

Q.1 a. Explain Peer-to-Peer communication between layers in OSI reference model.

Answer: Page Number 48-49 of Text Book

b. Given a channel with an intended capacity of 20 Mbps, the bandwidth of the channel is 3 MHz. Find SNR to achieve this capacity. Assuming the same channel capacity, find the number of signal levels using Nyquist formula.

Answer:

$$\begin{aligned} \text{Channel capacity, } C &= B \log_2 (1 + \text{SNR}) \\ 20 \times 10^6 &= (3 \times 10^6) \log_2 (1 + \text{SNR}) \\ \text{SNR} &= \boxed{101} \rightarrow \end{aligned}$$

using Nyquist formula,

$$\begin{aligned} C &= 2B \log_2 L \\ 20 \times 10^6 &= 2(3 \times 10^6) \log_2 L \\ L &= \boxed{110} \rightarrow \end{aligned}$$

c. Differentiate between the connection oriented and connectionless transfer services with relevant diagrams.

Answer: Page Number 284-285 of Text Book

d. 100 stations on a pure ALOHA system share a 1 Mbps channel. If the frame size is 1000 bits, find the throughput for each station sending 10 frames per second.

Answer:

$$\begin{aligned} \text{Frame time, } t_f &= \frac{1000 \text{ bits}}{1 \times 10^6 \text{ bps}} = \boxed{1 \text{ msec}} \rightarrow (01) \\ \text{Offered load to ALOHA system} \\ &= G = (100)(10)(1 \text{ msec}) = \boxed{1} \rightarrow (01) \\ \text{Total Throughput, } S &= G e^{-2G} = \boxed{13.53\%} \rightarrow (01) \\ \text{Throughput for each station} \\ &= (0.1353) 10 = \boxed{1.353 \text{ frame/sec}} \end{aligned}$$

- e. Explain in brief the two broad categories of schemes for sharing transmission medium.

Answer: Page Number 370-371 of Text Book

- f. Explain FIFO queuing with discard priority.

Answer: Page Number 540-541 of Text Book

- g. Draw the UDP header format and brief the function of each field.

Answer: Page Number 601-602 of Text Book

- Q.2 a. Draw the TCP/IP protocol graph and explain how the various layer work together in realizing internetworking.

Answer: Page Number 54-59 of Text Book

- b. Explain the various line coding methods with suitable waveforms.

Answer: Page Number 135-137 of Text Book

- Q.3 a. How does selective repeat ARQ protocol differ from Go-back-N ARQ protocol; explain it with suitable diagrams.

Answer: Page Number 309-310 of Text Book

- b. Describe the transitional phases of a PPP (Point-to-Point protocol) connection with the help of a phaser diagram.

Answer: Page Number 329-331 of Text Book

- c. What is the need for bit stuffing in HDLC frames? Explain with an example.

Answer: Page Number 326-327 of Text Book

- Q.4 a. What is the reservation protocol? Explain with the help of an example.

Answer: Page Number 388-389 of Text Book

- b. Explain CDMA technique with relevant diagrams.

Answer: Page Number 401-402 of Text Book

- c. In a CSMA/CD network at 1 Gbps over 1km with no repeaters, find the minimum frame size. Assume the signal speed in the cable as  $200\text{m}/\mu\text{sec}$ .

Answer:

Roundtrip propagation time =  $2Lp$   
 $= 2 \left[ \frac{10^3\text{m}}{200\text{m}/\mu\text{sec}} \right] = 10\mu\text{sec}$

At 1 Gbps with a round trip delay of  $10\mu\text{sec}$ , the number of bits that can be

transmitted =  $(1 \times 10^9 \text{ bps}) (10 \times 10^{-6} \text{ sec}) = 10^4 \text{ bits}$   
 $= \boxed{1250 \text{ bytes}}$

Minimum frame size = 1250 bytes.  $\rightarrow$

All frames with  $\geq 1250$  bytes can be transmitted.  $\rightarrow$

**Q.5 a. Explain IEEE 802.3 standard for Ethernet with the help of frame format.**

**Answer:** Page Number 429-430 of Text Book

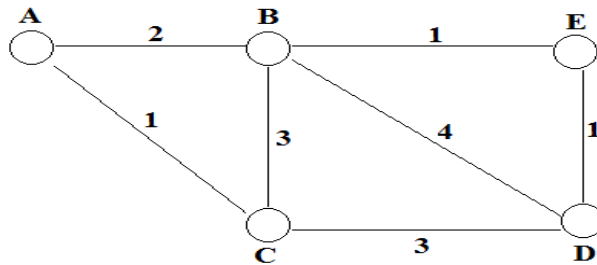
**b. Compare virtual circuit and datagram packet switching with the help of timing of events diagram showing the delays in packet switching.**

**Answer:** Page Number 504-508 of Text Book

**c. How are routing techniques classified?**

**Answer:** Page Number 516 of Text Book

**Q.6 a. Find the shortest path from A to D for the network shown**



**Answer:**

are  
 Path  $A \rightarrow C \rightarrow D$  with two hops  
 and  $A \rightarrow B \rightarrow E \rightarrow D$  with three hops  
 with weighting factor 4.  
 ACD is selected as it  
 has only 2 hops  $\rightarrow$  (05)

- b. Explain the arrival processes and service times with the help of a queuing system.

**Answer: Page Number 846-847 of Text Book**

- c. How is subnet mask useful in IP addressing? Explain with an example.

**Answer: Page Number 581 of Text Book**

- Q.7** a. Draw the TCP segment format and explain the function of each field.

**Answer: Page Number 605-606 of Text Book**

- b. What is secret key cryptography? Explain with a suitable block diagram.

**Answer: Page Number 766-767 of Text Book**

- c. Write a note on FTP.

**Answer: Page Number 78-79 of Text Book**

**Text Book**

Leon Garcia and Indra Widjaja, Communication Networks: Fundamental Concepts and Key Architecture, 2<sup>nd</sup> Edition, Tata McGraw-Hill, 2004