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Question No 1.

Answer:

Most protocols issue a special error message that is sent back to the source in this case.

Question No 2.

(a).

Solution:

$$SNR(dB) = 10 * \log_{10}(SNR)$$

$$SNR = 10^{(SNR(dB)/10)}$$

$$SNR = 10^{3.6} = 3981$$

Hence, $C = 2 * 10^6 * \log_2(3982) =$

$= 24$ MHz

Question No 2.

(b)

Answer:

a). $= 1/0.001s$

$= 1000$ bps

b). $= 2 \times 10^{-3} s = 10/20 \times 10^{-3} s$

$= 500$ bps

c). $= 20 \times 10^{-6} s = 10/20 \times 10^{-6} s$

$= 500000$ bps

Question No 3.

Answers:

i).

To be considered effective and efficient, a network must meet a number of criteria. the most important of these are performance, reliability, and security.

Performance → It can be measured in many ways, including transit time & response time.

Reliability → In addition to accuracy of delivery, network reliability is measured frequency of failure, the time it takes a link to recover from a failure.

Security → Network security issues include protecting data from unauthorized access and viruses.

ii).

→ A full-duplex device is capable of bi-directional network data transmissions at the same time.

→ Half-duplex devices can only transmit in one direction at one time. With half-duplex mode, data can move in two directions, but not at the same time.

iii).

→ n(n-1)/2 cable link are required for mesh,

→ n for ring.

→ n-1 cable link for bus.

→ n cable link for star.

iv).

The physical layer is concerned with actual transfer of data bits across a transmission medium between 2 devices. the physical layer coordinates the functions required to carry a bit stream over a physical medium.

v):

The services provided by the application layer in the internet mode are

→ Network virtual terminal
→ File transfer, access, management
→ Mail serives
→ Directory serives

vi).

The TCP/IP protocol suite was developed prior to the OSI model. therefore, the layers in the TCP/IP protocol suite do not exactly match those in the OSI model. the original TCP/IP protocol suite was defined as having four layers:

→ host-to-network, internet, transport and application.

However, when TCP/IP is compared to OSI, we can say that the host-to-network layer is equivalent to the combination of the physical and data link layers. the internet layer is equivalent to the network layer

and the application layer is roughly doing the job of the session, presentation, and application layer with the transport layer in TCP/IP taking care of part of the duties of the session layer. we assume that the TCP/IP protocol suite is made of five layers:
→ Physical, data link, network, transport, and Application.
The first four layers provide physical standards, network interfaces, internetworking and transport functions that correspond to the first fours layers of the OSI model. the three topmost layers in the OSI model, however, are represented in TCP/IP by a single layer called the application layer.

vii).
→ The amplitude of a signal measure the value of the signal at any point.
→ The frequence of a signal

measure the number of periods in 1 sec.

→ The phase of a signal measure tells us the position of the waveform relative to time zero.

Question No 4.

(b).

Solution:

Propagation time = distance / propagation speed

$= 2000 \text{ Km} / 2 \times 10^8 \text{ m/s} = 10 \text{ ms}$

Transmission time = Message Size / Bandwidth

$= 5 \times 10^6 \text{ bits} / 5 \text{ Mbps} = 1 \text{ s}$

Queuing time = 10 routers * 2 us = 20 us

Processing delay = 10 routers * 1 us = 10 us

Total delay (latency) = 10 ms + 1 s + 20 us + 10 us = 1010.03 ms

$= 1.01003 \text{ s}$

$= 1 \text{ s}$

Question No 4.

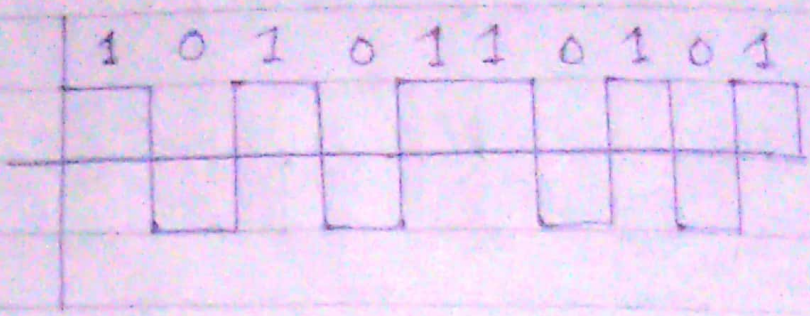
(a).

Bit stream:

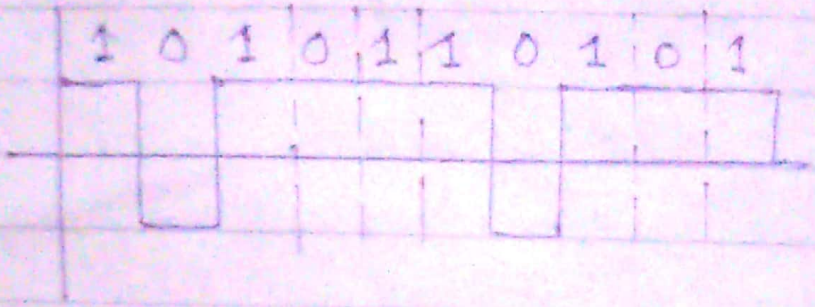
1010110101

P-T-O

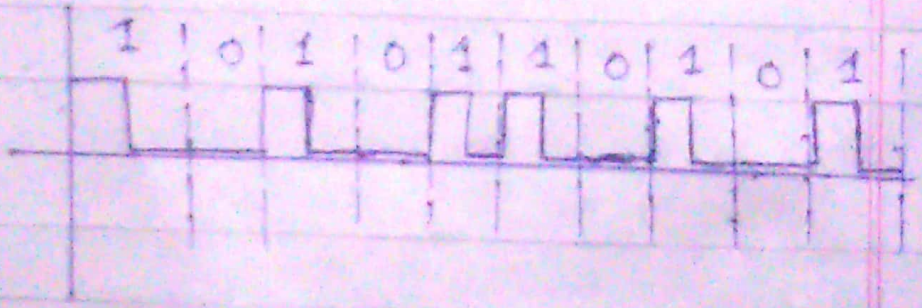
(a). NRZ-L:



(b). NRZ-S:



(c). UNIPOLAR-RZ.



(d). BIPOLAR-RZ.