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Q#01 (a) LAYERS IN THE INTERNET MODEL ARE NETWORK SUPPORT LAYER:-

Ans: Physical layer, data link layer, network layer support, session, presentation and application layers are user support layers the transport layer links these layers by segmenting and reassanging the data. These layers deals with the electrical specifications, physical connection, transport timing and reliability. The support layers are:

1: Session layer.
2: Presentation layer.
3: Application layer.

Q1 (b) THREE TYPES OF TRANSMISSION IMPAIRMENT:-

Ans ⇒ 1: Attenuation.
2: Distortion.
3: Noise.

1: ATTENUATION:-

It is the loss of energy. The decrement of signal's strength with increasing distance which causes loss of energy in overcoming resistance of medium. Amplifiers are the solution for attenuation.

2: DISTORATION:-

It is the change in the

signals shape, this is generally seen in the composite signal with different frequencies. Each frequency component has its own propagation speed travelling through a medium. Every component arrive at different time which leads to delay distoration. Therefore, they have different phases at recieved end from what they had at sender end.

3. NOISE:-

The random or unwanted signals that mixes up with the orignal signals is called noise. There are several types of noises such as induced noise, crosstalk noise, thermal noise and impulse noise which may currupt signals

- Induced noise comes from motors and appliences.
- Thermal noise is created due to movement of electrons in wires
- Crosstalk noise occurs when one wire affects the other one.

Q1 C: SHANNON CAPICITY:-

In simple words it is used in the communications to convert analog into digital signals. Claude shanon derived an equation governing the maximum channel capicity on a communication link. Shannon stated that $C = B \cdot \log_2(1 + S/N)$. Where C is the measurment in Bits per

second, B is the bandwidth of the communication channel S is the power signal and N is the noise power.

Shannon's work showed that the values of S, N and W set a limit upon the transmission rate - the two fundamental constrains on achievable data rates are the amount of available bandwidth and the ratio of signal to noise between the reciever and the sender.

Q7(d) FLOW CONTROL & ERROR CONTROL:-

Ans: FLOW CONTROL:-

(i) Flow control is meant for the proper transmission of the data from sender to the reciever.

(ii) Feedback-based flow control and rate based flow control are the approaches to achieve the proper flow control.

(iii) Avoid overrunning of recievers buffer and prevents the data loss.

ERROR CONTROL:-

(i) Error control is meant for delivering the error-free data to the reciever.

(ii) Parity Checking, Cyclic Redundry Code (CRC) and checksum and approaches to detect the error in data. Hamming codes, Binary convolution codes.

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Reed-solomon code, Low-density Parity Check codes are the approaches to correct the error in data.

(iii) Detects and corrects the error occured in the data.

Q1(e) PIGGYBACKING AND USEFULNESS:-

Piggybacking is used to improve the effeciency of bidirectional transmission. When a frame is carrying data from A to B, it can also carry control information about frames from B; when a frame is carrying data from B to A, it can also carry control information.

Piggybacking is used to gain free network access rather than other malicious intent, but it can slow down data transfer for legitamate users of the network.

It is used in the network layer of OSI Model, by using the Achnolgdment protocol.

Q1(f) HDLC TRANSFER MODE:-

- Normal response mode
- Asynchronous Balanced mode

HDLC FRAMES:-

- Flag
- Address
- Control
- Payload
- FCS

TYPES OF HDLC FRAMES:-

- I-Frame.
- S-Frame.
- U-Frame.

HDLC can be used for point-to-multipoint connections via the original master-slave modes normal to response mode (NRM)

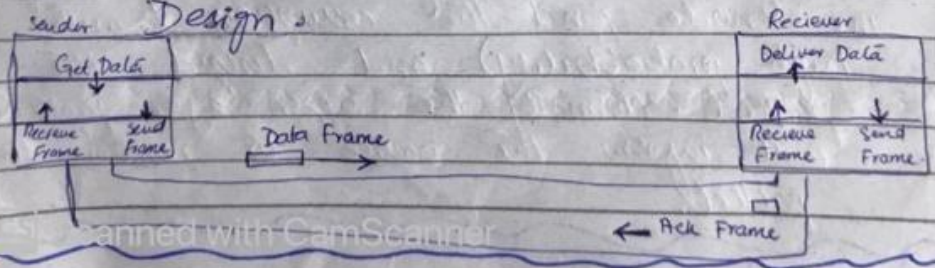
Q1 (g) PROTOCOL FOR NOISELESS CHANNELS:-

1. Simplest protocol:- it has no flow or error control. It is a unidirectional protocol in which data frames are travelling in only one direction - from the sender to reciever.

Design:

2. Stop Wait protocol:- If data frames arrive at the reciever side faster than they can be processed, the frames must be stored until their use.

Design:



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Q1(h) DIFFERENTIAL ENCODING:-

Ans. It is that type of encoding in which signal significant conditions represent binary data such as "0" and "1" and are represented as changes to succeding values rather than with the respect of a given refrence.

NRZ-L :-

Non Return to Zero level is a data encoding scheme in which a negative voltage is used to represent binary one and a positive voltage is used to represent binary zero.

NRZ-I :-

This maintains a constant voltage pulse for the duration of a bit time.

Q2 (i) Before using the destination address in an intermediate or the destination node, the packet goes through error checking. That may help the node find the corruption (with high probability) and discard the packet. Normally the upper layer protocol will inform the source to resend the packet.

Q2 (j) 1 Mbps sending data rate?

Sol:-

1 Mbps = 125000 Bps

Time required = $\frac{8}{125000}$

= 0.000064 Sec.

Q2 (k) Channel with 4 Khz.....

$C = B \times \log_2 (1 + SNR)$

$100 \times 10^3 = 4 * 10^3 \log_2 (1 + SNR)$

$\log_2 (1 + SNR) = 25$

$1 + SNR = 2^{25}$

$SNR = 2^{25} - 1 = 33554431$

$SNR_{db} = 10 \log_{10} (33554431) \approx 75dB.$

Q3 #(L) Wave form.