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Section :- B

Subject :- Computer Communication & Networks

Q#1 (a)

Answer

The Data Link Layer is responsible for moving frames from one hop (node) to the next hop (node). Data Link Layer performs the most reliable mode to node delivery of data. It takes the frames from the network layer and gives it to physical layer. It also synchronizes the information which is to be transmitted.

Function of Data Link Layer

Framing

The streams of bits received from the network layer into manageable data link layer units. This division of streams of bits is done by data link layer.

Physical Addressing

The data link layer adds a header to the frames in order to define physical address of the sender or receiver of the frame.

X

Q# 2 (a)

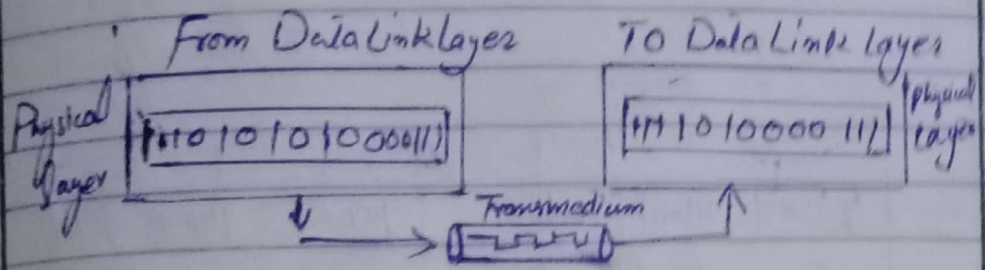
Answer

The seven layers are.

Physical Layer

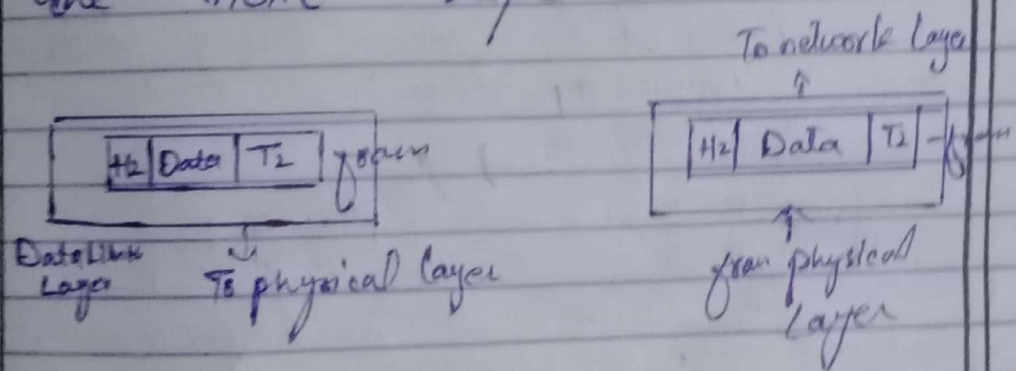
The physical layer is responsible for movements

of individual Bits from one hop (node) to the next hop (node).



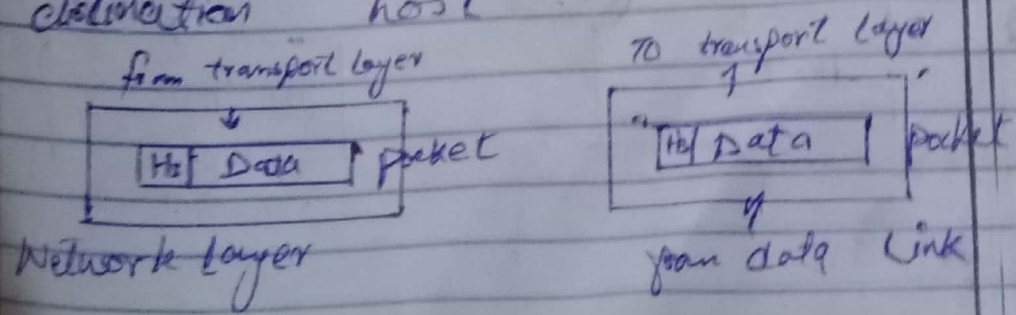
Data Link Layer

This layer is responsible for moving frames from one hop (node) to the next hop (node)



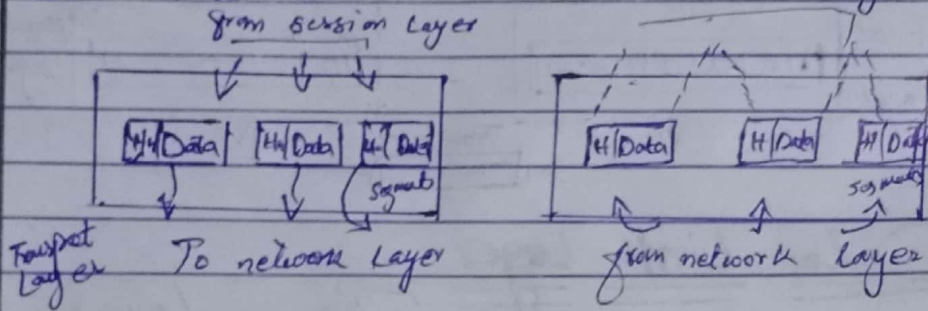
Network Layer

This layer is responsible for the delivery of individual packets from the source host to the destination host



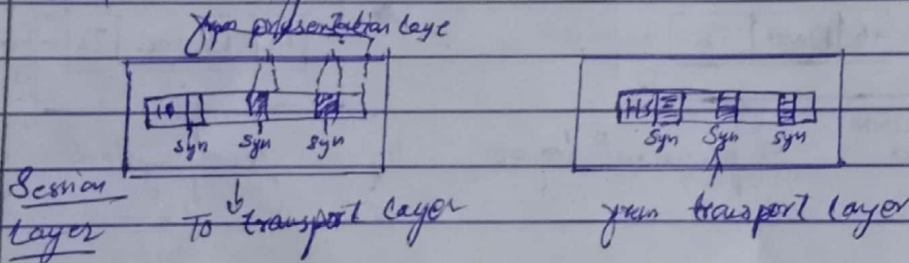
Transport Layer ::

This layer is responsible for the delivery of a message from one process to another.



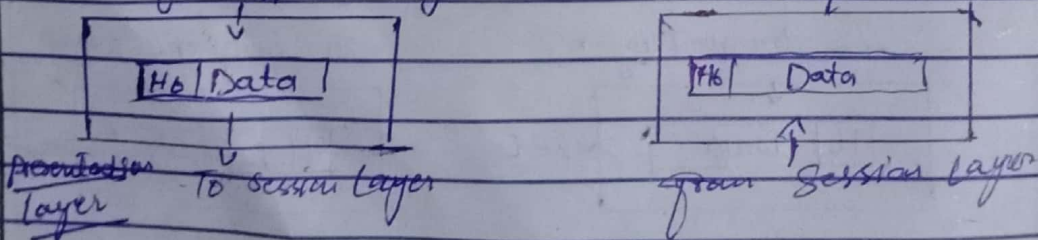
Session Layer ::

The session layer is responsible for dialog control and synchronization.



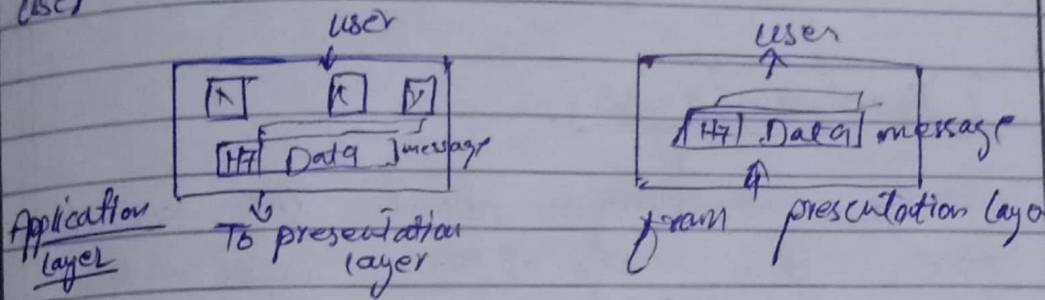
Presentation Layer ::

The presentation layer is responsible for translation, compression & encryption.



Application Layer :-

This layer is responsible for providing services to the user.



Q#1 (b)

Answer

Advantages :-

- There are many Advantages.
- Single layer to study as all the functionalities provided at this layer.
 - The higher bandwidth as number of layers is reduced.
 - Mostly, it simplifies the conceptual problem of having to deal with those things in the network stack itself.

- The session and presentation layer use might pick up. But you should keep it up.

Disadvantages:

- Make reasoning about the architecture of network systems less effective
- There will be security issues at the network security and application security will open at a single point which may our network open to our threat.
- It make troubleshooting hard as multiple errors may reside at single.
- It is very complex, and the initial implementation of OSI model is very complex & slow

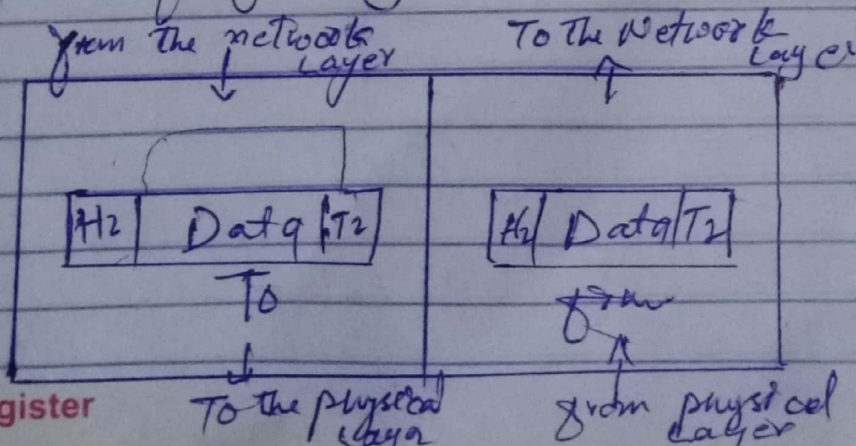
Q#2 (b)

Answer

Because two waves at different wavelength and frequency can't be exact copies of each other differing only by a phase shift. However it is possible for the sum of the two waves to be periodic then there will be an overall phase for the new periodic signal.

⇒ Phase and frequency are not explicitly measured on a time domain.

⇒ A frequency domain plot shows the relation between Amplitude & frequency.



Design issue with Data Link Layer

⇒ The issue that can arise in the data link layer is how to keep a fast transmitter from crashing a slow receiver in data.

⇒ Broadcast networks have an additional issue in the data link layer. How to control access to the shared channel. A special sublayer of the data link layer (the medium access control (MAC)).

Design issue with Data Link Layer

→ The issue that can arise in the data link layer is how to keep a fast transmitter from driving a slow receiver in data.

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Q#3(a)

Answer

The duration of 1 bit as follows for 10 Mbps. as

$\frac{\text{Unit bit}}{\text{Individual Connection}} = \text{multiplexing}$

So, $= \frac{1}{10,000 \text{ kbps}} = \frac{0.0001 \text{ s}}{[1 \text{ ms}] \text{ Ans}}$

The duration of 1 bit for connection 100 kbps as
 $= \frac{1 \text{ Bit}}{100 \text{ kbps}}$

$= \frac{1 \text{ Bit}}{100,000 \text{ kbps}}$

$= 0.00001 \text{ s}$ Ans

The duration of 1 bit for connection 1 mbps as

$\frac{1 \text{ bit}}{1 \text{ mbps}}$

$= \frac{1}{1 \times 10^6 \text{ bps}}$

$\frac{1}{10^6 \text{ bps}} = 10^{-6} \text{ s}$

$1 \mu\text{s}$ Ans

The duration of 1 bit for connection 10 mbps as:

$$\begin{aligned}
 & \frac{1 \text{ bit}}{10 \text{ Mbps}} \\
 &= \frac{1}{10 \text{ Mbps}} \\
 &= \frac{1}{1 \times 10^7 \text{ bps}} \\
 &= \frac{1}{1 \times 10^7 \text{ bps}} \\
 &= 1 \times 10^{-7} \text{ s} \\
 & \boxed{10 \times 10^{-8} \text{ s}}
 \end{aligned}$$

(b) The transmission rate of link

The rate of the link is 4 times
The rate of a connection or 4 kbps

(c) The duration of time slot as

The rate of the link is
4 times The rate of a
connection or 4 kbps.

The duration of each time
slot is one fourth

the duration of each bit
before multiplexing or $\frac{1}{4} \mu\text{s}$

or 250 ns. Note that
we also calculate this

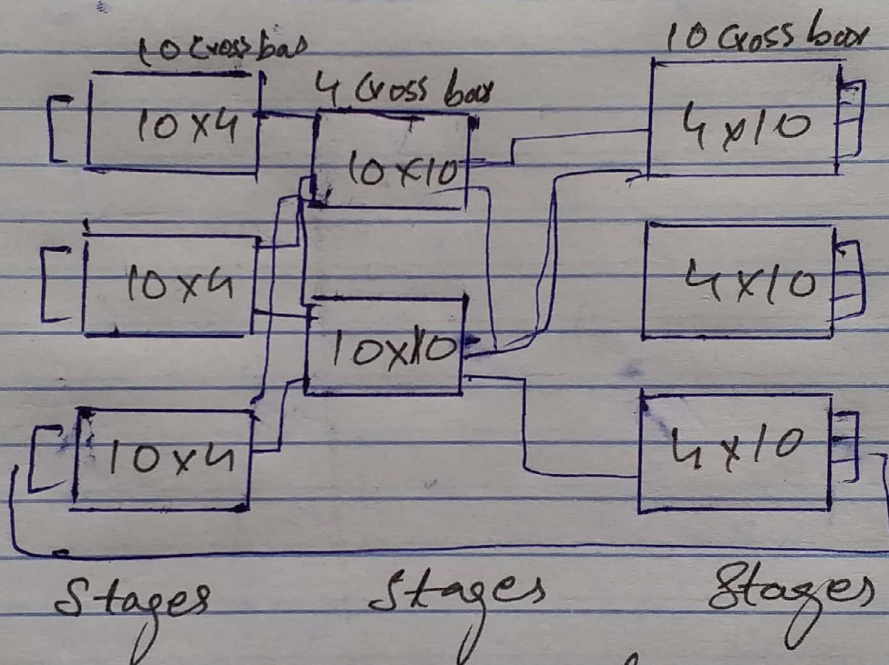
(d) The duration of a frame is
always the same as

the duration of unit
before multiplexing or 1 ms
we can also calculate this
in another way

Q#3 (b)

Answer :-

(a) Draw the Configuration diagram



(b) The total number of cross points
 $= 10(10 \times 4) + 4(10 \times 10) + 10(4 \times 10) = 1200$

(c) Only four simultaneous connections are possible for each crossbar at the first stage. This means that the total number of simultaneous connections is $4 \times 10 = 40$.