

NAME:	Q1 (2)	Q2 (4)	Q3 (4)	Q4 (6)	Q5 (4)	TOTAL (20)
ID:						
SIGNATURE:						

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BLG 337E - PRINCIPLES OF COMPUTER COMMUNICATIONS

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Midterm-1

Q1- (2 point)

What is the minimum bandwidth needed to achieve a data rate of B bits/sec if the signal is transmitted using NRZ and Manchester encoding? Explain your answer.

ANSWER: See Quiz 2 Answers

Q2- (4 point)

Why is an ARP query sent within a broadcast frame? Why is An ARP Response sent within a frame with a specific destination MAC address? Explain your answer by providing an example ARP request-reply scenario with appropriate header formats.

ANSWER: See ARP Slides

Q3- (4 point)

A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

ANSWER: With n layers and h bytes added per layer, the total number of header bytes per message is hn , so the space wasted on headers is hn . The total message size is $M + nh$, so the fraction of bandwidth wasted on headers is $hn / (M + nh)$.

Q4- (2x3=6 point)

Consider a 5-node wireless network with a connectivity matrix given in Figure-1. In this matrix, “1” means a unidirectional connection, whereas “0” indicates no connection between nodes. According to this topology;

	A	B	C	D	E
A	1	1	1	1	1
B	1	1	1	0	1
C	1	1	1	1	0
D	1	0	1	1	1
E	1	1	0	1	1

Figure-1: Connectivity Matrix

- When A is sending to B, what other communications are possible?
- When B is sending to A, what other communications are possible?
- When B is sending to C, what other communications are possible?

ANSWER:

- (a) Since all stations will see *A*'s packet, it will interfere with receipt of any other packet by any other station. So, no other communication is possible in this case.
- (b) *B*'s packet will be seen by *E*, *A* and *C*, by not by *D*. Thus, *E* can send to *D*, or *A* can send to *D*, or *C* can send to *D* at the same time.
- (c) This scenario is same as (b).

Q5- (2x2=4 point)

- (a) How do you define a MAC protocol?
- (b) What are the main differences between a p-persistent CSMA and slotted ALOHA protocol?

ANSWER:

- (a) See slides 4 to 7 in 23102018
- (b) See slides 26 and 47 in 23102018

DURATION: 90min