Roll No.:.....

National Institute of Technology, Delhi

Name of the Examination: B. Tech.

Branch	**: ECE**	**Semester**	**: VI**
Title of the Course	**: Computer Networks**	**Course Code**	**: CSB304**

Time: 2 Hours **Maximum Marks: 25**

Note: Attempt all the questions.
Assume any data, if necessary.
Marks of every question is different and given on its right side.

Question 1. (A) Suppose two nodes start to transmit at the same time a packet of length L over a broadcast of rate R .Denote the propagation delay between the two nodes as $\mathbf{d_{prop}}$ .Will there is collision if $\mathbf{d_{prop}} < (L/R)$? Why or why not? Explain in detail . (1.5 marks).

(B). Explain 802.5 IEEE standard (Token Ring) in Delayed token manner . (2 marks).

(C) Let G(x) be the generator polynomial used for CRC checking. What is the condition that should be satisfied by G(x) to detect odd number of bits in error?
(1) G(x) contains more than two terms (2) 1+x is a factor of G(x)
(3) G(x) does not divide $(1+x)^k$, for any k not exceeding the frame length
(4) G(x) has an odd number of terms. (1.5 marks)

Question 2. (A) Consider a network connecting two systems located 8000 kilometers apart. The bandwidth of the network is 500×10^6 bits per second. The propagation speed of the media is 4×10^6 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. Then, the minimum size in bits of the sequence number field has to be _____. (1.5 marks)

(B). 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 back-off race. At the end of this successful transmission by A, both A and B attempt to transmit and collide. The probability that A wins the second back-off race is ..... (1.5 marks)

(C) Explain the following in detail.
(1) Hybrid Topology (2) Vulnerable period (2 marks)

Question 3.(A) The distance between two stations M and N is L kilometers. All frames are K bits long. The propagation delay per kilometer is t seconds. Let R bits/second be the channel capacity. Assuming that processing delay is negligible, So find the minimum number of bits for the sequence number field in a frame for maximum utilization, when the sliding window protocols used ?

(1.5 marks)

(B) Explain Frame format of Ethernet (802.3) in detail . (2 marks)

(C) Consider a CSMA/CD network that transmits data at a rate of 100Mbps over 1KM cable with no repeaters .If the minimum frame size required for the network is 1250 bytes .What is the signal speed in the cable? (1.5 marks)

Question 4 (A) Suppose in a Stop and wait ARQ ,the system has set a time out value which is equal to the half of the time required to receive an acknowledgement when the station A sends n frames to station B and no errors occur during transmission ,how many duplicate frames the receiver B will discard?
(2 marks)

(B) consider a token ring with latency 500usec (micro seconds) .Packet size of 1500bytes .What is the effective throughput rate for both single active host and for many active hosts that can achieved if the ring has 3 Mbps bandwidth. Assume the strategy used id delayed token reinsertion method .
(2marks)

(C) After the K^{th} consecutive collision , each colliding station waits for a random time chosen from the interval ..... (1 mark)
(1) (0 to 2^{k}) * RTT (2) (0 to 2^{k-1}) * RTT (3) (0 to 2^{k-1}) * maximum propagation delay

Question 5 (A) Collision nodes A and B are attached to opposite ends of the cable with propagation delay of 125ms both nodes attempt to transmit at time t=0. Frames collide and after first collision A draws k=0 and B draws k=1 in the exponential back-off protocol .Ignore the jam signal .At what time (in seconds) is A's packet completely delivered at B, if the bandwidth of the link is 10mbps and packet size is 1000 bits. (2 marks)

(B) Explain the following in detail.
(1) Contention based method for efficient medium access in Ethernet LAN.
(2) X.25 protocol. (3 marks)