

1.

- (a) How many ways to convert digital data into signal? 4
what is line code and block coding?
(b) classify line code with example. 10

Ans to the ques No-1

(a)

There are two ways to convert digital data into digital signals. They are line coding and block coding.

- ① Line coding
② Block coding

Line coding:

A Line code is the code used for data transmission of digital signal over a transmission line. This process of coding is chosen so as to avoid overlap and distortion of signal such as

inter-symbol interface.

Block coding:

It helps in error detection and retransmission of the signal. It is normally referred to as mB/nB coding as it replaces each m-bit data group with an n-bit data group. Thus it

adds extra bits (redundancy bits) which helps in synchronization at receivers and senders

end and also providing kind of error detecting capability. It normally

involves three steps:

① division.

② substitution.

③ combination.

(b)

There are three types of Line coding.

- ① Unipolar
- ② Polar
- ③ Bi-Polar

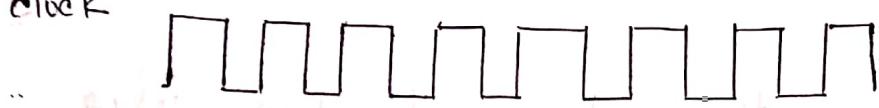
Unipolar Non-Return to Zero NRZ:

In this type of unipolar signaling, a high in data is represented by a positive pulse called as Mark which has a duration to equal to the symbol bit duration.

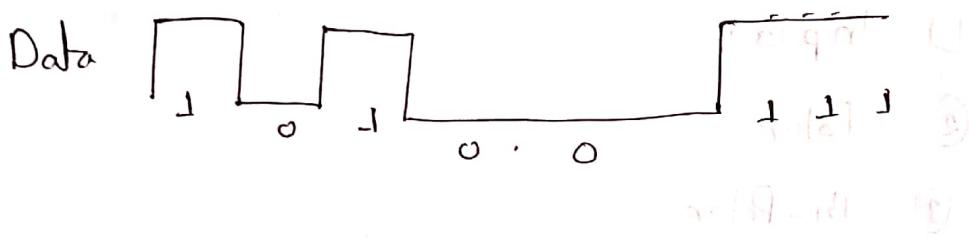
clock

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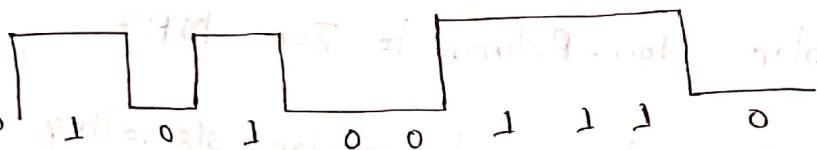


Data



Unipolar

NRZ



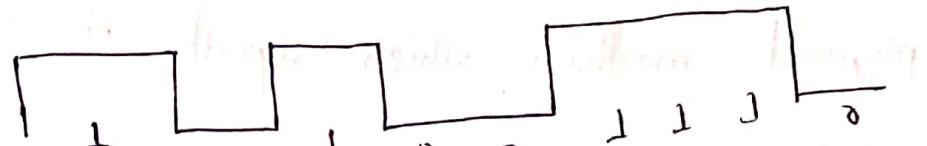
Unipolar Return to Zero RZ:

In this type of unipolar signaling a high in data through represented by a Mark pulse its duration to is less than the symbol bit duration. Half of the bit duration remains high but it immediately returns to zero.

clock



Data



Unipolar



Polar NRZ:

In this type of polar signaling, a high in data is represented by a positive pulse, while a low in data is represented by a negative pulse.

Polar RZ:

In this type of Polar signaling, a high in data is represented by a mark pulse. This duration is less than the symbol bit duration.

- Q.
- (a) Define physical and logical address.
 - (b) Define physical layer . when data is sent over physical medium which signal it is convert into?
 - (c) What are the possible reasons for data to deteriorate ? Explain.

Ans to the ques No - 2

(a)

Physical address:

The physical address also known as the link address is the address of a node as defined by its LAN or WAN. It is included in the frame used by the data link layer. It is the lowest - level address. The physical address have authority over the network . The

Logical Address:

Logical address are necessary for universal communication that are independent of underlying physical network. Physical address are not adequate in an internetwork environment where different networks can have different addressing formats. A universal addressing system is needed in which each host can be identified uniquely.

(b)

Physical layer in OSI model plays the role of interacting with actual hardware and signalling mechanism. Physical layer is the only layer of OSI network model which actually deals with the physical connectivity of two different

stations. This layer defines the hardware equipment cabling, wiring, frequencies, pluses etc.

When data is sent over physical medium it need to first converted into electromagnetic signals. Data itself can be converted into such as human voice or digital such as file on the disk.

Digital signal:

Digital signal are discrete in nature and represent sequence of voltage pulses. Digital signals are used within the circuitry of a computer system.

Analog signal:

Analog signal are in continuous wave form in

nature and represented by continuous electromagnetic waves.

(c)

When signals travels the medium they tends to deteriorate. This may have many reasons given -

① Attenuation:

for the receiver to interpret the data accurately the signal must be sufficiently strong. When the signal passes through the medium it tends to get weaker.

② Dispersion:

As signal travels through the media it tends to spread and overlaps. the amount of dispersion

depends upon the frequency used.

③ Delay - distortion:

Signals are sent over media with pre-defined speed and frequency. If the signal speed and frequency do not match,

④ Noise:

Random disturbance or fluctuation in an analog or digital signal is said to be noise in signal which may distort the actual information being carried. Noise can be characterized in one of the following class:

- ① Thermal.
- ② Intermodulation
- ③ Crosstalk
- ④ Impulse -

- Ques
- (a) Define channel capacity . which factor it depends on?
- (b) Explain multiplexing and switching.
- (c) Explain different types of cables used in transmission.

Ans to the ques No-3

(a)

channel capacity:

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

① Bandwidth:

The physical limitation of underlying media.

② Error-rate:

Incorrect reception of information because of noise .

③ Encoding:

The number of levels used for noise.

(b)

Multiplexing:

Multiplexing is a technique to mix and send

multiple data streams over a signal medium.

This technique requires hardware called

multiplexer for multiplexing the streams.

3 types of multiplexing techniques includes

following-

① Frequency Division Multiplexing

② Wavelength Division Multiplexing.

③ Time Division Multiplexing.

Switching:

Switching is a mechanism by which data sent from source towards destination which are not directly connected. Networks have interconnecting devices, which receives data from directly connected sources. stores data, analyze it and then forwards to the next interconnecting device to the destination. Switching can be categorized as:

- ① Circuit switching
- ② Message switching
- ③ Packet switching.

(c)

Explain Cables that are used in transmission of data

is given below:

Twisted Pair Cable:

A twisted pair cable is made of two plastic insulated copper wires twisted together to form a single media. There are two types of twisted pair cables.

① Shielded Twisted Pair Cable.

② Unshielded Twisted Pair cable.

Coaxial Cable:

Coaxial cable has two wires of copper. The core wire lies in the center and it is made of solid conductor. The core is enclosed in an insulating sheath.

Power Lines:

Power Line

communication (PLC) is layer - 1)

technology which uses power cables to transmit data signals. In PLC modulated data is sent over the cable. The receiver on the other end demodulates and interprets the data. There are two types of PLC.

① Narrow band PLC.

② Broad band PLC.

- 4:
- (a) Explain different transmission modes.
 - (b) classify analog to analog conversion.
 - (c) classify digital to analog conversion.

Ans to the ques No 4

(a)

The transmission mode decides how data is transmitted between two computers. The binary data in the

form of 1's and 0's can be sent two different modes.

① Parallel.

② Serial.

Parallel:

The binary bits are organized in to groups of fixed length. Both sender and receiver are connected in parallel with the equal number of data lines. Both computer distinguish between high order and low order data lines.

Serial:

In serial transmission bits are sent one after another in a queue manner, serial transmission requires only one communication channel.

(b)

when data from one computer is sent to another via some analog carrier it is first converted into analog signals. Analog signals are modified to reflect digital data. There are three kinds of analog to digital conversions:

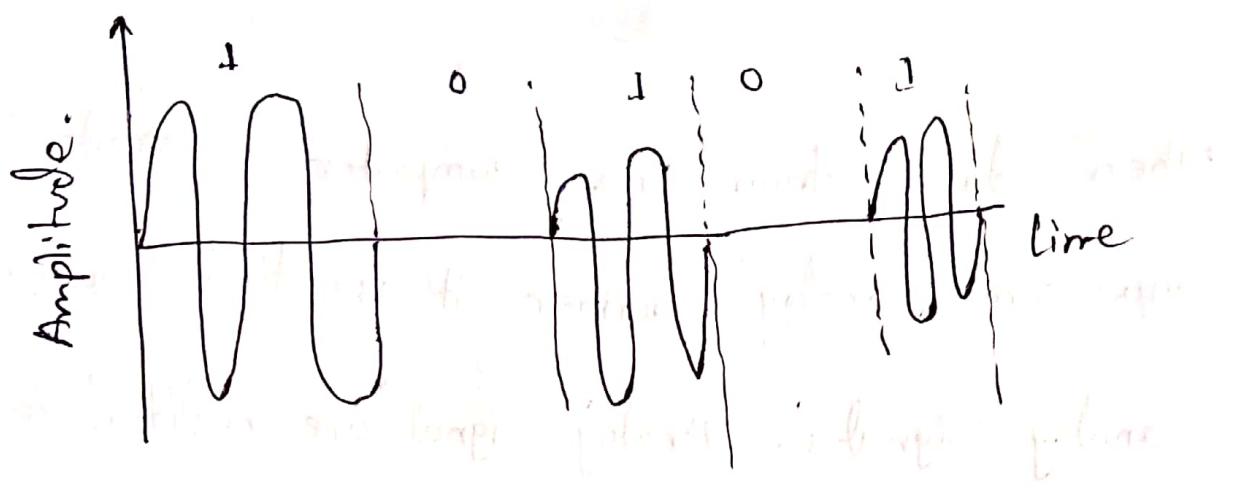
① Amplitude shift keying.

② Frequency shift keying

③ Phase shift keying.

Amplitude shift keying:

In this conversion technique the amplitude of analog carrier signal is modified to reflect binary data. When binary data represents digit A.



frequency shift keying:

In this conversion technique, the frequency of the analog carrier signal is modified to reflect binary data.

Phase shift keying:

In this conversion scheme, the phase of original carrier signal is altered to reflect the binary data.

(c)

Analog signals are modified to represent analog data.

This conversion is also known as Analog Modulation.

Analog to Analog conversion can be done in three ways:

① Amplitude Modulation.

② Frequency Modulation.

③ Phase Modulation.

Amplitude Modulation:

In this modulation the amplitude of the carrier signal is modified to reflect analog data. Amplitude modulation is implemented by mean

of multiplier. The amplitude of modulating signal is multiplied by the amplitude of carrier frequency

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.

Phase Modulation:

In the modulation technique the phase of carrier signal is modulated in order to reflect the change in voltage of analog data

signal. Phase modulation is practically similar to frequency modulation but in phase modulation frequency of the carrier signal is not increased.

- Q.
- (a) Define Wireless transmission.
 - (b) Briefly explain different types of wireless transmission.
 - (c) What is multiplexing? Classify different types of multiplexing.

Ans to the ques 1(b)-5

(a)

Wireless transmission is a form of unguided media. Wireless communication involves no physical link established between two or more devices, communicating wirelessly. Wireless signals are spread over in the air and are received and interpreted by appropriate antennas.

(b)

Different types of wireless transmission is given below:

Radio transmission:

Radio transmission is easier to generate and because of its large wavelength it can penetrate through walls and structures. Radio waves can

have length from 1 mm - 100,000 km.

Microwave Transmission:

Electromagnetic waves above 100 MHz tend to travel in a straight line and signals over them can be sent by beaming waves towards one particular station.

Infrared

Infrared Transmission:

Infrared wave lies in between visible light spectrum and microwaves. If has wavelength of 700-nm to 1-mm and frequency ranges from 300-GHz to 430 - THz.

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.

(c)

Multiplexing:

Multiplexing is a technique by which different analog and digital streams of transmission can be

simultaneously processed over a shared link.
Multiplexing divides the high capacity medium into low capacity logical medium which is then logical medium.

Frequency Division Multiplexing:

In analog multiplexing the most used technique is frequency division multiplexing. This technique uses various frequencies to combine streams of data for sending them on a communication.

Wavelength Division Multiplexing:

Wavelength Division Multiplexing (WDM) is an analog technique in which many data streams of different wavelengths are transmitted in the light spectrum.

7:

- (a) what is switching?
- (b) Briefly explain different types of switching.
- (c) How to convert analog signals into digital signals?
Explain with example.

Ans to the ques No-7

(a)

Switching is process to forward packets coming in from one port to a port leading towards the destination. When data comes on a port it is called ingress, and when data leaves a port it is called egress. Switching can be divided into two major categories:

① Connection less.

② Connection Oriented

Different types of switching:-

Circuit switching:

When two nodes communicate with each other

over a dedicated communication path, it is

called circuit switching. In circuit switching,

to transfer the data, circuit must be

established so that the data transfer

can be take place.

Circuits can be permanent or temporary

Applications which use circuit switching may

have to go through phases:

① Establish a circuit

② Transfer the data

③ Disconnect the circuit.

Circuit switching was designed for voice applications.

Telephone is the best suitable example of circuit switching.

(c)

Analog - to - digital conversion Microphones create analog voice and camera creates analog video which are treated as analog data. To

transmit this analog data over digital signals,

we need to analog to digital conversion.

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

① Sampling

② Quantization

③ Encoding.

Sampling:

The analog signal is sampled every interval.

Most important factor in sampling is the rate at which analog signal is sampled.

Quantization:

Sampling yields discrete form of continuous

analog signal. Every discrete pattern shows the amplitude of the analog signal at that instance.

Encoding:

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

Q8:

(a) Define transport layer.

(b) Write down the function of transport layer.

(c) Explain end-to-end communication in transport layer.

Ans to the ques No - 8

(a)

Transport layer offers peer-to-peer and end-to-end connection between two processes on

remote hosts. Transport layer takes data from upper layer and then breaks it

it into smaller size segments, numbers each byte
and hands over to lower layer for delivery.

(b)

The function of transport layer is given below:

- a) The layer is the first one which breaks the information / data, supplied by application layer, into smaller unit.
- b) This layer ensure that data must be received in the same sequence in which it was sent.
- c) This layer provides end-to-end delivery of data between hosts which may or may not belong to the same

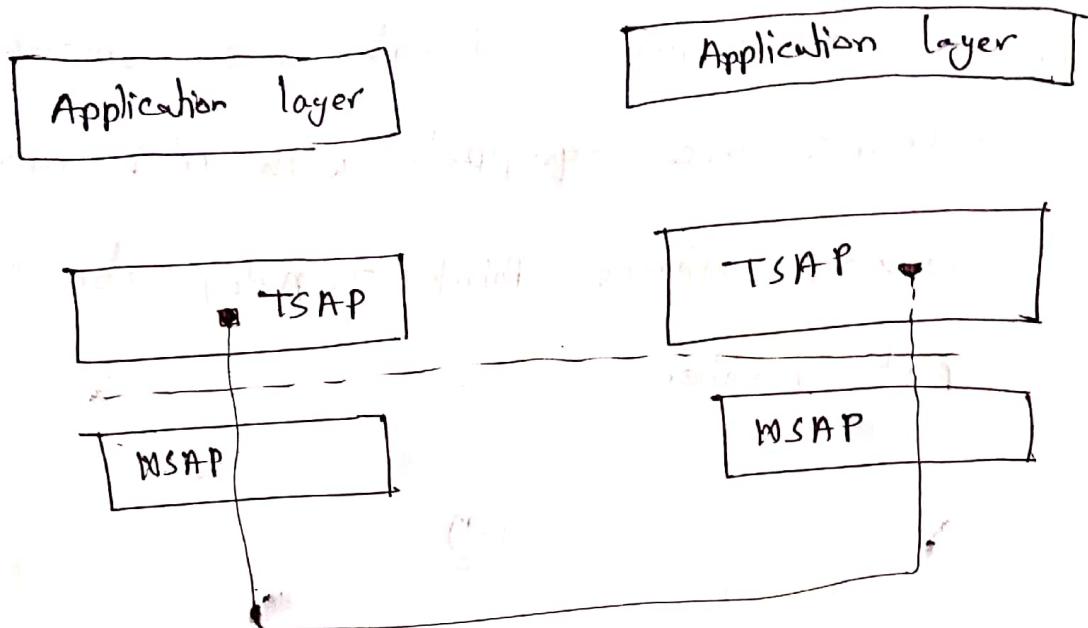
subnet.

- ② All server processes intend to communicate over the network are equipped with well known transport Service Access Point (TSAPs) also known as port number.

(C)

A process on one host 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 communicate with its peer knows this in advance.

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for example when a DHCP client wants to communicate with remote DHCP server it always request an port number 67.

The two main transport layer protocols are:

B) Transport Control Protocol.

B) User Datagram Protocol.