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SEC: A

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Subject: Data Communications

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Ans. to ques. no. - 01(a)

My ID is : 18101032.

$$\text{So, } X = (2+1) \\ = 3$$

$$Y = (3+1) \\ = 4$$

So, 3 computers connected with mesh topology and  
4 computers connected with star topology.

$$\therefore \text{For mesh topology links needed} = \frac{n(n-1)}{2} \\ = \frac{3(3-1)}{2} \\ = 3.$$

For star topology connection links needed = 4.

$\therefore$  For mesh topology we needed 3 links and  
for star topology we needed 4 links.

Between Mesh and star topology, Mesh is more secure than star topology. Because In Mesh topology each node is connected with others. There is no need of any third party entry. If we want to send data from A node to B node, it will send directly from A node to B node. But in the star topology, there needed a central hub by which every node is connected. So, In star there is a third party entry which may causes lack of data security.



Ans. to ques. no. - 01(b)

Half-duplex: In the half-duplex mode both transmit and receive possible, but not at the same time.

Advantage: As, we are communicating one way, so there is no possibility of data traffic and less possibility to make noise.

Disadvantage: We can communicate only one way at a time. It can drop a packet.

Full-duplex:

Advantage: Transmit and receive at the same time. Fewer network blocks.

Disadvantage: If we want to communicate with the bandwidth, there is a possibility to make noise.

Ans. to ques. no. - 02 (a)

My ID is: 18101032

$$\therefore X = 2^r \bmod 6 = 4 \bmod 6 = 4$$

$$Y = (4+1) \bmod 6 = 5 \bmod 6 = 5$$

So, I will be in PC4 and my friend will be in PC5.

Suppose, the IP address of PC4 = 04

the IP address of PC5 = 05

the mac address of PC4 = 01

" " " " PC40 = 02

" " " " PC42 = 03

" " " " PC52 = 04

" " " " PC50 = 05

" " " " PC5 = 06.

For E:

01	02	04	05	6000	7000	Data	T <sub>2</sub>
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~~for PC40:~~

02	03	04	05	6000	7000	Data	T <sub>2</sub>
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For PC42:

03	04	04	05	6000	7000	Data	T <sub>2</sub>
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For  $\pi 52$ : 

04	05	04	05	6000	7000	Data	T <sub>2</sub>
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For  $\pi 50$ : 

05	06	04	05	6000	7000	Data	T <sub>2</sub>
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For  $\pi$ : 

05	06	04	05	6000	7000	Data	T <sub>2</sub>
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Ans. to ques. no. - 02(b)

As, Transport layer is responsible for delivery of a message from one process to another process, they also needed to check the error and flow of the data. As, it is an process to process connection, it is work on end-to-end connection. But in the data link layer is responsible for moving frames from one hop to the next hop. So, data link layer work on a single link. As flow-control and error-control are also performed in transport layer but in end-to-end rather



than single link as it is responsible for process-to-process message delivery.

Flow control: Flow control in transport layer is like data link layer. But the layer is performed end-to-end rather than across a single link because transport layer works on process-to-process packet delivery.

Error control: Like data link layer. But the layer is performed process-to-process (end-to-end) rather than across a single link. Error correction is usually achieved through retransmission.

Ans. to ques. no. -03(a)

My ID is : 18101032

$$\therefore x = 32 \text{ km}$$

$\therefore$  The loss in the cable in decible is

$$(-0.3 \times 32) \text{ dB}$$

$$= -9.6 \text{ dB}$$

We know,

$$\text{dB} = 10 \log_{10} \frac{P_2}{P_1}$$

$$-9.6 = 10 \log_{10} \frac{P_2}{2}$$

$$\log_{10} \frac{P_2}{2} = -0.96$$

$$\frac{P_2}{2} = 10^{-0.96}$$

$$\frac{P_2}{2} = 0.10965$$

$$\therefore P_2 = 0.2193 \text{ mW}$$

$\therefore$  In 32 km the power is 0.2193 mW. ✓



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Ans. to. ques. no. - 03(b)

We know that, for the noisy channel we use Shannon's law. Shannon's law is

$$\text{Capacity} = \text{bandwidth} \times \log_2(1 + \text{SNR})$$

Here SNR is sound-to-noise Ratio. Here, in capacity means the highest value that we can have in the bandwidth. That means the upper limit of the signal.

We know that, for noiseless channel we use Nyquist formula: the Nyquist formula

is:

$$\text{Bit Rate} = 2 \times \text{bandwidth} \times \log_2 L$$

Here,  $L$  = number of level.

~~from the Shannon's law~~

The number of level is the power of 2's value. That means 2, 4, 8, 16, 32, 64, ...

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from the shannon law we get the capacity or the highest bit rate. By using this bit rate or less than this bit rate, we can know the level from the Nyquist formula.

Ans. to ques. no. - 03 (c)

i.)





