

# National Institute of Technology, Delhi

Name of the Examination: B. Tech. / M. Tech. / Ph.D.

Branch : ECE

Semester : VII

Title of the Course : Computer Networks

Course : EC 405

Code

Time: 2 Hours

Maximum Marks: 30

Note: Attempt all the questions.

Assume any data, if necessary.

Marks of every question is different and given on its right side.

Question no 1. A) To formulate the performance of a multiple access network ,we need a mathematical model,we used the poisson distribution to find probability of generating x number of frames ,in a certain period of time ,  $P(x) = (e^{-\lambda}) \times \lambda^x / (x!)$  find the probability that a frame in a such a network reaches its destination without colliding with other frames ,we have G stations each sending an average of one frame during the frame transmission time ,then probability of success for a station is the probability that no other stations sends a frame during the vulenrable time ,

1) Find probability that a station in slotted aloha network can sucessfully send a frame during vulenrable time .

2) Find probability that a station in pure aloha network can sucessfully send a frame during vulenrable time . ( 3 marks )

B) Describe Frame format of 802.3 (Ethernet ) and also define working mechanism of token passing access methods ? ( 2 marks )

C) Show given signal in manchester encoding – 10101011110101. ( 1 mark ) .

Question no 2. A) Find the codeword using CRC if the dataword is 1001011011 and divisor is 11011. (1.5 marks )

B) In a CSMA/CD network with a data rate of 100 Mbps ,the minimum frame size is found to be 1024 bits for the correct operation of the collosion detection process .What should be the minimum frame size if we keep the size of the network constant ,but increases the data rate to 1 Gbps. (2 marks ) .

C) A and B are the only two stations on an Ethernet. Each has a steady queue of frames to send. Both A and B attempt to transmit a frame, collide, and A wins the first backoff race. At the end of this successful transmission by A, both A and B attempt to transmit and collide, find probability that A wins the second backoff ? ( 1.5 marks )

Question no. 3. A) Why might a mesh topology be superior to a base station topology for communication in a natural disaster ? ( 1.5 marks )

B) What do you maen by term “Byte Stuffing based framing”? ( 1 mark)

C) State the responsibilities of data link layer .

( 1 mark)

D) Explain the token early and delayed token release in token passing method .

(1.5 marks)

Question no 4. A) Explain X.25 ( ITU-standrad protocol ) in detail .

( 1.5 marks )

B) Find net\_id and host\_id of given:-

1) 111.64.2.6

2) 131.57.9.30

3) 207.64.52.11

(1.5 marks)

C) Host A is sending data to host B over a full duplex link. A and B are using the sliding window protocol for flow control. The send and receive window sizes are 5 packets each. Data packets (sent only from A to B) are all 1000 bytes long and the transmission time for such a packet is 50  $\mu$ s. Acknowledgement packets (sent only from B to A) are very small and require negligible transmission time. The propagation delay over the link is 200 ms . What is the maximum achievable throughput in this communication?

( 2 marks )

Question no . 5 A) Consider a network connecting two systems located 8000 kilometers apart. The bandwidth of the network is  $500 \times 10^6$  bits per second. The propagation speed of the media is  $4 \times 10^6$  meters per second. It is need to design a Go-Back-N sliding window protocol for this network. The average packet size is  $10^7$  bits. The network is to be used to its full capacity. Assume that processing delays at nodes are negligible. What has to be the minimum size in bits of the sequence number field?

( 2 marks )

B) What is the difference between a physical address and logical address ?

( 2 marks )

Question no . 6 A) Draw a neat labeled diagram showing interaction between the layers of OSI architecture ?

B) What is the difference between 2 layer switch and 3 layer switch.

( 3 + 2 marks ) .