

NAME:	Q1 (8)	Q2 (3)	Q3 (5)	Q4 (4)	TOTAL (20)
ID:					
SIGNATURE:					

December 18, 2018

## BLG 337E - PRINCIPLES OF COMPUTER COMMUNICATIONS

Assoc. Prof. Dr. Berk CANBERK

T.A. Tuğçe BİLEN

### Midterm-2

#### Q1- (8 point)

- a) (2 pt) The wireless LANs that we studied used protocols such as MACA instead of using CSMA/CD. Under what conditions, if any, would it be possible to use CSMA/CD instead?  
**ANSWER: Radios cannot receive and transmit on the same frequency at the same time, so CSMA/CD cannot be used. If this problem could be solved (e.g., by equipping each station with two radios), there is still the problem of not all stations being within radio range of each other. Only if both of these problems can be solved, is CSMA/CD a candidate.**
- b) (2 pt) Assume that six stations, A through F, communicate using the MACA protocol. Is it possible that two transmissions take place simultaneously? Explain your answer.  
**ANSWER: Yes. Imagine that they are in a straight line and that each station can reach only its nearest neighbors. Then A can send to B while E is sending to F.**
- c) (2 pt) Compare connection-oriented and connectionless service giving one example scenario for each  
**ANSWER: Slides 5-6 of 04122018.**
- d) (2 pt) Why would the token-ring protocol be inefficient if a LAN had a very large perimeter?  
**ANSWER: When a node transmits a frame, the node has to wait for the frame to propagate around the entire ring before the node can release the token. Thus, if  $L/R$  is small as compared to  $t_{prop}$ , then the protocol will be inefficient.**

#### Q2- (3 point)

What is path contention in a banyan switch and how to solve this problem? Motivate your answer with a scenario.

**ANSWER: Slides 77-95 of 27112018.**

#### Q3- (5 point)

Assume that, in a Stop-and-Wait ARQ system, the bandwidth of the line is 1 Mbps, and propagation time is 10 ms.

- a) (1.5 pt) If the system data frames are 1000 bits in length, what is the bandwidth-delay product?

**ANSWER: 10,000 bit**

b) (1.5 pt) What is the Link Utilization?

**ANSWER: %5**

c) (1 pt) What is the time needed for an ACK to arrive? (ignore the ACK frame transmission time)

**ANSWER: 0.021 sec**

d) (1 pt) How many frames can be transmitted during that time?

**ANSWER: 21 frames**

**Q4- (4 point)**

a) (1.5 pt) Given a message  $M = 1010001101$ , determine the CRC using the polynomial  $P = x^5 + x^4 + x^2 + 1$ . Show your work.

**ANSWER: 01110**

b) (1.5 pt) What is the transmitted message?

**ANSWER: 101000110101110**

c) (1 pt) How does the receiver check whether the message T was transmitted without any errors?

**ANSWER: The received message is divided by P and if the remainder is zero then message is error-free otherwise it contains errors.**

**Duration: 90 min**