

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
PDDC - SEMESTER-VIII • EXAMINATION – WINTER • 2014

Subject Code: X 81102

Date: 01-12-2014

Subject Name: Wireless Communication

Time: 02:30 pm - 05:00 pm

Total Marks: 70

Instructions:

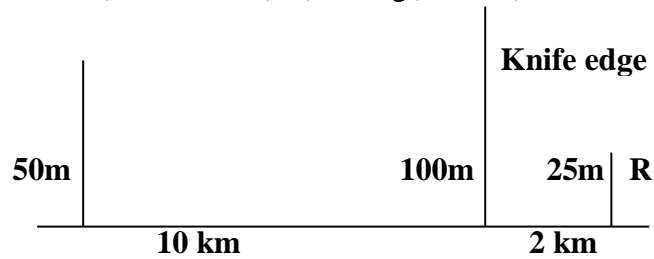
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) 1. Describe the following terms: **07**
(I) Cell (II) Cluster (III) Channel Capacity
(IV) RSSI (V) MAHO (VI) Dwell Time
(VII) Cell Dragging
- (b) Compare 2.5G TDMA standards: HSCSD, GPRS, and EDGE **07**
- Q.2** (a) Explain the classification of GSM channels. **07**
(b) With the help of block diagram, explain the IS 95 CDMA forward channel in detail **07**
- OR**
- Explain GSM signal processing in detail with the aid of block diagram. **07**
(b)
- Q.3** (a) Prove that for hexagonal symmetry, the co-channel reuse ratio is given by $Q = \sqrt{3N}$ **07**
(b) A cellular service provider decides to use a digital TDMA scheme which can tolerate a signal-to-interference ratio of 15 dB in the worst case. Find the optimal value of N for (a) Omni-directional antennas, (b) 120° sectoring, and (c) 60° sectoring. Should sectoring be used? If so, which sectoring (120° or 60°) will be better? Assume a path loss exponent $n=4$. **07**
- OR**
- Q.3** (a) The coverage area of a cellular system is 2000 sq km with each cell having radii of 5 sq km, and there are total of 1000 radio channels available for handling the traffic. **07**
a) Calculate the system capacity for 7 cell-reuse
b) If $N=4$, How many times the cluster has to be replicated in order to approximately cover the entire cellular area? Also calculate the system capacity.
- Does decreasing the cluster size increase the system capacity? Explain.
- (b) Discuss Okumura's outdoor propagation model with necessary equations. **07**
- Q.4** (a) Derive the expression for received power for two ray ground wave reflection model. **07**
Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. For a **07**
(b) vehicle moving 60mph, compute the received carrier frequency if the mobile is moving
(a) directly toward the transmitter, (b) directly away from the transmitter, and (c) in a direction which is perpendicular to the direction of arrival of the transmitted signal.

OR

Q.4 (a) Classify the small-scale fading & explain the frequency selective fading. **07**

Q.4 (b) Given the following geometry, determine the loss due to knife-edge diffraction. Assume $f=900$ MHz (Hint use $G_d(\text{dB})=20\log(0.225/\nu)$) **07**



Q.5 (a) Write a short note on Ad-Hoc network. **07**

(b) Compare TDMA, FDMA, and CDMA technologies for cellular systems **07**

OR

Q.5 (a) Write a short note on Wi-Max. **07**

(b) Write a brief note on OFDM **07**
