

ASSINGMENT - 03

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IT-18057

1. a) what is physical layer ?
- b) write about signals.
- c) write about transmission impairment
- d) what is channel capacity ?

2. a) what is Multiplexing ?

- b) write about channel capacity,

- c) Briefly describe about noise.

3. a) write about transmission media.

- b) write a short note about switching.

- c) write about Analog to digital conversion.

4. a) what is transmission Modes ?

- b) write about parallel and serial transmission model.

- c) what is block coding .

5. a) what is wireless transmission ?

- b) write about short note :

- i) Radio transmission ii) Infrared transmission

- iii) Microwave transmission iv) Light transmission

6. a) what is switching?
b) write down type of switching.
c) write about circuit, message, Packet switching.

7. a) what is transport layers?
b) write down the functions of transport layer.
c) Describe the end-to-end communication

8. a) what is user-dataagram protocols
b) write down the requirement of UDP.
c) write about the features of UDP.
d) where is the application of UDP.

Answer to the Question no: 1 (a)

Physical Layer:

Physical layer in the OSI model plays the role of interacting with actual hardware and signaling mechanism. Physical layer is the only layer of OSI network model which actually deals with the physical connectivity of two different stations. Physical layer provides its services to Data-link layer. Data-link layer hands over frames to physical layer.

Answer to the Question no: 1 (b)

When data is sent over physical medium, it needs to be first converted into electromagnetic signals. Data itself can be analog such as human voice or digital such as file on the disk. Both analog and digital data can be represented in digital or analog signals.

Digital Signals:

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

Analog Signals:

Analog signals are in continuous wave form in nature and represented by continuous electromagnetic waves.

Answer to the Question no: 1 (c)

When signals travel through the medium they tend to deteriorate. This may have many reasons as given.

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.

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 do not match, there are possibilities that signal reaches destination in arbitrary fashion.

In digital media, this is very critical that some bits reach earlier than the previously sent ones.

Noise:

Random disturbance or fluctuation in analog or digital signal is said to be noise in signal, which may distort the actual information being carried.

Answer to the Question no: 1 (a)

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 number of levels used for signaling.

Answer to the Question no: 2 (a)

Multiplexing:

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

Answer to the Question no: 2 (b)

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.

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Error-rate : Incorrect reception of information because of noise.

Encoding : The number of levels used for signaling.

Answer to the Question no: 2 (c)

Noise can be characterized in one class of the following

Thermal Noise : Heat agitators in the electronic conductors of a medium which may introduce noise in the media. Up to a certain level, thermal noise is unavoidable.

Intermodulation :

When multiple frequencies share a medium, their interference can cause noise in the medium. Intermodulation noise occurs

If two different frequencies are sharing a medium and one of strength or the component itself is not functioning properly, then the resultant frequency may not be delivered as expected.

Crosstalk:

This sort of noise happens when a foreign signal enters into the media. This is because signal in one medium affects the signal of second medium.

Simpulse:

This noise is introduced because of irregular disturbances such as lightening, electricity, short circuit or faulty components. Digital data is mostly affected by this sort of noise.

Answer to the Question no: 3(a)

Data or information can be stored in two ways, analog and digital. For a computer to use the data, it must be in discrete digital form, similar to data, signals can also be in analog and digital form. To transmit data digitally, it needs to be first converted to digital form.

Answer to the Question no: 3(b)

switching:

This 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 its entirety. A switch working on message switching, first receives the whole message and buffers it until there are resources available to transfer

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

Answer to the question no: 3 (a)

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

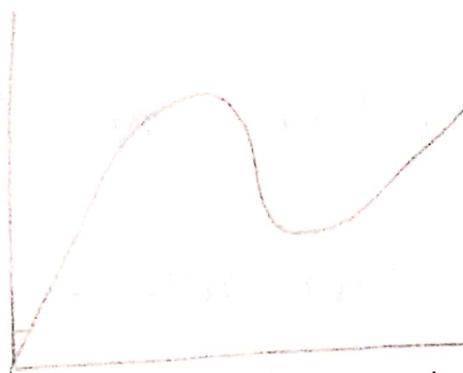
It is one of the most commonly used method to convert analog data digital form. It involves three

- 1. Sampling
- 2. Quantization
- 3. Encoding

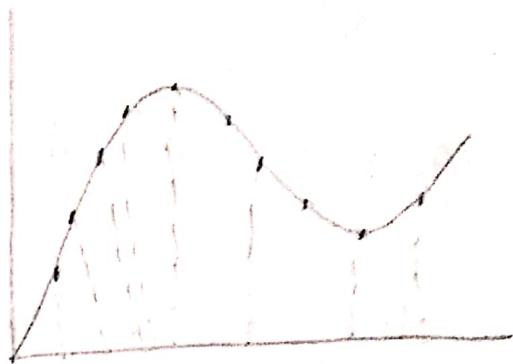
Sampling:

Analog signal is sampled every Δt time interval and converted into digital signal.

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

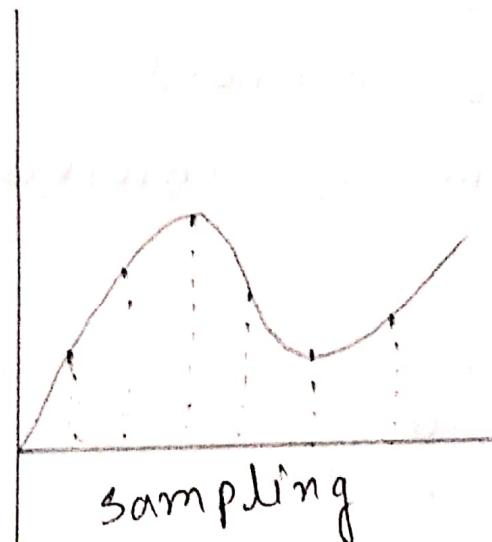


Analog Signal

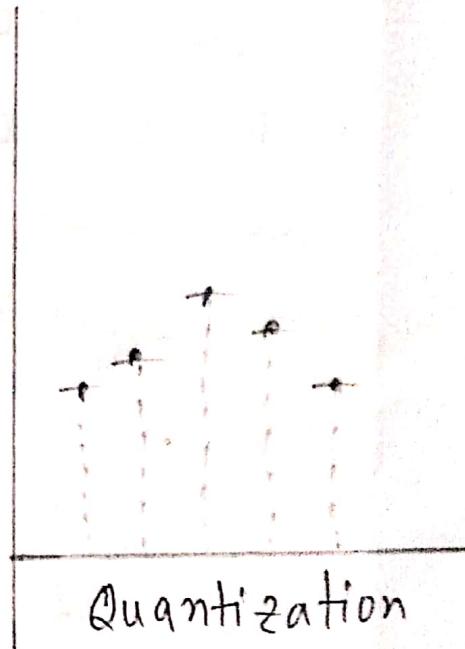


Sampling

Quantization:



Sampling

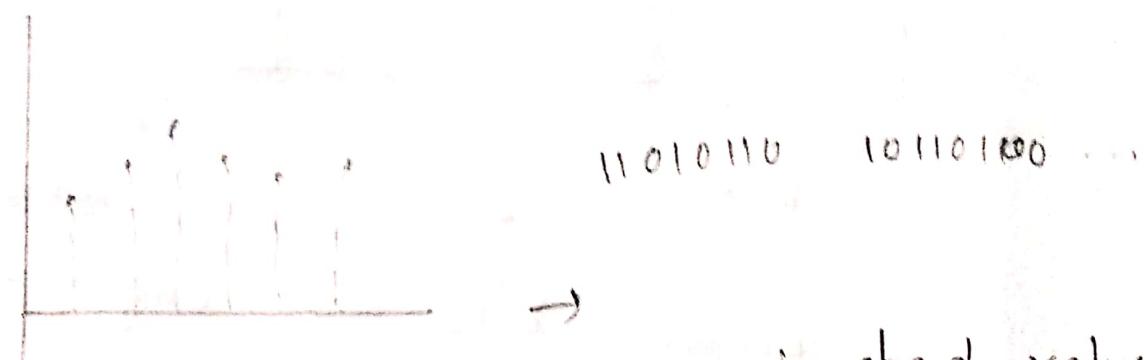


Quantization

sampling yields discrete form of continuous analog signal. Every discrete pattern shows the amplitude of the

analog signal at that instance. Quantization is approximation of the instantaneous analog value.

Encoding:



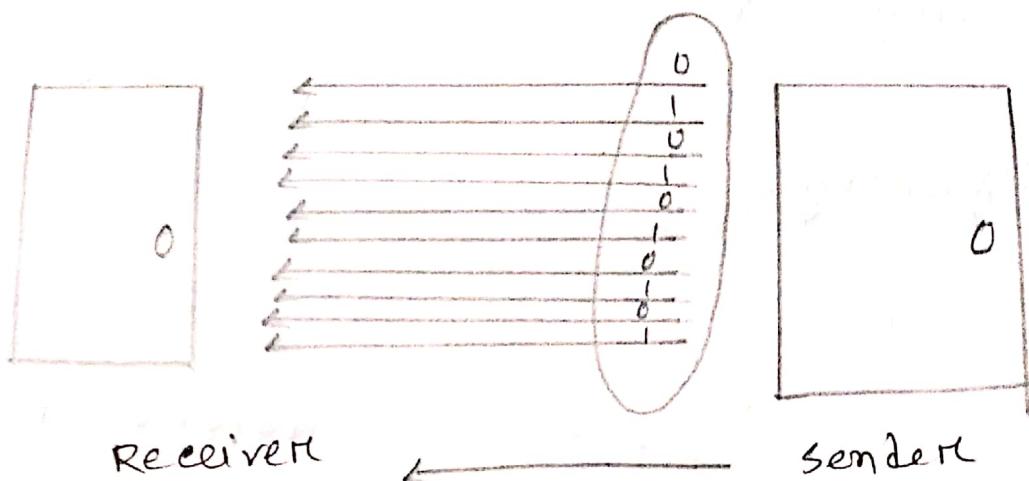
In encoding each approximated value is then converted into binary format.

Answer to the Question no: 4(a)

The transmission mode decider how data is transmitted between two computers. The binary data in the form of 1s and 0s can be sent in two different modes.

Answers to the Question no: 4(b)

Parallel Transmission:



The binary bits are organized into groups of fixed length. Both sender and receiver are connected in parallel with the equal number of data lines. The sender sends all the bits at once on all lines. Because the data lines are equal to the number of bits in a group on data frame. A complete group of bits is sent in one go.

Serial Transmission:



0 1 0 1 0 1 0 1 0 1



Receiver

Sender

In serial transmission, bits are sent one after another in a queue manner. Serial transmission requires only one communication channel. Serial transmission can be either asynchronous or synchronous.

Answer to the Question no: 4(c)

Block Coding:

Block coding is represented by slash notation, mB/nB . Means m -bit means m -bit block is substituted with n -bit block where $n > m$. Block coding involves three steps.

- ⇒ Division
- ⇒ substitution
- ⇒ combination

After block coding is done, it is line coded for transmission.

Answer to the Question no: 5(a)

Wireless transmission:

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 they are received and interpreted by appropriate antennas.

Answers to the Question no: 5 (b)

Radio transmission:

Radio transmission 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 to 300 GHz. Radio frequencies are sub-divided into six bands.

Radio waves at lower frequencies 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 beaming 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.

Microwaves can have wavelength ranging from 1mm - 1 meter and frequency ranging from 300 MHz to 300 GHz.

Microwaves have higher frequencies and do not penetrate wall like obstacles.

Micro wave transmission depends highly upon the weather conditions and the frequency it is using.

Infrared Transmission:

Infrared wave lies in between visible light spectrum and micro waves. 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 its remote. Infrared travels in a straight line hence it is directional by nature. Because of high frequency range, Infrared Infrared cannot cross wall-like obstacles.

Microwave transmission:

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

Light transmission:

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

Because of frequency light uses, it tends to travel strictly in straight line. Hence the sender and receiver must be in the line-of-sight.

Because laser transmission is unidirectional at both ends of communication the photo-detectors need laser and the 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.

Previous handshaking is required and acknowledgements are optional.

connection oriented:

Before switching data to be forwarded to destination there is a need to pre-establish circuit along the path between both endpoints. Data is then forwarded on that circuit. After the transfer is completed, circuits can be kept for future use or can be turned down immediately.

Answer to the question no: 6(c)

Circuit switching:

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

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Answer to the question no: 6(a)
switching:

Switching is a process to forward packets coming 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 or goes out it is called egress. A communication system may include of switches and nodes.

Answer to the Question no: 6(b)

Switching can be divided into two major categories:

connectionless:

The data is forwarded on behalf of forwarding tables. No

There is a need of pre-specified route from which data will travel and on other data is permitted. In circuit switching, to transfer the data, circuit must be established so that the data transfer can take place. Applications which use circuit switching may have to go through three phases:

1. Establish a circuit
2. Transfer the data
3. Disconnect the circuit

Message switching:

This technique was somewhere in middle of circuit switching and packet switching. In message switching the whole message is treated as a data unit 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.

Packet Switching:

Shortcomings of message switching gave birth to an idea of packet switching. The entire message is broken down into smaller chunks called packets. The switching information is added in the header of each packet and transmitted independently. It is easier for intermediate networking devices to store small chunks called packets. The switching information is added in the header of each packet and

Answer to the Question no: 7(a)

Transport Layer:

Transport layer offers peer-to-peer and end-to-end connection between two process on remote hosts. Transport layer takes data from upper layer and then breaks it into smaller size segments, numbers each byte and hands over to lower layer for delivery.

Answer to the Question no: 7(c)

Functions:

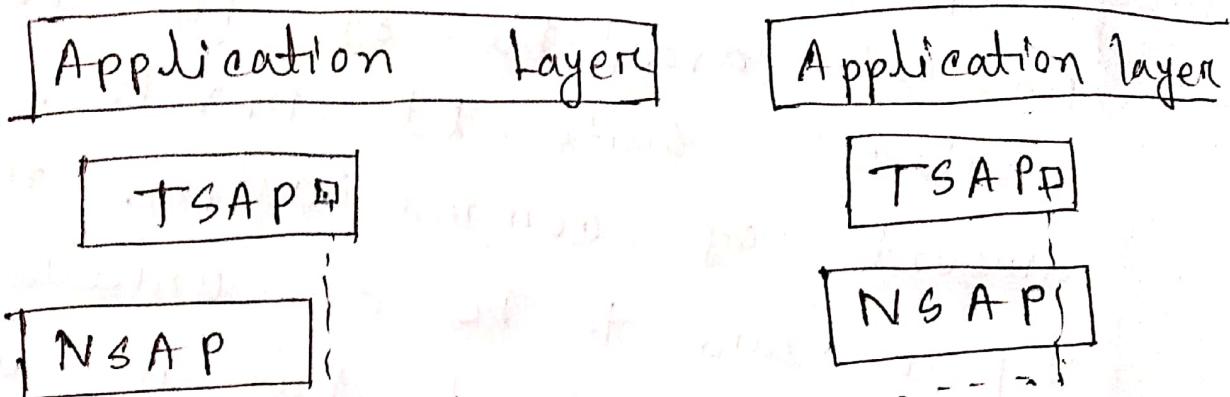
1. This layer is the first one which breaks the information data supplied by Application layer in to smaller units called segments.

2. This layer ensure that data received in the 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 the same subnet.
4. All servers processes intend to communicate over the network are equipped with well-known transport service Access Points, also known as port numbers.

Answers to the Question no: 7(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

defined and a process which is trying to communicate with its peer, knows this in advance.



The two main transport layer protocols are:

Transmission control protocol :

It provides reliable communication between two hosts.

User Datagram Protocol :

It provides unreliable communication between two hosts.

Answers to the Question no:- 8(a)

The User Datagram protocol is simplest Transport layer communication protocol available of the TCP/IP protocol suite. It involves minimum amount of communication mechanism. UDP is said to be an unreliable transport protocol but it uses IP services which provides best effort delivery mechanism.

Answers to the Question no: 8(b)

1. UDP is used when acknowledgement of data does not hold any significance.
2. UDP is good protocol for data flowing in one direction.

3. UDP is simple and suitable for query based communications.
4. UDP is not connection oriented.
5. UDP does not provide congestion control mechanism.
6. UDP does not guarantee ordered delivery of data.
7. UDP is stateless.
8. UDP is suitable protocol for streaming applications such as VoIP multimedia streaming.

Answer to the Question no: 8(d)

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

1. Domain Name services
2. Simple Network management protocol

3. Trivial file transfer protocol
4. Routing Information protocol.
5. Kerberos.