Registration No. : | | | | | | | | | | |

Total number of printed pages – 3

B. Tech

PEEC 5302

Sixth Semester Regular Examination – 2014

MOBILE COMMUNICATION

BRANCH(S) : EC, ETC

QUESTION CODE : F 327

Full Marks – 70

Time : 3 Hours

*Answer Question No. **1** which is compulsory and any **five** from the rest.*

The figures in the right-hand margin indicate marks.

1. Answer the following questions : 2×10

(a) What do you mean by free space loss in mobile radio propagation ?

(b) Calculate the reduction in the transmit power in dB when the radius of the new cell becomes half of that of the old cell assuming path loss exponent, k = 4.

(c) In M-ary FSK modulation schemes how the transmitted signals are made orthogonal? Why is this needed ?

(d) Find the far distance for an antenna with maximum dimension of 1m and operating frequency of 1800 MHz.

(e) What is the advantage of using hexagonal cell shape over square and triangle cell shapes for cellular communication ?

(f) Define near-far problem. How it can be avoided in case of spread spectrum cellular systems ?

(g) Explain how the frequency dispersion introduces distortion into the received signal in a wireless communication system ?

(h) Define spectral efficiency of a cellular network. How it depends on the multiple access scheme used ?

(i) What is the ambiguity in the decoded output in case of PSK systems ? How it is corrected ?

(j) How the power delay profile of the channel is found for small scale channel modeling?

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2. (a) Calculate the magnitude of the electric field at the receiver antenna located 10 km from a 50 W transmitter for space propagation. Assume the carrier frequency is 900 MHz, transmitter and receiver antenna gains are 1 and 2 respectively. 5

(b) What is the use of path loss models for a mobile communication system ? Which path loss models are mostly used for microcellular areas ? 5

3. (a) Discuss the performance of BPSK, DPSK and QPSK modulation schemes in fading multipath mobile channels. List the advantages and disadvantages of each modulation method. 5

(b) Define carrier synchronization. Explain how it is achieved in coherent detection of QPSK signal. 5

4. Explain how the capacity of a cellular system is improved with the help of frequency reuse concept. Discuss various other mechanisms based on cellular layout and antenna design to increase the capacity of a cellular system with diagram. 10

5. (a) What causes fading to occur in mobile radio environment ? Classify different types of small scale fading experienced by a signal considering the nature of the transmitted signal and the characteristics of the channel. 5

(b) For what values of T-R separation distance and antenna height, the two ray model is used for predicting large scale signal strength ? Derive the path loss for the two ray model with antenna gains. 5

6. (a) Given a cellular system with hexagonal cells of radius R each. The service area is partitioned into cell clusters and frequency reuse is used from cluster to cluster. The geometric relation between adjacent co-channel cells is described by two non negative integers i and j. With pictorial illustration determine the number of cells in each cluster and the distance between the centers of two adjacent co-channel cells. 5

(b) What types of multiple access techniques are used to allow many mobile users to share a finite amount of radio spectrum simultaneously ? Explain how these techniques can be grouped as narrowband and wideband systems. 5

7. (a) If 63 numbers of users share a CDMA system and each user has a processing gain of 511, then determine the average probability of error for each user. What are assumptions to be taken in determining the result ? 5

(b) What is slotted frequency hopping ? Explain why this may not be a realistic scenario for many FH-SS systems ? 5

8. Write short notes on any **two** of the following : 5×2

(a) Cost 231 model

(b) Multi carrier DS-CDMA systems

(c) Interference in cellular communication

(d) Wireless 4G networks.