PRINCE OF SONGKLA UNIVERSITY

FACULTY OF ENGINEERING

Examination : Mid - Session 2	**Year** : 2002
Date : 25 December 2002	**Time** : 13.30 – 16.30
Subject : 240 – 361 Computer Networks	**Room** : R200

Note

- There are 6 questions. Answer all questions.
- All questions are of different values.
- Calculator, textbooks and hand-out are prohibited.
- Every answer must be clear and show how to get the answer.
- All answers must be given in ink.
- Unless otherwise indicated, pencils should only be used for graphical work.

Name :_____Student ID:_____Section:_____

Question	1	2	3	4	5	6	Total
Scores							

Student ID : Name: Section :

1. Consider sending a file 1000-KB from Host A to Host B. There are 10 links between A and B. Each link transmits at 10 Mbps. The network is lightly loaded so that there are no queueing delays. The file is broken up into 1000 packets. Assuming an RTT is 100 ms. and the network is initial 2-RTT of handshaking before data is sent. ***How long does it take to send the file from source to destination?*** (5 marks)

Answer

2. Answer the following questions.

   (i) ***Explain in detail the principles of CSMA/CD algorithm***. (2 marks)

(ii) Suppose nodes A and B are on the same 10 Mbps Ethernet segment, and the propagation delay between the two nodes is 255 bit times. Suppose A and B send frames at the same time, the frames collide, and then A and B choose different values of K in the CSMA/CD algorithm. Assuming no other nodes are active, ***can the retransmissions from A and B collide?*** Suppose A and B begin transmission at t=0 bit times. They both detect collisions at t=255 bit times. They finish transmitting jam signal at t= 255+48 = 303 bit times. Suppose K_A=0 and K_B= 1. ***At what time does B schedule its retransmission? At what time does A begin transmission? At what time does A's signal reach B? Does B refrain from transmitting at its scheduled time?*** (10 marks)

Answer

3. Consider an application which transmits data at a steady rate (e.g., the sender generates an N bit unit of data every k time units, where k is small and fixed). Also, when such an application starts, it will stay on for relatively long period of time. Answer the following questions, briefly justifying your answer:

   (i) ***Would a packet-switched network or circuit-switched network be more appropriate for this application? Why?*** (3 marks)

Answer

(ii) Suppose that a packet-switching network is used and the only traffic in this network comes from such applications as described above. Furthermore, assume that the sum of the application data rates is less that the capacities of each and every link. ***Is some form of congestion control needed? Why?***

(3 marks)

Answer

4. ***What are the differences between Go-Back-N (GBN) and Selective Repeat (SR) protocol?***

(3 marks)

Answer

5. Suppose *p* is probability to transmit frame and *N* is active node in networks. Answer the following questions.

   (i) ***The principles of pure ALOHA*** (2 marks)

Answer

(ii) Express the efficiency of Pure Aloha in term of p and N (3 marks)

Answer

(iii) *Find the value of p that maximizes the expression in part (ii)* (3 marks)

Answer

(iv) Using the value of p found in part (iii), ***find the maximum efficiency of pure ALOHA by letting N approach infinity***. Hint: $(1 - 1/N)^N$ approaches 1/e as N approaches infinity. (3 marks)

Answer

6. Suppose we want to transmit the message 11001001 and protect it from errors using the CRC polynomial x^3+1.

(i) Use polynomial long division to ***determine the message that should be transmitted.*** (5 marks)

Answer

(ii) Suppose the leftmost bit of the message is inverted due to noise on the transmission link. What is the result of the receiver's CRC calculation? ***How does the receiver know that an error has occurred?*** (3 marks)

Answer