

Mst. Zakia Sultana

ID: IT- 18027

Sub:

Day

Time:

Date: / /

1.
  - a) What is physical layer?
  - b) What are the functions of physical layer?
  - c) Difference between analog signal and digital signal.
  - d) What is transmission media and channel capacity?
2.
  - a) Define switching and multiplexing.
  - b) Difference between serial and parallel transmission.
  - c) Explain the process of analog-to-digital conversion.
3.
  - a) Describe the different types of transmission media.
  - b) Difference between synchronous and asynchronous transmission.
  - c) Explain the process of analog-to-analog conversion.
4.
  - a) Describe different types of wireless transmission.
  - b) Difference between Frequency division Multiplexing and Time division Multiplexing.
  - c) Write the applications of Multiplexer.

Sub:

Day

11

Time:

Date: / /

5.

- a) What is circuit switching?
- b) Write the advantages and disadvantages of circuit switching.
- c) Explain the technique message switching.
- d) Difference between circuit switching and packet switching.

6. a) Difference between circuit switching and message switching.

b) Write the advantages and disadvantages of packet switching.

c) Describe about wavelength Division Multiplexing and Code Division Multiplexing.

7. a) What is Transport Layer?

b) Write the functions of transport layer.

c) Describe about End-to-End communication.

d) Write the features of Transmission control protocol.

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

8. a) What is UDP?  
b) Write the features of UDP.  
c) Write the parameters of UDP header and applications of UDP.  
d) Describe the different types of timers which uses TCP to control and management various tasks.

Sub : \_\_\_\_\_

Day \_\_\_\_\_  
Time : \_\_\_\_\_ Date : / /

1. (a) What is physical layer?

Answer :

The physical layer consists of all the functions required to transmit a bitstream over a physical medium. The electrical and mechanical specifications of the interface and transmission medium deals by this layer.

- This is the lowest layer of the OSI reference model.
- For transmission, it defines all the procedures and functions that physical devices and interfaces have to perform.
- It is physical and tangible as well.
- However, it does not deal with the actual physical medium (like fibers, copper).
- Physical layer devices are Hub, Repeaters, Modem, Cables.

Sub:

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

(b) What are the functions of physical layer?

Answer:

Following are the various functions performed by the Physical layer of OSI model.

1. Representation of Bits: Data in this layer consists of stream of bits. The bits must be encoded into signals for transmission. It defines the type of encoding i.e. how 0's and 1's are changed to signal.
2. Data Rate: This layer defines the rate of transmission which is the number of bits per second.
3. Synchronization: It deals with the synchronization of the transmitters and receivers. The senders and receivers are synchronized at bit level.
4. Interface: The physical layer defines the transmission interface between devices + transmission medium.

Sub:

Day

--	--	--	--	--	--	--

Time:

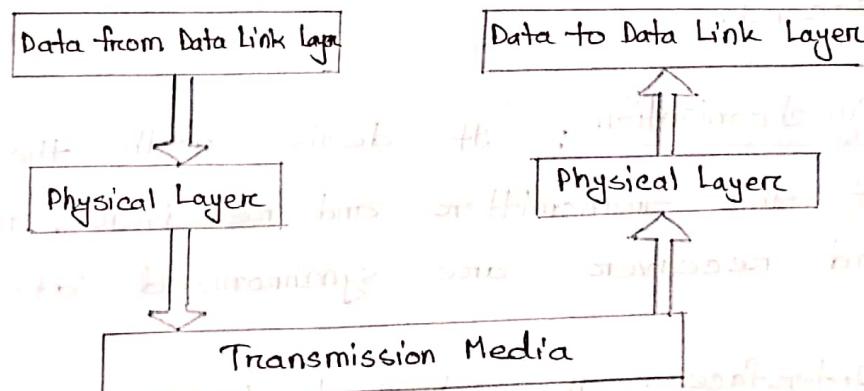
Date: / /

5. Line Configuration: This layer connects devices with the medium. Point to point configuration and Multipoint configuration.

6. Topologies: Devices must be connected using the following topologies: Mesh, Star, Ring and Bus.

7. Transmission Modes: Physical Layer defines the direction of transmission between two devices: Simplex, Half Duplex, Full Duplex.

8. Protocol: Deals with baseband and broadband transmission.



Sub :

Day

Time:

Date: / /

### (c) Difference between analog signal and digital signal.

Answer:

Basis for comparison	Analog signal	Digital signal
Basic	An analog signal is a continuous wave that changes over a time period.	A digital signal is a discrete wave that carries information in binary form.
Representation	An analog signal is represented by a sine wave.	A digital signal is represented by square waves.
Description	An analog signal is described by the amplitude, period or frequency and phase.	A digital signal is described by bit rate and bit intervals.
Range	Analog signal has no fixed range.	Digital signal has a finite numbers i.e. 0 and 1.
Distortion	An analog signal is more prone to distortion	A digital signal is less prone to distortion.
Transmit	An analog signal transmit data in the form of a wave.	A digital signal carries data in the binary form i.e. 0 and 1.
Example	The human voice is the best example of an analog signal.	Signal used for transmission in a computer are the digital signal.

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time: / / Date: / /

(d) What is transmission media and channel capacity?

Answer: Transmission Media

The media over which the information between two computer systems is sent, called transmission media. Transmission media comes in two forms.

- Guided Media

All communication wires / cables are guided media, such as, UTP, coaxial cables and fibre optics. In this media, the senders and receivers 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 senders and receivers.

Information is spread over the air, and anyone including the actual recipient may collect the information.

Sub : \_\_\_\_\_

Day

--	--	--	--	--	--	--

Time : \_\_\_\_\_

Date : / /

## Channel Capacity

The speed of transmission of information is said to be the channel capacity. We count it as data rate in digital world. It depends on numerous factors such as:

- Bandwidth : The physical limitation of underlying media.
- Error-rate : Incorrect reception of information because of noise.
- Encoding : The numbers of levels used for signaling.

2. Define switching and Multiplexing.

Answer:

### Switching

Switching is a mechanism by which data/information sent from source towards destination which are not directly connected. Networks have interconnecting devices, which receives data from directly connected sources,

Day

--	--	--	--	--	--	--

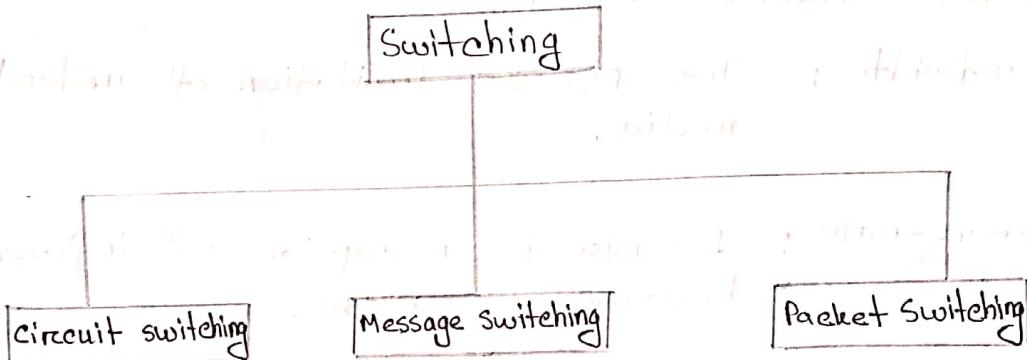
Time:

Date: / /

Sub:

stores data, analyze it and then forwards to the next interconnecting device closest to the destination.

Switching can be categorized as:



## Multiplexing

Multiplexing is a technique to mix and send multiple data streams over a single medium. This technique requires system hardware called multiplexer (MUX) for multiplexing the streams and sending them on a medium and de-multiplexer (DMUX) which takes information from the medium and distributes to different destinations.

Sub : \_\_\_\_\_

Day

--	--	--	--	--	--	--

Time : / /

Date : / /

(b) Differences between serial and parallel transmission.

Answer:

Basis for comparison	Serial Transmission	Parallel Transmission
Meaning	Data flows in bidirection, bit by bit.	Multiple lines are used to send data, i.e. 8 bits or 1 byte at a time.
Cost	Economical	Expensive
Bits transferred at one clock pulse	1 bit	8 bits or 1 byte
Speed	Slow	Fast
Applications	Used for long-distance communication E.g., computer to computer	Short distance E.g., computer to a printer.
Number of communication channel required	Only one	N numbers of communication channels are needed.
Need of converters	Required to convert the signals according to the need.	Not required.

Sub: \_\_\_\_\_

Day: \_\_\_\_\_  
Time: / / Date: / /

(C) Explain the process of analog-to-digital conversion.

Answer:

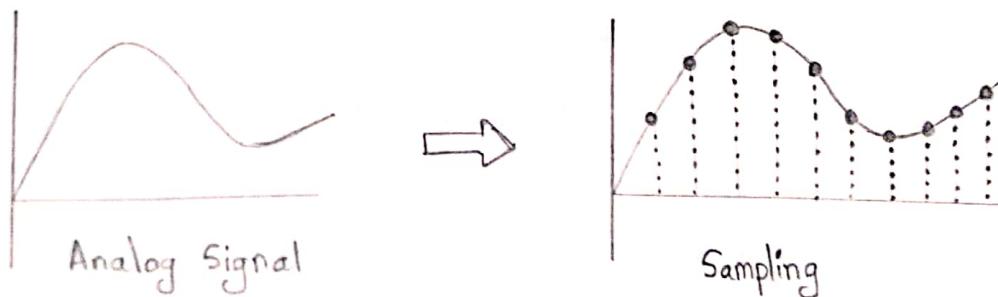
Micropohones create analog voice and camera creates analog videos, which are treated as analog data. To transmit this analog data over digital signals, we need analog to digital conversion.

Analog data is a continuous stream of data in the wave form whereas digital data is discrete. To convert analog wave into digital data, we use Pulse Code Modulation(PCM).

PCM is one of the most commonly used method to convert analog data into digital form. It involves three steps:

- Sampling
- Quantization
- Encoding

Sampling



Sub:

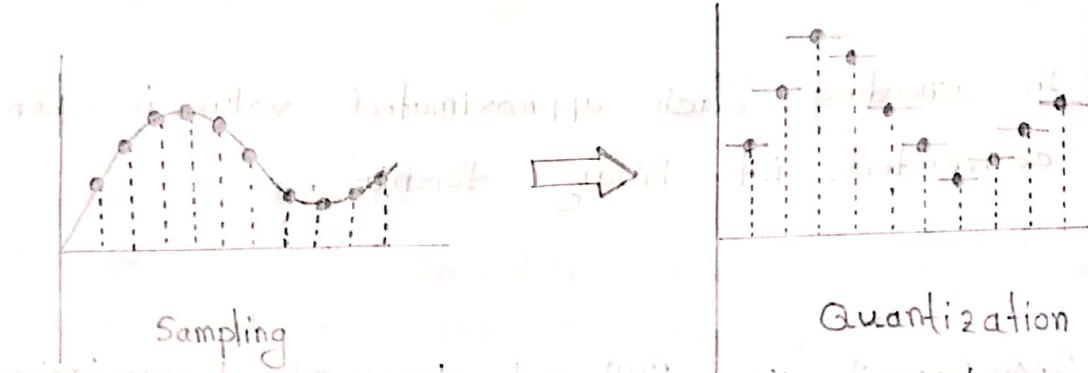
Day

Time:

Date: / /

The analog signal is sampled every  $T$  interval. Most important factors in sampling is the rate at which analog signal is sampled. According to Nyquist Theorem, the sampling rate must be at least two times of the highest frequency of the signal.

### Quantization



Sampling yields discrete form of continuous analog signal. Every discrete pattern shows the amplitude of the analog signal at that instance. The quantization is done between the maximum amplitude value and the minimum amplitude value. Quantization is approximation of the instantaneous analog value.

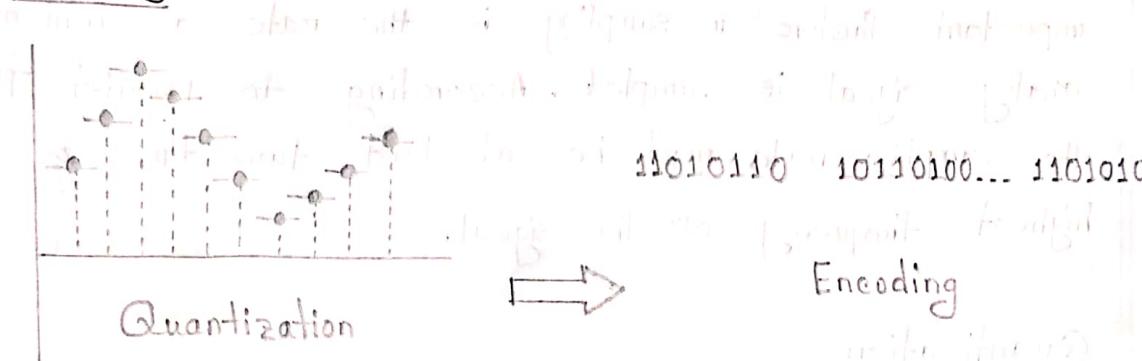
Sub: \_\_\_\_\_

Day \_\_\_\_\_

Time: \_\_\_\_\_

Date: / /

## Encoding

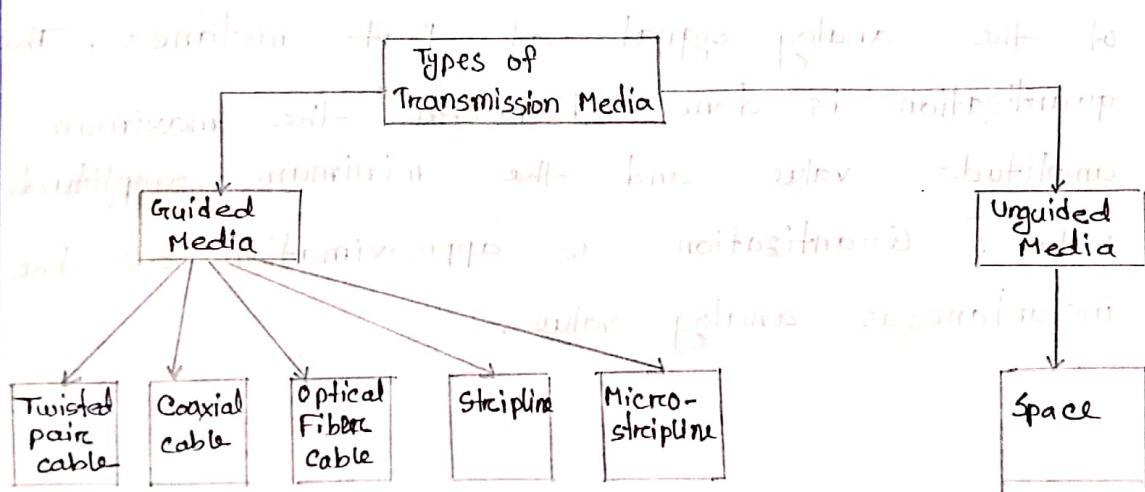


In encoding, each approximated value is then converted into binary format.

3. (a) Describe the different types of transmission media.

Answer:

Transmission Media is broadly classified into the following types:



Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

## 1. Guided Media :

It is also referred to as Wired or Bounded transmission media. Signals being transmitted are directed and confined in a narrow pathway by using physical links.

Features:

- High speed bandwidth
- Secure signals transfer
- Used for comparatively shorter distances

There are 3 major types of Guided Media:

### a) Twisted Pair Cable

It consists of 2 separately insulated conductors wires wound about each other. Twisted pair is of two types:

#### a) Unshielded Twisted Pair (UTP):

This type of cable has the ability to block interference and does not depend on a physical shield for this purpose. It is used for telephonic applications.

#### b) Shielded Twisted Pair (STP):

This type of cable consists of a special jacket to block external interference. It is used in fast-data-rate Ethernet and in voice and data channels of telephone lines.

Sub:

Day

--	--	--	--	--	--	--

Time:

Date: / /

#### (ii) Coaxial Cable —

It has an outer plastic covering containing 2 parallel conductors each having a separate insulated protection cover. The coaxial cable transmits information in two modes: Baseband mode (dedicated cable bandwidth) and Broadband mode (cable bandwidth is split into separate ranges).

#### (iii) Optical Fibre Cable —

It uses the concept of reflection of light through a core made up of glass or plastic. The core is surrounded by a less dense glass or plastic covering called the cladding. It is used for the transmission of large volumes of data.

#### (iv) Stripline —

Stripline is a transverse electromagnetic (TEM) transmission line medium. This conducting material is sandwiched between two layers of the ground plane which are usually shorted to provide EMI immunity.

#### (v) Microstripline —

In this, the conducting material is separated from the ground plane by a layer of dielectric.

Sub : \_\_\_\_\_

Day \_\_\_\_\_  
 Time : \_\_\_\_\_ Date : / /

## 2. Unguided Media :

It is also referred to as wireless or Unbounded transmission media. No physical medium is required for the transmission of electromagnetic signals.

- (b) Difference between synchronous and asynchronous transmission.

Answer:

Synchronous Transmission	Asynchronous Transmission
1. In synchronous transmission, Data is sent in form of blocks or frames.	1. In asynchronous transmission, Data is sent in form of byte or characters.
2. Synchronous transmission is fast.	2. Asynchronous transmission is slow.
3. Synchronous transmission is costly.	3. Asynchronous transmission is economical.
4. In synchronous transmission, time interval of transmission is constant.	4. In asynchronous transmission, time interval of transmission is not constant, it is random.

Sub : \_\_\_\_\_

Day \_\_\_\_\_  
 Time : \_\_\_\_\_ Date : / /

Synchronous Transmission	Asynchronous Transmission
5. In synchronous transmission, there is no gap present between data.	5. In asynchronous transmission, there is present gap between data.
6. Efficient use of transmission line is done in synchronous transmission.	6. While in asynchronous transmission, transmission line remains empty during gap in characters transmission.
7. Synchronous transmission needs precisely synchronized clocks for the information of new bytes.	7. Asynchronous transmission have no need of synchronized clocks as parity bit is used in this transmission for information of new bytes.

(C) Explain the process of analog-to-analog conversion.

Answer:

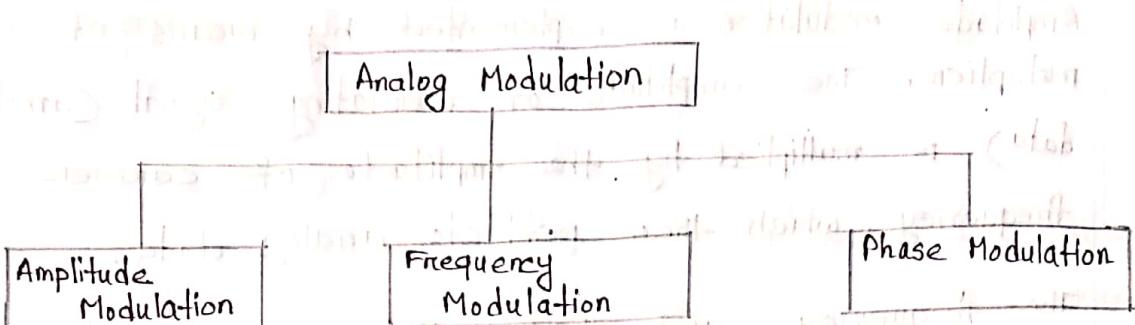
Analog-to-analog conversion, or modulation is the representation of analog information by an analog signal. Analog modulation is required when bandpass is used. Analog-to-analog conversion can be done in three ways:

Day

Time:

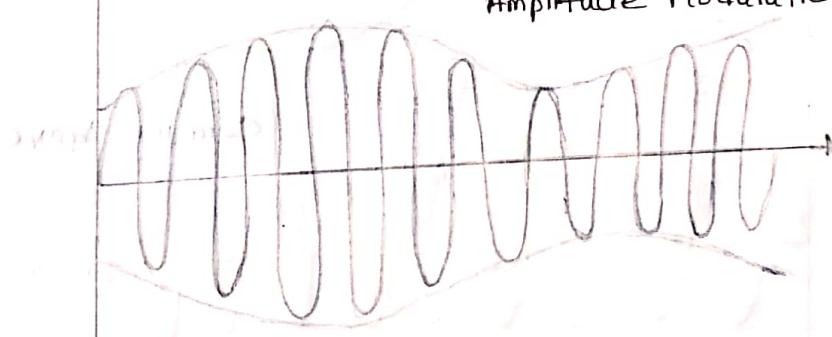
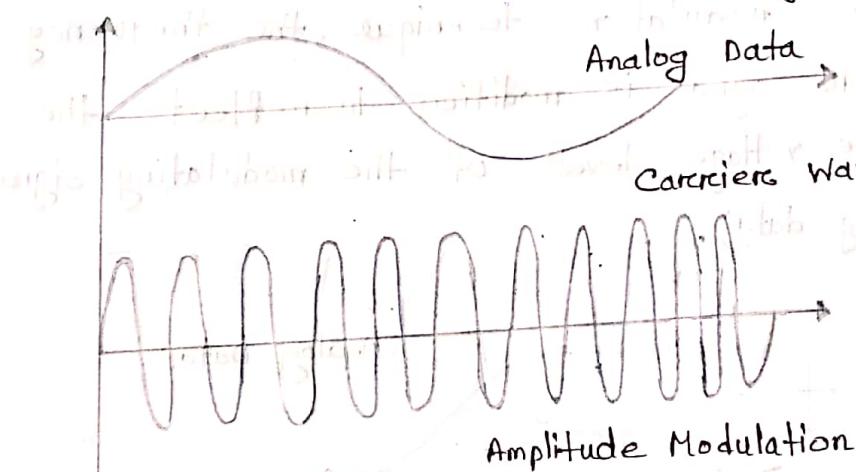
Date: / /

Sub: \_\_\_\_\_



### Amplitude Modulation

In this modulation, the amplitude of the carrier signal is modified to reflect the analog data.



Sub: \_\_\_\_\_

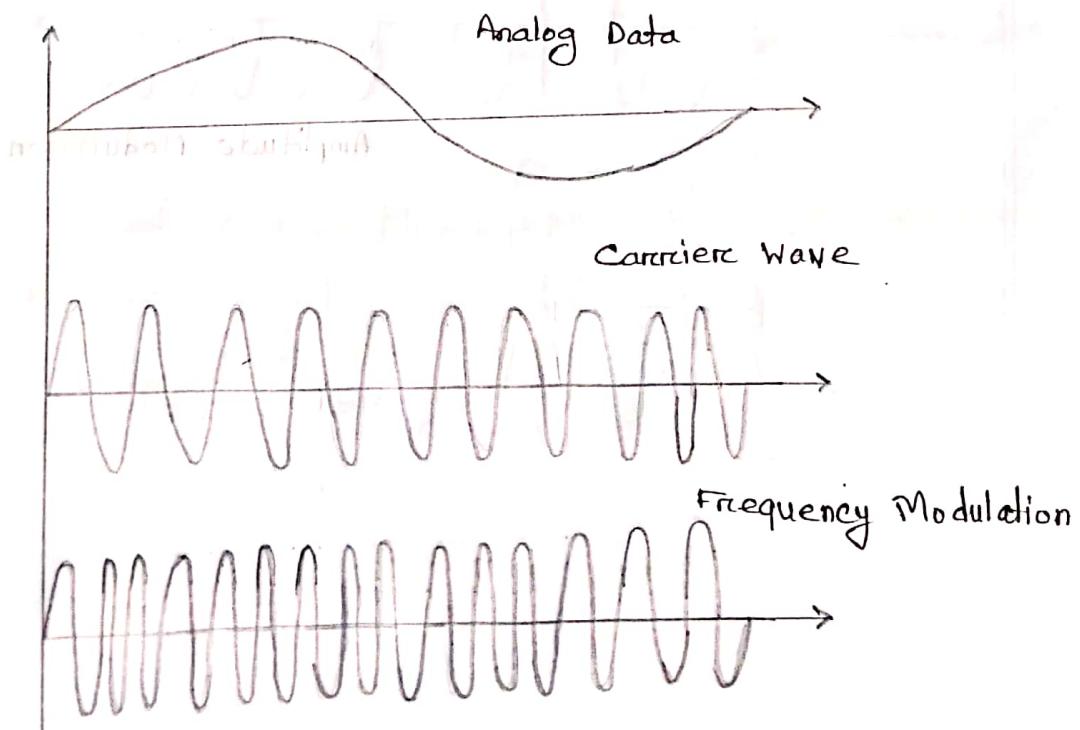
Day: \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

Amplitude modulation is implemented by means of a multiplier. The amplitude of modulating signal (analog data) is multiplied by the amplitude of carrier frequency, which then reflects analog data.

The frequency and phase of carrier signal remain unchanged.

#### • Frequency Modulation

In this modulation technique, the frequency of the carrier signal is modified to reflect the change in the voltage levels of the modulating signal (analog data).

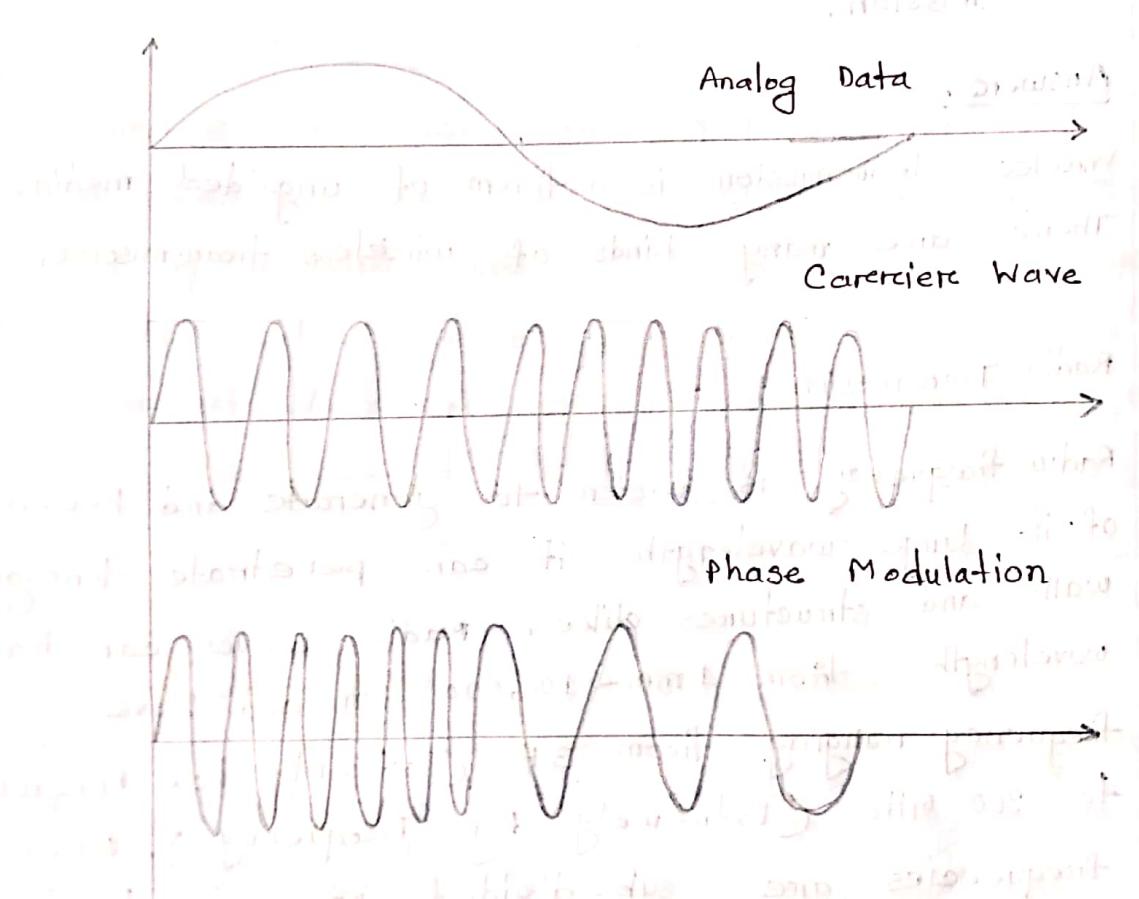


Sub: \_\_\_\_\_

The amplitude and phase of the carrier signal are not altered.

- Phase Modulation

In the modulation technique, the phase of carrier signal is modulated in order to reflect the change in voltage (amplitude) of analog data signal.



Phase modulation is practically similar to Frequency Modulation, but in Phase modulation frequency of

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time : \_\_\_\_\_ Date : / /

the carrier signal is not increased. Frequency of carrier signal is changed (made dense and sparse) to reflect voltage change in the amplitude of modulating signal.

4. (a) Describe different types of wireless transmission.

Answer: ~~and explain~~

Wireless transmission is a form of unguided media.

There are many kinds of wireless transmission.

### Radio Transmission

Radio frequency is easier to generate and because of its large wavelength it can penetrate through walls and structures alike. Radio waves can have wavelength from 1 mm - 100,000 km and have frequency ranging from 3 Hz (Extremely Low Frequency) to 300 GHz (Extremely High Frequency). Radio frequencies are sub-divided into six bands.

Sub:

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

Radio waves at lower frequency can travel through walls whereas higher RF can travel in straight line and bounce back. The power of low frequency waves decreases sharply as they cover long distance. High frequency radio waves have more power.

### Microwave Transmission

Electromagnetic waves above 100 MHz tend to travel in a straight line and signals over them can be sent by beamforming those waves towards one particular station. Because microwaves travels in straight lines, both sender and receiver must be aligned to be strictly in line of sight.

### Infrared Transmission

Infrared wave lies in between visible light of spectrum and microwaves. It has wavelength of 700-nm to 1-mm and frequency ranges from 300-GHz to 430-THz. Infrared wave is used for very short range communication purposes such as television and it's remote.

Sub : \_\_\_\_\_

Day	_____	_____	_____	_____	_____	_____
Time :	_____	_____	Date :	_____	_____	_____

Infrared travels in a straight line hence it is directional by nature. Because of high frequency range, Infrared cannot cross wall-like obstacles.

### Light Transmission,

Highest most electromagnetic spectrum which can be used for data transmission is light or optical signaling. This is achieved by means of LASER.

Because of high frequency light uses, it tends to travel strictly in a straight line. Hence the senders and receivers must be in the line-of-sight. Because laser transmission is unidirectional, at both ends of communication the lasers and the photo-detectors needs to be installed. Laser beam is generally 1 mm wide hence it is a work of precision to align two far receptors each pointing to lasers source. Lasers works as TX (transmitter) and photo-detectors works as RX (receivers).

Sub: \_\_\_\_\_

Day

--	--	--	--	--	--	--

Time: \_\_\_\_\_

Date: / /

(b) Difference between Frequency division Multiplexing and Time Division Multiplexing.

Answer:

Basis for comparison	FDM	TDM
Definition	A technique that allows transmission of multiple signals using different frequency slots over a common link.	A technique that permits the flow of multiple data signal over a communication link in different time domains.
Stands for	Frequency Division Multiplexing	Time Division Multiplexing
Multiplexing technique	Analog	Digital
Synchronization	Not needed	Necessary
Circuit Orientation	Complex	Comparatively simple
Cross talk	Exist	Does not exist
Propagation Delay	Not sensitive	Sensitive
Efficiency	Less	More efficient than FDM system
Cost	High	Comparatively low

Sub: \_\_\_\_\_

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

\* (c) Write the applications of Multiplexer.

Answer:

### Applications of Multiplexer—

A Multiplexer is used in numerous applications like, where multiple data can be transmitted using a single line.

Communication System — A multiplexer is used in communication systems, which has a transmission system and also a communication network. A multiplexer is used to increase the efficiency of the communication system by allowing the transmission of data such as audio & video data from different channels via cables and single lines.

Computer Memory — A Multiplexer is used in computer memory to keep up a vast amount of memory in the computers and also to decrease the numbers of copper lines necessary to connect the memory to other parts of the computer.

Day \_\_\_\_\_

Time: \_\_\_\_\_ Date: / /

Sub: \_\_\_\_\_

Telephone Networks — A multiplexer is used in telephone networks to integrate the multiple audio signals on a single line of transmission.

5. (a) What is circuit switching?

Answer:

When two nodes communicate with each other over a dedicated communication path, it is called circuit switching.

Circuits can be permanent or temporary. Applications which use circuit switching may have to go through three phases:

- Establish a circuit path for send
- Transfer the data as one unit
- Discard the circuit established

Telephone is the best suitable example of circuit switching.

With addition of repeaters and hub, it is suitable for long distance and high speed data transfer.

Sub :

Day

--	--	--	--	--	--	--

Time :

Date : / /

(b) Write the advantages and disadvantages of circuit switching.

Answer:

Some of the advantages of circuit switching are as follows—

- It uses a fixed bandwidth.
- A dedicated communication channel increases the quality of communication.
- Data is transmitted with a fixed data rate.
- No waiting time at switches.
- Suitable for long continuous communication.

Some of the disadvantages of circuit switching are as follows—

- A dedicated connection makes it impossible to transmit other data even if the channel is free.
- Resources are not utilized fully.
- The time required to establish the physical link between the two stations is too long.

Sub: \_\_\_\_\_

Day

--	--	--	--	--	--	--

Time: \_\_\_\_\_

Date: / /

- As a dedicated path has to be established for each connection, circuit switching is more expensive.
- Even if there is no transfer of data, the link is still maintained until it is terminated by users. By this channel remains ideal for a long time thereby making circuit switching inefficient.
- Dedicated channels require more bandwidth.

(c) Explain the technique message switching.

Answer:

Message switching technique was somewhere in middle of circuit switching and packet switching. In message switching, the whole message is treated as a data unit and is switching/transferred in its entirety.

A switch working on message switching, first receives the whole message and buffers it until there are resources available to transfer it to the next hop. If the next hop is not having

Sub:

Day

Time:

Date: / /

enough resources to accommodate large size message, the is stored and switch waits.

This technique was considered substitute to circuit switching. As in circuit switching the whole path is blocked for two entities only. Message switching is replaced by packet switching.

Message switching has the following drawbacks:

- Every switch in transit path needs enough storage to accommodate entire message.
- Because of store-and-forward technique and waits included until resources are available, message switching is very slow.
- Message switching was not a solution for streaming media and real-time applications.

Sub : \_\_\_\_\_

Day

--	--	--	--	--	--

Time : / /

Date : / /

(d) Difference between circuit switching and packet switching.

Answer:

Circuit Switching	Packet Switching
1. Circuit switching is a method that is used when a dedicated channel or circuit needs to be established.	1. Packet switching is a method of grouping data which is transmitted over a digital network into packets.
2. Circuit switching connections are classified into two categories half-duplex or full-duplex.	2. Packet switching is a connections network switching method.
3. You need to establish a dedicated path between the source and the destination before the transfer of data commences.	3. You do not need to establish a dedicated path from the source to the destination.
4. It was initially designed for voice transfer.	4. It was initially designed for data transfers.
5. It is implemented at Physical Layer.	5. It is implemented at Network Layer.

Day \_\_\_\_\_  
 Time : / / Date : / /

Sub :

Circuit switching	Packet switching
6. Data is processed and transmitted at the sourcee only.	6. Data is processed and transmitted, not only at the sourcee but also at the destination.
7. Its initial cost is low.	7. Packet switching demands high installation costs.
8. The protocols for delivery are simpler.	8. It requires complex protocols for delivery
9. charging happens per minute.	9. charging happens per packet.
10. Each packet follows the same route.	10. Each packet does not follow the same route.
11. It does not store and forward transmission.	11. It does store and forward transmission.
12. Initially designed for voice communication	12. Initially designed for Data Transmission.
13. It is an inflexible method because once a path is set, all parts of a transmission follow the same path.	13. It is a flexible method because the route is created for each packet to travel to the destination.
14. Reserve the entire Bandwidth in advance.	14. Never reserves the Bandwidth.

Sub : \_\_\_\_\_

Day

Time : / /

Date : / /

6. (a) Difference between circuit switching and packet message switching.

Answer:

Circuit switching	message switching
1. Circuit switching is done by setting a physical path between two systems.	4. In message switching data is stored by one node then forwarded to another node to transfer data to another system.
2. In circuit switching, data is not stored.	2. In message switching, data is first stored then forwarded to the next node.
3. It needs dedicated physical path.	3. It does not need dedicated physical path.
4. It is a geographical addressing	4. It is a hierarchical addressing.
5. It is costly.	5. It is less costly than circuit switching
6. Circuit switching routing is manual type routing.	6. Message switching routing is not manual type routing.
7. It reserves full bandwidth in advance.	7. It does not reserve the entire bandwidth in advance.

Day \_\_\_\_\_  
 Time: \_\_\_\_\_ Date: / /

Sub: \_\_\_\_\_

Circuit switching	message switching
8. charge depend on time and distance.	8. charge is based on the number of bytes and distance.
9. Congestion occurs for per minute in circuit switching.	9. In message switching no congestion or very less congestion occurs.

(b) Write the advantages and disadvantages of packet switching.

Answer:

Advantages of packet switching —

- Delay in delivery of packets is less, since packets are sent as soon as they are available.
- switching devices don't require massive storage.

Sub:

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

- Data delivery can continue even if some parts of the network faces link failure.
- It allows simultaneous usage of the same channel by multiple users.
- It ensures better bandwidth usage.

### Disadvantages of packet switching

- They are unsuitable for applications that cannot afford delays in communication like high quantity voice calls.
- Packet switching has high installation costs.
- They require complex protocols for delivery.
- Network problems may introduce errors in packets, delay in delivery of packets or loss of packets.

Sub:

Day \_\_\_\_\_  
Time : / / Date : / /

(c) Describe about wavelength Division Multiplexing and Code division multiplexing.

Answer:

Wavelength Division Multiplexing :

Light has different wavelength. In fiber optic mode, multiple optical carrier signals are multiplexed into an optical fiber by using different wavelength.

This is an analog multiplexing technique and is done conceptually in the same manner as FDM but uses light as signals.

Code Division Multiplexing :

Multiple data signals can be transmitted over a single frequency by using code

Division Multiplexing to FDM divides the frequency in smaller channels but CDM allows its users to full bandwidth and

Day \_\_\_\_\_  
Sub : \_\_\_\_\_ Time : \_\_\_\_\_ Date : / /

transmit signals all the time using a unique code. CDMA uses orthogonal codes to spread signals.

7. (a) What is transport layer?

Answer: Transport layer is a conceptual division

Transport Layer: In computer networking, the transport layer is a conceptual division of methods in the layered architecture of protocols in the network stack in the internet protocol suite and the OSI model.

(b) Write the functions of transport layer.

Answer:

Functions of transport layer:

- 1) This layer is the first one which breaks the information data supplied by Application layer into smaller units called segments layer and numbers every byte in these segments.

Sub:

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

maintains their accounting.

2) This layer ensures that data must be received in same sequence in which it was sent.

3) This layer provides end-to-end delivery of data between hosts which may or may not belong to the same subnet.

4) All servers process intend to communicate over the network are equipped with well known Transport Service Access Points (TSAP) also known as port numbers.

(c) Describing about End-to-End Communication.

Answer:

End-to-End Communication:

A process on host node identifies its peer host on remote network by means of TSAPs, also known as port numbers. TSAPs are very well defined and a process which is trying to

Sub: \_\_\_\_\_

Day

Time: \_\_\_\_\_

Date: / /

communicate with its peer knows in advance.

Application Layer

Application Layer

TSAP

TSAP

NSAP

NSAP

For example, when a DHCP client wants to communicate with remote DHCP server, it always requests on port number 67. When a DNS client wants to communicate with remote DNS server, it always requests on port number 53 (UDP).

Two main Transport Layer Protocols are:

1) Transmission control protocol: It provides reliable communication between two hosts.

2) User Datagram Protocol: It provides unreliable communication between two hosts.

Day

--	--	--	--	--	--	--

Time:

Date: / /

Sub:

(d) Write the features of Transmission Control Protocol.

Answer:

The Transmission Control Protocol (TCP) is one of the most important protocols of Internet protocols suite. It is most widely used protocol for data transmission in communication network such as internet.

Features:

- ① TCP is reliable protocol. That is, the receiver always sends either positive or negative acknowledgment about the data packet to the sender, so that the sender always has bright clue about whether the data packet is reached the destination or it needs to resend it.
- ② TCP ensures that the data reaches intended destination in the same order it was sent.

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

Sub: \_\_\_\_\_

- 3] TCP is connection-oriented. TCP requires that connection between two remote points be established before sending actual data.
  - 4] TCP provides error-checking and recovery mechanism.
  - 5] TCP provides end-to-end communication.
  - 6] TCP provides flow control and quality of service.
  - 7] TCP operates in client / server point-to-point mode.
  - 8] TCP provides full duplex , server i.e. it can perform roles of both receiver and sender.
- 8.
- (a) What is UDP?
- Answer: The User Datagram Protocol (UDP) is simplest Transport Layer communication protocol available for the TCP/IP protocol suite. It involves minimum amount of overheads.

Day

--	--	--	--	--	--

Time:

Date: / /

Sub :

of communication mechanism. UDP is said to be an unreliable transport protocol but it uses IP services which provides best effort delivery mechanism.

(b) Write the features of UDP.

Answer:

UDP has features with following P.R.

Features:

- UDP is used when acknowledgement of data does not hold any significance.
- UDP is good protocol for data flowing in one direction.
- UDP is simple and suitable for query based communications.
- UDP is not connection oriented.
- UDP does not provide congestion control mechanism.
- UDP does not guarantee ordered delivery of data.
- UDP is stateless.

Sub:

Day

Time:

Date: / /

- UDP is suitable protocol for streaming applications such as VoIP, multimedia streaming.

- (c) Write the parameters of UDP header and applications of UDP.

Answer: UDP header is as simple as its function.

UDP header contains four main parameters:

- Source Port — This 16 bits information is used to identify the source port of the packet.
- Destination Port — This 16 bits information, is used identify information application level on destination machine.
- Length — Length field specifies the entire length of UDP packet (including headers). It is 16-bits field and minimum value is 8 bytes, i.e. the size of UDP header itself.
- Checksum — This field stores the checksum value generated by the sender before sending. IPv4 has this field as optional so when checksum field does not contain any value it is made 0 and all its bits are set to zero.

Day \_\_\_\_\_  
Time: / / Date: / /

Sub: \_\_\_\_\_

Here are few applications where UDP is used to transmit data:

- Domain Name Services,
- Simple Network Management Protocol
- Trivial File Transfer Protocol
- Routing Information Protocol
- Kerberos

(d) Describe different types of timer which uses TCP to control and management various tasks.

Answer: TCP uses different types of timers to control and management various tasks:

Keep-alive timer:

• This timer is used to check the integrity and validity of a connection.

• When keep-alive time expires, the host sends a probe to check if the connection still exists.

Sub:

Day \_\_\_\_\_  
Time: \_\_\_\_\_ Date: / /

## Retransmission timer:

- This timer maintains stateful session of data sent.
- If the acknowledgment of sent data does not receive within the retransmission time, the data segment is sent again.

## Persist timer:

- TCP session can be paused by either host by sending Window Size 0.
- To resume the session a host needs to send Window Size with some larger value.
- If this segment never reaches the other end, both ends may wait for each other for finite time.
- When the persist timer expires, the host re-sends its window size to let the other end know.
- Persist Timer helps avoid deadlocks in communication.

Day \_\_\_\_\_  
Time: / / Date: / /

Sub:

### Timed-Wait:

- After releasing its connection, either of the hosts waits for a Timed-Wait time to terminate the connection completely.
- This is in order to make sure that the other end has received the acknowledgement of its connection termination request.
- Timed-out can be at a maximum of 240 seconds (4 minutes).