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:

$$\text{Channel Capacity}, \ C = B \log_2 (1 + SNR)$$

$$20 \times 10^6 = (3 \times 10^6) \log_2 (1 + SNR)$$

$$SNR = \boxed{101} \qquad \longrightarrow$$

Using Nyquist formula,

$$C = 2B \log_2 L$$

$$20 \times 10^6 = 2(3 \times 10^6) \log_2 L$$

$$L = \boxed{10} \qquad \longrightarrow$$

      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:

$$\text{frame time}, \ t_f = \frac{1000 \text{ bits}}{1 \times 10^6 \text{ bps}} = \boxed{1 \text{ msec}} \to (01)$$

offered load to ALOHA system

$$= G = (100)(10)(1 \text{ msec}) = \boxed{1} \to (01)$$

$$\text{Total Throughput}, \ S = G e^{-2G} = \boxed{13.53\%} \to (01)$$

Throughput for each station

$$= (0.1353) \ 10 = \boxed{\begin{array}{c} 1.353 \\ \text{frame/sec} \end{array}}$$

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 $= 2t_p$

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

At 1 Gbps with a ground trip delay of 10 μsec, the number of bits that can be

$$\text{transmitted} = (1\times10^9 \text{ bps})(10\times10^{-6} \text{ sec}) = 10^4 \text{ bits}$$
$$= \boxed{1250 \text{ bytes}}$$

Minimum frame size = 1250 bytes. →

All frames with ≥ 1250 bytes can be →
transmitted.

Q.5　a. **Explain IEEE 802.3 standard for Ethernet with the help of frame format.**
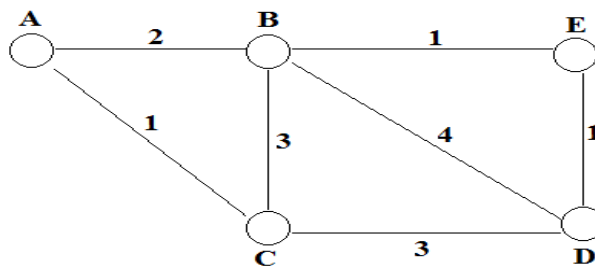**Answer: Page Number 429-430 of Text Book**

　　　b. **Compare virtual circuit and datagram packet switching with the help of**
　　　　timing of events diagram showing the delays in packet switching.
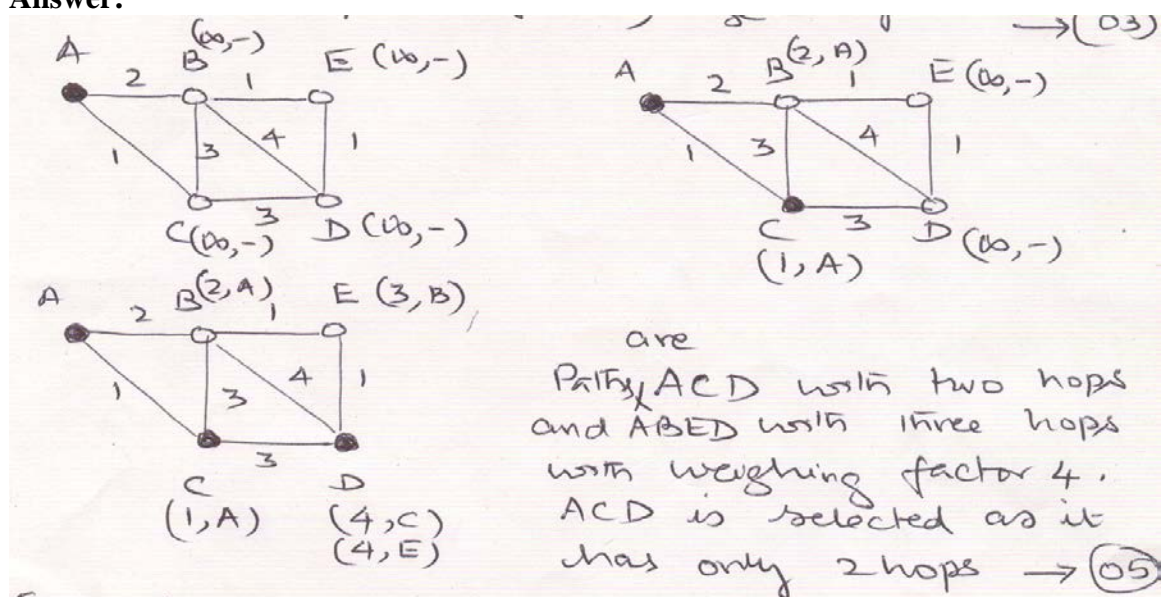**Answer: Page Number 504-508 of Text Book**

　　　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 ACD with two hops
and ABED with three hops
with weighing factor 4.
ACD is selected as it
has only 2 hops → (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, 2nd Edition, Tata McGraw-Hill, 2004