Course Code : CST 317 **KOLP/RW – 19 / 9110**

Fifth Semester B. E. (Computer Science and Engineering) Examination

COMPUTER NETWORKS

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions are compulsory.
(2) All questions carry marks as indicated.
(3) Internal choices are given for some questions.
(4) Explain your answer with neat sketches, wherever applicable.

1. (a) When a file is transferred between two computers, two acknowledgement strategies are possible. In the first one, the file is chopped up into packets, which are individually acknowledged by the receiver, but the file transfer as a whole is not acknowledged. In the second one, the packets are not acknowledged individually, but the entire file is acknowledged when it arrives. Discuss these two approaches in terms of bandwidth utilization. 3 (CO 1)

   (b) What does "negotiation" mean when discussing network protocols ? Give an example. 2 (CO 1)

   (c) Classify the Connection oriented and Connection less service in terms of reliable and unreliable services. Also provide the example with reason. 5 (CO 1)

2. (a) Explain the significance of twisting in twisted pair cable. What are its types ? Also explain the categories of Unshielded twisted pair cables w. r. t. their characteristics. 5 (CO 2)

   (b) Radio antennas often work best when the diameter of the antenna is equal to the wavelength of the radio wave. Reasonable antennas range from 1 cm to 5 meters in diameter. What frequency range does this cover ? 3 (CO 2)

(c) Explain the significance of internal reflection in fiber optics. 2 (CO 2)

3. Solve any **Two** :

(a) Compute the fraction of the bandwidth that is wasted on overhead (headers and retransmission) for protocol 6 on a heavily loaded 50-kbps satellite channel with data frames consisting of 40 header and 3960 data bits. Assume that the signal propagation time from the earth to the satellite is 270 msec. ACK frames never occur. NAK frames are 40 bits. The error rate for data frames is 1%, and the error rate for NAK frames is negligible. The sequence numbers are 8 bits. 5 (CO 3)

(b) (i) Suppose that a message 1001 1100 1010 0011 is transmitted using Internet Checksum (4-bit word). What is the value of the checksum ? 2 (CO 3)

(ii) Explain the significance of "I" "S" and "U" of HDLC frame. 3

(c) Sender A wants to send bit sequence "1011101110001" to sender B.

(i) Calculate the number of parity bits require to calculate hamming code.

(ii) Calculate Hamming code at Sender side

(iii) Consider that, while sending the Hamming code, third bit from right is an error. How this error can be corrected at receiver side ? 5 (CO 4)

4. Solve any **Two** :

(a) (i) A group of N stations share a 56-kbps pure ALOHA channels. Each station outputs a 1000-bit frame on average once every 100 sec, even if the previous one has not yet been sent (e. g., the stations can buffer outgoing frames). What is the maximum value of N ? 3 (CO 4)

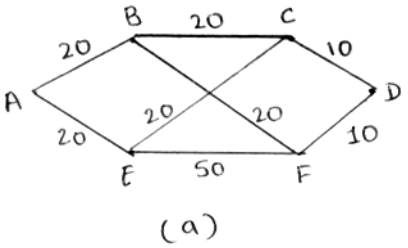
(ii) In the binary countdown protocol, explain how a lower-numbered station may be starved from sending a packet. 2

(b) Sixteen stations, numbered 1 through 16, are contending for the use of a shared channel by using the adaptive tree walk protocol. If all the stations whose addresses are prime numbers suddenly become ready at once, how many bit slots are needed to resolve the contention ? 5 (CO 4)

(c) Explain the working of CSMA-CD protocol. Write the formula for collision detection time in worst case. 5 (CO 4)

5. Solve any **Two** :

(a) Compute the mean packet delay on each line from queuing theory. Consider the mean packet size is 800 bits.



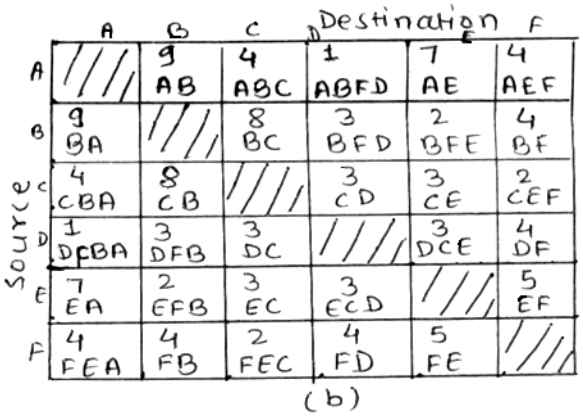


Fig. a: A subnet with line capacities in kbps

Fig. b: The traffic in Packet/sec and the routing matrix 5 (CO 3)

(b) A computer on a 6-Mbps network is regulated by a token bucket. The token bucket is filled at a rate of 1 Mbps. It is initially filled to capacity with 8 megabits. How long can the computer transmit at the full 6 Mbps ? 5 (CO 3)

(c) How choke packets help in preventing congestion ? Explain Push back method of choke packet to reduced congestion. 5 (CO 3)

6. (a) (i) Consider the effect of using slow start on a line with a 10–msec round-trip time and no congestion. The receive window is 24 KB and the maximum segment size is 2 KB. How long does it take before the first full window can be sent ? 3 (CO 4)

(ii) Suppose that the TCP congestion window is set to 18 KB and a timeout occurs. How big will the window be if the next four transmission bursts are all successful ? Assume that the maximum segment size is 1 KB. 2

(b) How the crash recovery is handled by transport layer ? What are the difficulties in crash recovery process ? How those difficulties can be handled ? 5 (CO 3)