

## BLG 337E - PRINCIPLES OF COMPUTER COMMUNICATIONS

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### Midterm-1 & ANSWERS

#### 1. (50 points)

Define and compare the following concepts:

1.1. (10 points) Channel capacity, Bandwidth, Data Rate and Path Loss.

ANSWER: Refer to lecture notes: slides week2\_16092014.pdf

1.2. (10 points) AM and FM.

ANSWER: Refer to lecture notes: slides week3\_23092014.pdf

1.3. (10 points) TDD-FDMA and FDD-TDMA.

ANSWER: Refer to lecture notes: slide 26 week6\_16092014.pdf

1.4. (10 points) Reflection, Scattering and Diffraction.

ANSWER: Refer to lecture notes: slide 16 week6\_14102014.pdf

1.5. (10 points) 1-Persistent CSMA and Slotted-ALOHA.

ANSWER: Refer to lecture notes: slides 31-35 wee6\_14102014.pdf

#### 2. (25 points)

Assume that a wireless system has a channel with a 1-MHz of width. The Signal-to-Noise ratio for this channel is 63. What are the appropriate bit rate and signal level?

ANSWER: Refer to lecture notes: slides 57-59 week2\_16092014.pdf

#### 3. (25 points)

Consider a 5-node wireless smart home network with a connectivity matrix given in Figure-1.

In this matrix, "1" means an active downlink and uplink connection, whereas "0" indicates no connection between nodes.

	Cell phone	TV	Fridge	Oven	Music Player
Cell phone	1	1	1	1	1
TV	1	1	1	0	1
Fridge	1	1	1	1	0
Oven	1	0	1	1	1
Music Player	1	1	0	1	1

Figure-1: Connectivity Matrix

According to this topology;

3.1. (10 points) Draw this wireless smart home network.

3.2. (5 points) When **Cell Phone** is sending data to **TV**, what other communications are possible?

ANSWER: Fridge-TV, TV-Fridge, Fridge-Oven, Oven-Fridge, Music Player-TV, TV-Music Player, Music Player-Cell Phone, Music Player-Oven, Oven-Music Player

3.3. (5 points) When **TV** is sending data to **Cell Phone**, what other communications are possible?

ANSWER: Cell-TV, Cell-Music, Music-Cell, Cell-Fridge, Fridge-Cell, Cell-Oven, Oven-Cell, Fridge-TV, Fridge-Oven, Oven-Fridge, Music-

**TV,Music-Oven, Oven-Music**

**3.4.(5 points)** When **TV** is sending data to **Fridge**, what other communications are possible?

**ANSWER: Cell-TV, TV-Cell, Cell-Music, Music-Cell, Cell-Fridge, Fridge-Cell, Cell-Oven, Oven-Cell, Fridge-TV,Fridge-Oven, Oven-Fridge, Music-TV, Music-Oven, Oven-Music**

*HINT: When a wireless node transmits a signal from a channel, no other connection setup is possible originating from this wireless node.*