CE2-R3: WIRELESS AND MOBILE NETWORKS

NOTE:

1. **Answer question 1 and any FOUR questions from 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Time: 3 Hours **Total Marks: 100**

1.

a) Sometimes when a cellular user crosses the boundary from one cell to another, the current call is abruptly terminated, even though all transmitters and receivers are functioning perfectly. Why?

b) What is the difference between adjacent channel interference and co-channel interference?

c) Sometimes the user is moving within the cell towards the BSS and experiences sudden loss in signal strength. What is it due to? What are the factors responsible for temporary signal loss?

d) Why are GEO systems for telecommunications currently being replaced by fiber optics?

e) Why the collision avoidance is used in the wireless ad-hoc networks/WLAN in place of the collision detection methods?

f) How is Ultra Wide Band (UWB) different from frequency hopping used in Blue-tooth?

g) Prove that the capacity of WLL is independent of the path loss.

(7x4)

2.

a) Differentiate between wireless and fixed networks. What are the time limitations in wireless networking?

b) Show that the magnitude (envelope) of the sum of two independent identically distributed complex (quadrature) Gaussian sources is Rayleigh distributed. Assume that the Gaussian sources are zero mean and have unit variance.

(8+10)

3.

a) The US Digital Cellular TDMA system uses a 48.6 kbps data rate to support three users per frame. Each user occupies two of the six time slots per frame. What is the raw data rate provided for each user?

b) Using a concentric Cellular geometry determine recursive expressions for the two weighting factors for the equivalent hexagonal geometry for the second layer and all subsequent layer cells.

(9+9)

4.

a) Show how to integrate the registration and the authentication procedures in GSM.

b) Which of the following is a blank-and-burst channel in AMPS system? Elaborate.

i) Paging Channel
ii) Reverse Voice Channel
iii) Slow Associated Control Channel
iv) Fast Associated Control Channel

(8+10)

5.

a) What mechanisms would cause breakdown in the reverse link of an IS-95 CDMA System as the number of users in a sector approaches the theoretical limit.

b) Discuss the similarities and differences between a Conventional Cellular Radio System and Satellite Based Radio System. Which system would support a larger number of users for a given frequency allocation? Why?

(9+9)

6.

a) Compare the Infrared Transmission Technology with Radio Transmission Technology used in WLANs. Discuss the problem of hidden terminals. How is it solved?

b) What are the different techniques used for Improving Coverage and Capacity in Cellular System? How co-channel interference is reduced using sectoring?

(9+9)

7.

a) What is the need for security in Blue-tooth system? How does authentication take place between two Blue-tooth devices? Use diagrams to support your explanation.

b) Discuss various channel allocation technologies used in WLANs? Compare fixed and dynamic channel allocation schemes.

(8+10)