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

**38010/K/489** **P. T. O.**

(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