Text 2.Multipart 3.Message 4.Image 5.Video 6.Audio 7.Application **26. List some of the encoding methods**

- 7 bit
- 8 bit
- Binary
- Base 64
- Quoted printable

19. What are the modes in POP3?

There are 2 modes. 1.Delete mode 2.Keep mode

20. Define HTTP.

Hyper text transfer protocol is a protocol used to access data on World wide web.It transfers text data, hyper text, audio and video.

21. List the sections of DNS tree 1.Generic domain 2.Country domain 3.Inverse domains

22**. What are the client components of FTP?**

1.User interface 2.Client control process 3.Client data transfer process

31. What are the server components of FTP?

1.Server control process 2.Server data transfer process

23. List the network security services

- Confidentiality
- Integrity
- Authentication
- Non repudiation
- Authentication of entity