

FINAL EXAMINATION

WIRELESS NETWORKS (CSC 418)

INSTRUCTION TO STUDENTS: ATTEMPT ALL QUESTIONS. TIME: 3 HOURS

1. What do you understand by the following terms? (30mks)
 - i. **Wireless local area networks (WLAN) –**
 - ii. **Wireless Personal area network (WPAN) –**
 - iii. **Mobile AD HOC Network (MANETs) –**
 - iv. **CDMA: Code Division Multiple Access. –**
 - v. **Duplexing –**
 - vi. **Wireless ATM (Asynchronous transfer mode) –**
 - vii. **Wireless Sensor Networks –**
 - viii. **Back pressure routing –**
 - ix. **Opportunistic routing –**
 - x. **Transmission control protocol (TCP) –**

2. Discuss the following characteristics of wireless communication channel. (10mks)
 1. Path loss
 2. Fading and shadowing
 3. Interference
 4. Doppler shift

3. Orthogonal Frequency Division Multiplexing (OFDM) is a multi-carrier modulation technique which is very much popular in new wireless networks of IEEE standard, digital television, audio broadcasting and 4G mobile communications. LIST FIVE advantages and FIVE disadvantages.

Advantages of OFDM are listed as follows: (10mks)

The disadvantages are as follows: (10mks)

4. Integer linear formulation problem (20mks)

Merrill Lynch is considering investments into 6 projects: A, B, C, D, E and F. Each project has an initial cost, an expected profit rate (one year from now) expressed as a percentage of the initial cost, and an associated risk of failure. These numbers are given in the table below:

	A	B	C	D	E	F
Initial cost (in M)	1.3	0.8	0.6	1.8	1.2	2.4
Profit rate	10%	20%	20%	10%	10%	10%
Failure risk	6%	4%	6%	5%	5%	4%

Provide a formulation to choose the projects that maximize total expected profit, such that Merrill Lynch does not invest more than 4M dollars and its average failure risk is not over 5%. For example, if Merrill Lynch invests only into A and B, it invests only 2.1M dollars and its average failure risk is $(6\%+4\%)/2=5\%$.

5. Interference is one of the characteristics of wireless communication channels. Discuss this further (from question 2 above) stating the effects of interference, the sources of interference and expanding the two given types of interference below (20mks)

Interference. (Definition)

Effects of Interference.

Sources of Interference

Types of Interference

There are two types of system generated interference

1. Co-channel interference –

2. Adjacent channel interference –