

4132COMPUTER COMMUNICATION AND NETWORKS

Module II

PART A

Answer all questions in one word or one sentence.

1. The physical layer in an OSI architecture transfers the data in the form of _____
Bits
2. List any two services of data link layer
Framing, flow control, error control, connectionless and connection oriented
(any two)
3. List two multiple access protocols for channel access control
CSMA/CD, CSMA/CA
4. The working principle of optical fiber is _____
Total internal reflection
5. In an OSI model architecture _____ layer transmits the error-free frames
Data link layer
6. What is Ethernet?
Ethernet is defined as a networking technology that includes the protocol, port, cable, and computer chip needed to plug a desktop or laptop into a local area network (LAN) for speedy data transmission via coaxial or fiber optic cables.
7. List different types of transmission media
Guided Media and unguided media
8. What is bit stuffing?
Bit stuffing is the mechanism of inserting one or more non-information bits into a message to be transmitted, to break up the message sequence, for synchronization purpose.

Question and Answers

9. Write notes on transmission impairment
Transmission Impairment:
When signals travel through the medium they tend to deteriorate. This may have many reasons as given:
 - Attenuation: When the signal passes through the medium, it tends to get weaker.
 - Dispersion: As signal travels through the media, it tends to spread and overlaps. The amount of dispersion depends upon the frequency used.
 - Delay distortion: Signals are sent over media with pre-defined speed and frequency. There are possibilities that signal reaches destination in arbitrary fashion. Some bits reach earlier than the previously sent ones.Noise: Random disturbance or fluctuation in analog or digital signal is said to be Noise. (Any 3)
10. What are the services of Data link layer?
Data link layer services:
 - a) Framing: The data link layer divides the bit streams from physical layer into frames to provide a frequent change of bit streams to the network layer.

- b) Physical addressing: MAC address is the physical address
- c) Flow control: Without flow control, the receiver's buffer can overflow, and frames can get lost. To overcome this problem, the data link layer uses the flow control to prevent the sending node on one side of the link from overwhelming the receiving node on another side of the link.
- d) Error control: It includes sequencing frames and sending control frames for acceptance.

11. Explain various transmission media

Transmission media is used to transfer the information between two computer systems. Transmission media comes in two forms.

- Guided media
- Unguided media

Guided Media:

All communication wires/cables are guided media, such as UTP, coaxial cables, and fiber Optics. In this media, the sender and receiver are directly connected and the information is send (guided) through it.

Unguided Media:

Wireless or open air space is said to be unguided media, because there is no connectivity between the sender and receiver. Information is spread over the air, and anyone including the actual recipient may collect the information.

12. Explain Ethernet evolution

Ethernet is a type of communication protocol that is a widely used LAN protocol. It connects computers within the local area network and wide area network.

There are some kinds of Ethernet networks, which are discussed below:

- Fast Ethernet: This type of Ethernet is usually supported by a twisted pair or CAT5 cable, which has the potential to transfer or receive data at around 100 Mbps. They function at 100Base and 10/100Base Ethernet on the fiber side of the link if any device such as a camera, laptop, or other is connected to a network. The fiber optic cable and twisted pair cable are used by fast Ethernet to create communication. The 100BASE-TX, 100BASE-FX, and 100BASE-T4 are the three categories of Fast Ethernet.
- Gigabit Ethernet: This type of Ethernet network is an upgrade from Fast Ethernet, which uses fiber optic cable and twisted pair cable to create communication. It can transfer data at a rate of 1000 Mbps or 1 Gbps. In modern times, gigabit Ethernet is more common. This network type also uses CAT5e or other advanced cables, which can transfer data at a rate of 10 Gbps.

13. Explain the working of CSMA/CD

CSMA/ CD

It is a **carrier sense multiple access/ collision detection** network protocol to transmit data frames. The CSMA/CD protocol works with a medium access control layer. Therefore, it first senses the shared channel before broadcasting the frames, and if the channel is idle, it

transmits a frame to check whether the transmission was successful. If the frame is successfully received, the station sends another frame. If any collision is detected in the CSMA/CD, the station sends a jam/stop signal to the shared channel to terminate data transmission. After that, it waits for a random time before sending a frame to a channel.

14. List and explain different types of guided media

Guided Media:

It is defined as the physical medium through which the signals are transmitting. It is also known as Bounded media.

Types of Guided media:

1. Twisted pair: To reduce this electromagnetic interference, pair of copper wires is twisted together in helical shape like a DNA molecule. Such twisted copper wires are called twisted pair.
 - Unshielded Twisted Pair: The wires those are not shielded but simply bundled together in a protective sheath.
 - Shielded Twisted Pair: To counter the tendency of twisted pair cables to pick up noise signals, wires are shielded.
2. Coaxial Cable: Coaxial cables are copper cables with better shielding than twisted pair cables, so that transmitted signals may travel longer distances at higher speeds.
 - Baseband transmission:
 - Broadband transmission
3. Fiber Optic: Thin glass or plastic threads used to transmit data using light waves are called optical fiber.

15. Explain Aloha

ALOHA is a multiple access protocol for transmission of data via a shared network channel. It operates in the medium access control sublayer (MAC sublayer) of the open systems interconnection (OSI) model. Using this protocol, several data streams originating from multiple nodes are transferred through a multi-point transmission channel.

In ALOHA, each node or station transmits a frame without trying to detect whether the transmission channel is idle or busy. If the channel is idle, then the frames will be successfully transmitted. If two frames attempt to occupy the channel simultaneously, collision of frames will occur and the frames will be discarded. These stations may choose to retransmit the corrupted frames repeatedly until successful transmission occurs.

Versions of ALOHA Protocols:

Pure ALOHA: In this the time of transmission is continuous. Whenever a station has an available frame, it sends the frame. If there is collision and the frame is destroyed, the sender waits for a random amount of time before retransmitting it.

Slotted ALOHA: This reduces the number of collisions and doubles the capacity of pure ALOHA. The shared channel is divided into a number of discrete time intervals called slots. A station can transmit only at the beginning of each slot. However, there can still be collisions if more than one station tries to transmit at the beginning of the same time slot.

16. Explain DLC services

DLC services are:

Framing, Flow control and Error control

Framing: Data Link Layer protocols encapsulate each network frame within a Link layer frame before the transmission across the link. A frame consists of a data field in which network layer datagram is inserted and a number of data fields. It specifies the structure of the frame as well as a channel access protocol by which frame is to be transmitted over the link.

Flow control: A receiving node can receive the frames at a faster rate than it can process the frame. Without flow control, the receiver's buffer can overflow, and frames can get lost. To overcome this problem, the data link layer uses the flow control to prevent the sending node on one side of the link from overwhelming the receiving node on another side of the link.

Error Control: Errors can be introduced by signal attenuation and noise. Data Link Layer protocol provides a mechanism to detect one or more errors. This is achieved by adding error detection bits in the frame and then receiving node can perform an error check.

17. Compare CSMA/CD and CSMA/CA

S.NO	CSMA/CD	CSMA/CA
1.	CSMA / CD is effective after a collision.	Whereas CSMA / CA is effective before a collision.
2.	CSMA / CD is used in wired networks.	Whereas CSMA / CA is commonly used in wireless networks.
3.	It only reduces the recovery time.	Whereas CSMA/ CA minimizes the possibility of collision.
4.	CSMA / CD resends the data frame whenever a conflict occurs.	Whereas CSMA / CA will first transmit the intent to send for data transmission.
5.	CSMA / CD is used in 802.3 standard.	While CSMA / CA is used in 802.11 standard.
6.	It is more efficient than simple CSMA(Carrier Sense Multiple Access).	While it is similar to simple CSMA(Carrier Sense Multiple Access).
7	It is the type of CSMA to detect the collision on a shared channel.	It is the type of CSMA to avoid collision on a shared channel.

18. Explain functions of MAC sublayer

The medium access control (MAC) is a sublayer of the data link layer of the open system interconnections (OSI) reference model for data transmission. It is responsible for flow control and multiplexing for transmission medium. It controls the transmission of data packets via remotely shared channels. It sends data over the network interface card.

Functions of MAC Layer

- It provides an abstraction of the physical layer to the LLC and upper layers of the OSI network.
- It is responsible for encapsulating frames so that they are suitable for transmission via the physical medium.
- It resolves the addressing of source station as well as the destination station, or groups of destination stations.
- It performs multiple access resolutions when more than one data frame is to be transmitted. It determines the channel access methods for transmission.
- It also performs collision resolution and initiating retransmission in case of collisions.

It generates the frame check sequences and thus contributes to protection against transmission errors.