Roll No. ..... Total Pages : 4

BT-8/M-20 **38010**

WIRELESS & MOBILE COMMUNICATION

Paper–ECE-402-E

Time Allowed : 3 Hours] [Maximum Marks : 100

Note : Attempt **five** questions in all, selecting at least **one** question from each Unit.

UNIT–I

1. (a) Explain in detail Okumura model and Hata Model. 10

   (b) Explain the Clarke's model for multipath flat fading channel. 10

2. (a) What are three most important effects of small-scale multipath propagation ? What is fading and Doppler spread ? Discuss the types of services, requirements, spectrum limitations and noise considerations of wireless communications. 10

   (b) Explain the principle of Cellular Networks and various types of Handoff techniques. 10

UNIT–II

3. (a) What is meant by Quadrature phase shift keying ? Write in detail about the transmission and detection of $\pi/4$ OPSK signals with block diagrams. 10

(b) Explain the need for RAKE receivers for a CDMA based wireless communication system. Also explain its usage for multipath mitigation and the soft handoff process in CDMA based systems. 10

4. (a) Illustrate frequency hopping spread spectrum and Direct Sequence spread spectrum with suitable example. 10

(b) If a transmitter produces 50 W of power, express the transmit power in units of dBM and dBW. If 50 W is applied to a unity gain antenna with a 900 MHz carrier frequency, find the received power in dBM at a free space distance of 100 m from the antenna. What is (10 km) ? Assume unity gain for the receiver antenna. 10

UNIT–III

5. (a) Find the signal-to interference ratio for a 7-cell cluster layout with 120° sectors. Assume path loss exponent n = 4. 10

(b) Show that the frequency reuse factor for a cellular system is given by k/S. Where k is the average number of channels per cell and S is the total number of channels available to the cellular service provider ? 10

6. (a) What do you understand by coverage and capacity in cellular systems ? Explain various possible techniques to improve coverage and capacity in cellular systems. 10

(b) Show that if n = 4, a cell can be split into four smaller cells, each with half the radius and 1/16 of the transmitter power of the original cell. If extensive measurements show that the path loss exponent is 3, how should the transmitter power P be changed in order to split a cell into four smaller cells ? What impact will this have on the cellular geometry ? Explain your answer and provide drawings that show how the new cells would fit within the original macro cells. For simplicity use omni-directional antennas. 10

UNIT–IV

7. (a) Classify the forward and reverse logical channels used in GSM. Also explain the signal exchange that takes place during call setup using these channels, between calling subscriber BTS, BSC/ MSC and called subscriber. 10

(b) Looking at the HLR/VLR database approach used in GSM–how does this architecture limit the scalability in terms of users, especially moving users? 10

8. Explain the following :

(a) Near-far problem in CDMA

(b) IS-95

(c) IMT-2000

(d) UMTS. 20

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