

- ① a) What is transport layer?
b) What are the services of transport layer?
c) Describe all the aspects of Reliability of the transport layer.

- ② a) What are the protocols used by the Transport layer?
b) What is TCP?
c) What is UDP?

- ③ a) What is Socket?
b) Segment format.
c) Difference between TCP and UDP.

- ④ a) How TCP works?
b) Pros & cons of UDP.
c) Pros & cons of TCP.

- ⑤. a) Explain all types of Data transmission.
- b) What is transmission media?
- c) What are the factors that need to be considered for designing the transmission media?
- c) What are the causes of impairment?

- ⑥. a) Show the classification tree of Transmission Media.
- b) Explain all types of guided media.
- c) Explain all types un-guided media.

- ⑦. a) What is Multiplexing? Why is it used for?
- b) What are the Multiplexing Techniques?
- c) What are the differences between FDM TDM and WDM?
- ⑧. a) What is switching? Why switching?
- b) What are the 3 types of switching
- c) Classification of Switching Techniques.

a) The transport layer is 4th layer in the OSI model and is responsible for end-to-end communication over a network. This layer enables the host to send & receive error corrected data, packets or messages over a network and is the network component that allows multiplexing.

b) The services provided by the transport layer protocols can't be divided into 5 categories:

- ① End-to-end delivery
- ② Addressing
- ③ Reliable delivery
- ④ Flow control
- ⑤ Multiplexing

c.) The transport layer provides reliability services by retransmitting the lost and damaged packets.

The reliable delivery has 4 aspects :

- ① Error control
- ② Sequence control
- ③ Loss control
- ④ Duplication control.

2. a) What are the protocols used by transport layer?

Ans. The transport layer is represented by two protocols — TCP and UDP.

UDP : UDP stands for User Datagram protocol. UDP is a simple protocol that provides non-sequenced transport functionality. It is a connectionless protocol. This type of protocol is used when reliability and security are less important than speed and size. UDP is an end-to-end transport level protocol that adds transport level address, checksum error control, and length information to the data from the upper layer.

TCP : TCP stands for Transmission Control Protocol. It provides full transport

layer services to applications.
It is connection-oriented protocol means the connection established between both the ends of the transmission. For creating the connection, TCP generates a virtual circuit between sender and receiver for the duration of a transmission.

b) TCP stands for Transmission Control Protocol. It provides full transport layer services to applications.

Features of TCP protocol:

① Stream data transfer: TCP protocol transfers the data in the

form of contiguous stream of bytes.

II Reliability: TCP assigns a sequence number to each byte transmitted and expects a positive acknowledgement from the receiving TCP. If ACK is not received within a timeout arrival, then the data retransmitted to the destination.

III Flow control: When receiving TCP sends an acknowledgement back to the sender # indicating the number of bytes it can receive without overflowing its internal buffer.

IV Multiplexing: Multiplexing is a process of accepting the data from different applications and forwarding to the different applications on different computer

⑤ Logical connections: The combinations of sockets, sequence numbers, and window sizes is called a logical connection.

⑥ Full duplex: TCP provides full duplex service.

c) UDP stands for User Datagram Protocol. It provides non-sequenced transport functionality. It is connectionless protocol.

Features of UDP protocols are:

- ① Works fine for real time communication.
- ② UDP is used when acknowledgement of data does not hold any

significance.

- (m) UDP is good protocol for data flowing in one direction.
- (n) It is not connection-oriented.
- (o) UDP is suitable for query based communications.
- (p) UDP is stateless.
- (q) Suitable for VoIP.

a) What is Socket ?

What are the types of socket ?

Ans. A socket is one endpoint of a two-way communication link between two programmes running on the network. A socket is bound to a port number so that the TCP layer can identify the application that data is destined to be sent to.

Types of Socket —

- ① Stream Sockets .
- ④ Datagram Sockets
- ⑩ Raw sockets
- ⑪ Sequence packet sockets .

b)

Describe TCP segment format?

Ans.

TCP segments are described below:-

① Source port address: It is used to define the address of the application program in a source computer. It is 16bit field.

⑪ Destination port Address: It is used to define the address of the application program in a destination computer. It is 16 bit field.

⑫ Sequence number: A stream of data is divided into two or more TCP segments. The 32 bit sequence number field represents the position of the data in an original data stream.

⑬ Acknowledgement number: A 32 bit field acknowledgement number acknowledgement the data from other communicating devices. If ACK is set to 1, then it specifies the sequence number that receiver is expecting to receive.

⑤ Header Length (HLEN): It specifies the size of the TCP Header in 32 bit words. The minimum 5 words and maximum is 15 words size.

⑥ Reserved: It is a 6 bit field which is reserved for future use.

⑦ Control bits: Each bits of a control field functions individually and independently. A control bit defines the use of a segment or series as a validity check for other fields.

c) Difference between TCP and UDP :-

TCP	UDP
① TCP establishes a virtual circuit before transmitting the data.	① UDP transmits the data directly computer to the destination computer without verifying whether the receiver is ready to receive or not.
② Connection-oriented	② connection-less
③ Slow speed.	③ High speed.
④ Reliable	④ Unreliable.
⑤ Header size 20 bytes	⑤ Header size 8 bytes.
⑥ Waits for acknowledgement.	⑥ Doesn't wait for acknowledgement.

a) How TCP work ?

Ans. TCP allows for transmission of information in both directions. This means that computer ~~is~~ systems that communicate over TCP can send and receive data at the same ~~is~~ time, similar to a telephone conversation. The protocol uses segments (packets) as the basic units of data transmission. In addition to the payload, segments can also contain control information and a limited to 1500 bytes. The TCP software in the network protocol stack of the operating system is responsible for establishing and terminating the end-to-end connections as well as transferring data.

TCT software is controlled by various network applications, such as web browser or servers, via specific interface. Each connection must always be identified by two clearly defined endpoints (client and server). It doesn't matter which side assumes the client role and which assumes the server role.

b) Pros & cons of ^{UDP} protocol.

Ans: Advantages of ^{UDP} protocols are :-

- ① Simple protocol
- ② Provides non-sequenced transport functionality.
- ③ High speed data transfer.

Disadvantages of UDP protocol :-

- ① Provides basic function of end-to-end delivery of a transmission.
- ② It doesn't provide any sequencing or reordering functions and doesn't specify the damaged packet when reporting an error.
- ③ It can not specify which packet has lost.

Q) Pros & cons of TCP protocol ?

Ans. Advantages of TCP :-

- ① Provides full transport layer services to application.
- ② It is reliable and secure communication protocol.

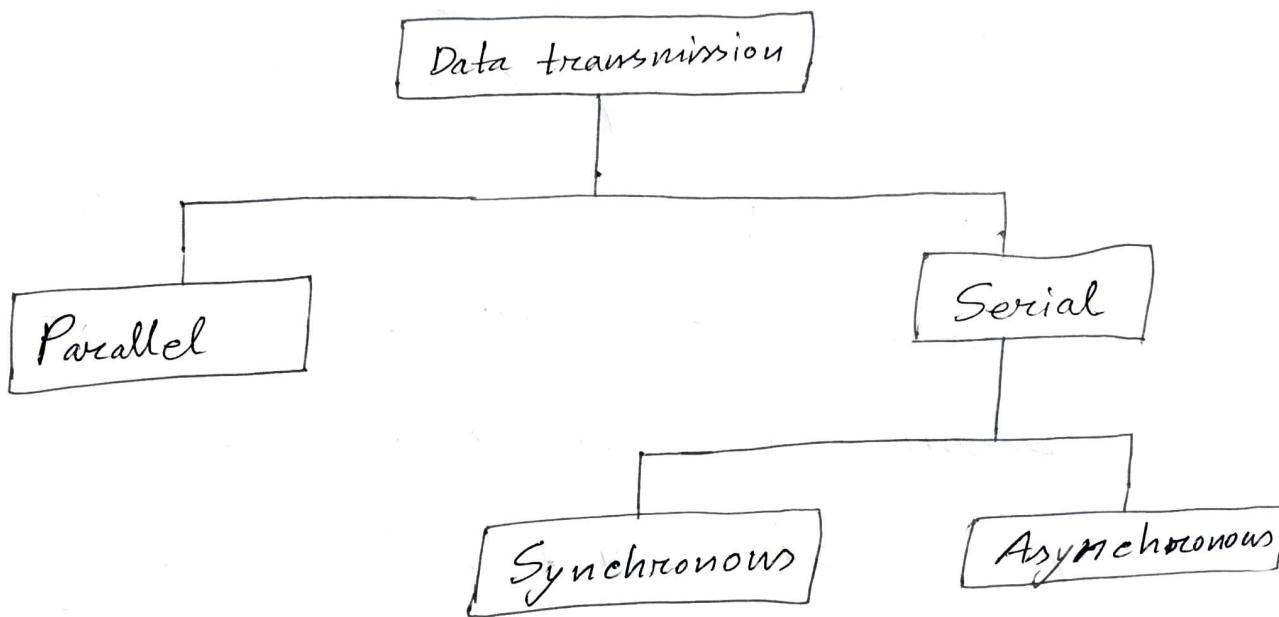
Disadvantages of TCP :-

- ① It is slow in speed.
- ② It is not efficient in real time communication.
- ③ Slow handshake.

Ans. NO - 5

a) Explain all types of Data transmission.

Ans. There are two types of Data transmission.



Parallel transmission: Within a computing or communication device, the distances between each sub-unit and data is exchanged using a parallel transfer mode. This mode of operation results in minimal delays in transferring each word.

Serial transmission: When transferring data between two physically separated devices, especially if the separation is more than a few kilometers, for reasons of cost, it is more economical to use a single pair of lines. Data is transmitted as a single bit at a time using a fixed time interval for each bit. This mode is also known as bit-serial transmission. It is used for long distance communication.

b) What is transmission media? What are the factors needed to be considered for designing the transmission media?

Ans. Transmission media is a communication channel that carries the information from the sender to the receiver. Data is transmitted through the electromagnetic signals.

Some factors need to be considered for designing the transmission media -

① Bandwidth: All the factors remaining constant, the greater the bandwidth of a medium, the higher the data transmission rate of a signal.

② Transmission Impairment: When received signal is not identical to the transmitted one due to the transmission impairment. The quality

of the signals will get destroyed due to transmission impairment.

(iii) Interference: An interference is defined as the process of disrupting a signal when it travels over a communication medium on the addition of some unwanted signals.

c) What are the causes of Transmission Impairment?

Ans. Causes of Transmission Impairment are —

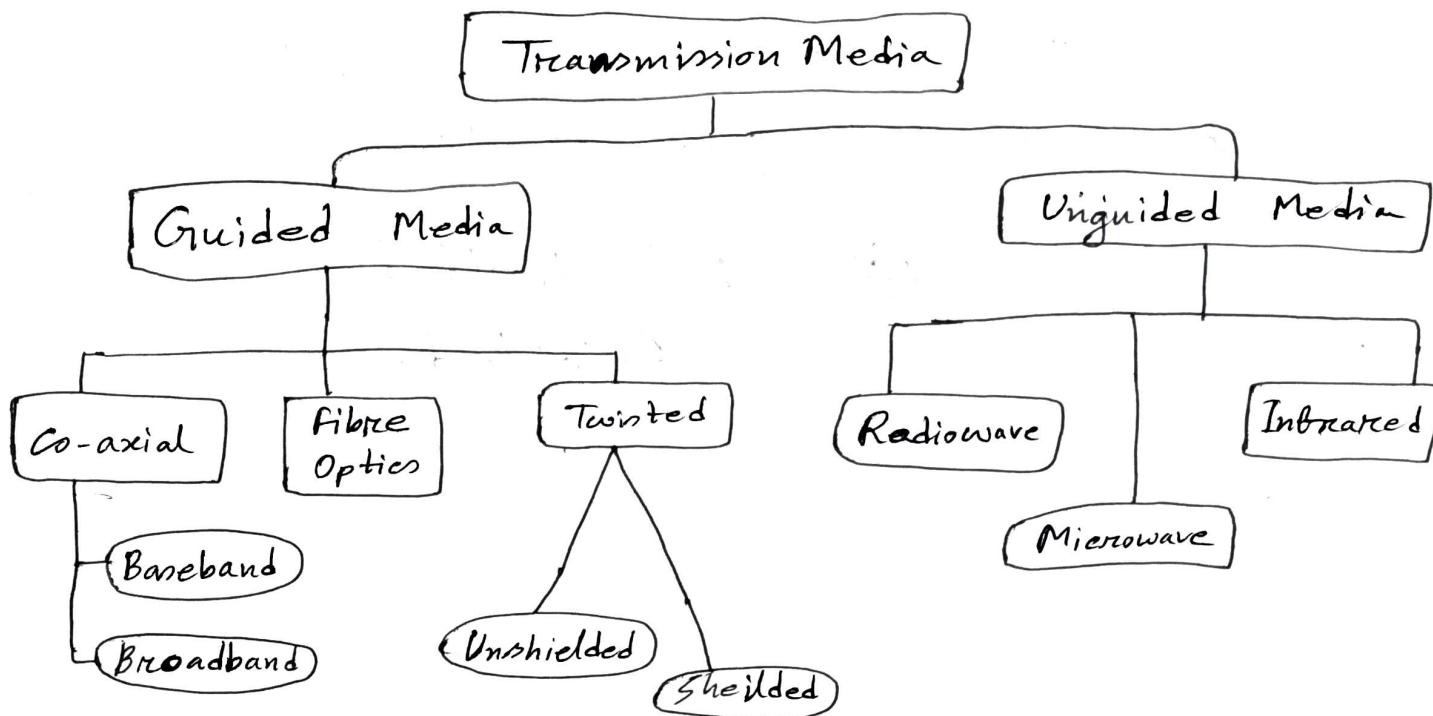
(1) Attenuation: Attenuation means the loss of energy.

⑩ Distortion: It occurs when there is a change in the shape of the signal.

⑪ Noise: When data is travelled over a transmission medium, some unwanted signal is added to it which creates noise.

Am. No - 06

a) Classification tree of Transmission media-



b) Explain all types of Guided media.

Ans. Guided media is the physical medium through which the signals are transmitted.

Types of Guided media

- ① Twisted pair
- ② Co-axial cable
- ③ Fibre optic

① Twisted pair cable is cheap and compared to other transmission media. There are 2 types of twisted pair cable.

- ④
 1. Unshielded
 2. Shielded.

2. Coaxial cable : It is very commonly used transmission media. The name of cable is co-axial because it contains two conductors parallel to each other.

③ Fibre optic : It is faster ~~than~~ than other media. Data is transmitted through light.

c) Explain all the types of Un-guided media.

Ans. An Unguided transmission transmits the electromagnetic waves without using any physical medium.

There are 3 types of - Unguided media:

- ① Radio waves
- ② Microwaves
- ③ Infrared

① Radio waves: It has frequency

range of 3 KHz to 1 KHz. It is transmitted through ~~antenna~~ air by antenna and received by antenna.

② Microwaves: Microwaves are of 2 types. They are -

- 1. Terrestrial microwave
- 2. Satellite microwave communication.

③ Infrared: An infrared is a wireless technology used for communication over short range. Its frequency is from 300 KHz to 400 THz.

Ans. No - 7

a) What is multiplexing? Why it is used for?

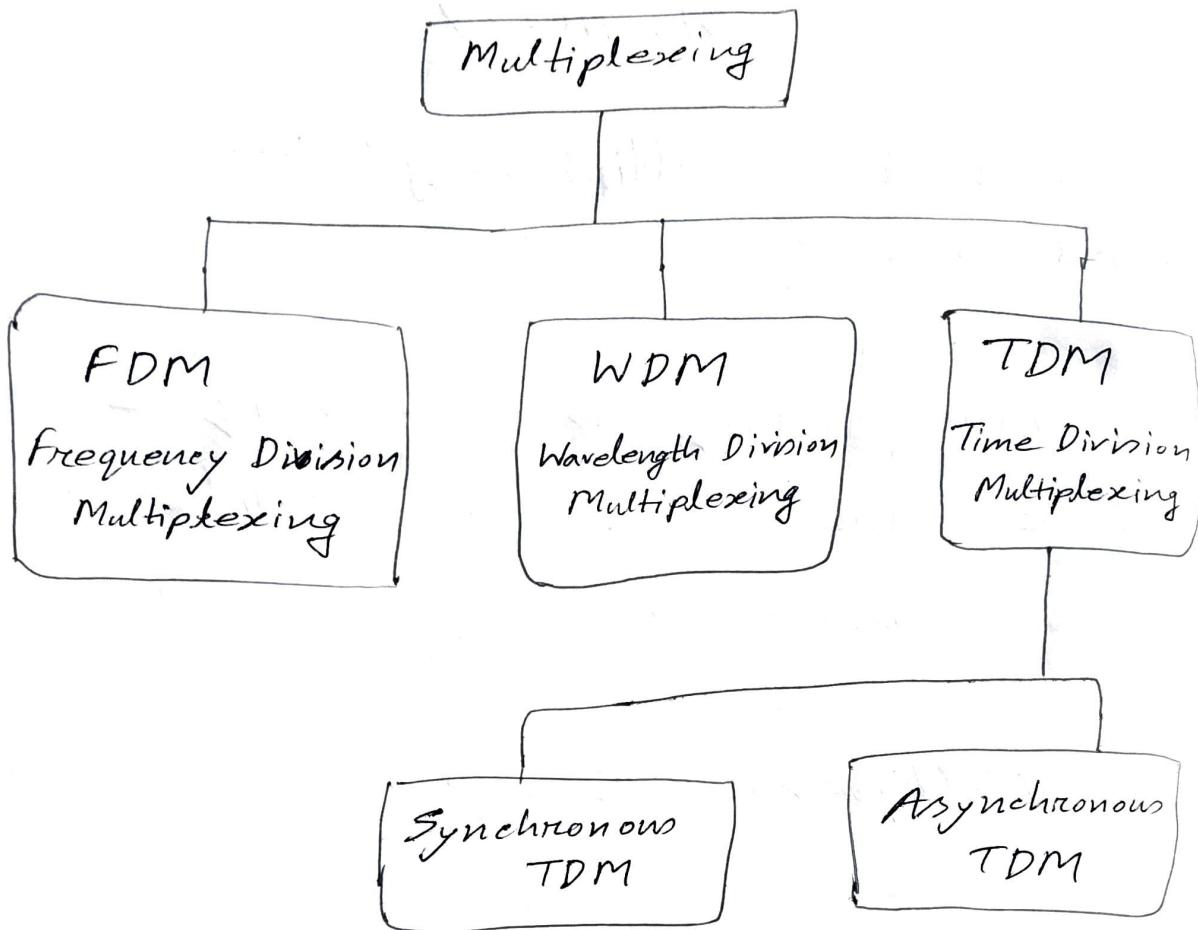
Ans: Multiplexing is a technique used to combine and send the multiple data streams over a single medium.

Multiplexing is used for following advantages:-

- ① More than one signal can be sent over a single medium.
- ② The bandwidth of a medium can be utilized effectively.

b) What are the multiplexing techniques?

Ans: The multiplexing techniques are given below —



Q) What are the difference between FDM, WDM and TDM ?

Ans.: Difference between FDM, WDM and TDM are given below —

FDM	TDM	WDM
① Several data signals are combined for simultaneous transmission via a shared communication medium.	① Allows Allows several users to send signals on a common channel by allocating a fixed time slot to each user.	① Modulates numerous data streams, optical carrier signals of variable wavelengths in a single light beam passing through a single optical fiber
② Frequency Division Multiplexing	② Time Division Multiplexing	② Wavelength Division Multiplexing.
③ Divide the bandwidth into smaller frequency range.	③ Allocates fixed time slot to each user.	③ Combines Combines several light beams from several channels and combine them into a single light beam.
④ Uses analog signals	④ Uses Analog and Digital signals	④ Uses Optical signal

Ans. No - 8

a) What is Switching? Why is it used here?

Ans. When a user accesses the internet or another computer network outside their immediate location, messages are sent through the network of transmission media. ~~This~~ This technique of transferring information from one computer network to another network is known as Switching.

Switching is required for the following reasons —

- ① It increases the bandwidth of the network.
- ② Reduces the workload.

③ It increases the overall performance of the network by reducing traffic.

④ Less frame collision.

b) What are the three types of switching moods?

Ans. There are three types of switching moods —

- ① Store-and-forward
- ② Cut-through
- ③ Fragment-free

c) Classification of Switching Techniques.

Ans. Classification tree of Switching techniques ~~is~~ is given below -

