Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 171004 Date: 28-11-2013

Subject Name: Wireless Communication

Time: 10:30 TO 01:00 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)** Explain the following terms with respect to wireless networks: **06**
(i) Frequency Reuse (ii) Co-channel interference (iii) handoff (iv) Umbrella cell approach v) Dwell time vi) Cell dragging

(b) Explain (i) Concept of frequency reuse (ii) 2G and 3G wireless networks. **06**

(c) Why is hexagonal cell shape preferred over square or triangular cell shape to represent the cellular architecture **02**
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Q.2 **(a)** Calculate the total available channels for a cellular system having a total bandwidth of 60MHz which uses two 50 kHz simplex channels to provide full duplex voice and control channels. Assume that the system has nine cell reuse pattern and 1 MHz of the total BW is allocated for control channels, determine an equitable distribution of control channels. Also calculate the number of the control channels and voice channels/cell. Assume the area of the cell is 9 Sq Km and the area of the entire system is 3630 Sq Km. If the cluster size is reduced to 4, what is the system capacity. Comment on this. **07**

(b) Prove that for a hexagonal symmetry,the co-channel reuse ratio is given by $Q=\sqrt{(3N)}$. **07**

OR

(b) Illustrate the principle of cell splitting in a cellular system. Prove that the transmit power of the microcell must be reduced by 12 dB in order to fill in the original coverage area with microcells, while maintaining the *S/I* requirement for the path loss exponent n=4. **07**

Q.3 **(a)** Discuss the fixed channel allocation, Channel borrowing and dynamic channel allocation techniques in cellular systems. **07**

(b) Explain the three basic propagation mechanisms which impact the propagation of signal in a mobile environment. **07**

OR

Q.3 **(a)** Compare the S/I ratio for a mobile radio for the following cases of cellular system with frequency reuse factor of 7 for (i) Omni directional antenna (ii) 120^0 Directional antennas. **07**

(b) Explain free space propagation of radio signal.Establish the relation for the received power in free space. Define path loss in free space.Calculate the received power at a distance of 3 KM from the transmitter if the path loss exponent α is 4.Assume that the transmitting power of 4 W at 1800MHz.,a shadow effect of 10.5 dB,and the path loss at a reference distance (do=100 m) of -32dB.What is the allowable path loss? . **07**

Q.4	**(a)**	Draw the block diagram of the reference architecture of GSM and explain the function of each subsystem	**07**
	(b)	Explain (i) The effects of multipath fading (ii) Doppler spectrum (iii) Multipath delay spread	**07**
		OR	
Q.4	**(a)**	With the aid of block diagrams, explain in detail the IS-95 CDMA forward and reverse channels and compare the two	**07**
	(b)	What is meant by Hand off and explain different Hand off strategies How handoff operation is performed while mobile moves into a different cell while a conversation is in progress.Discuss the cases for proper and improper handoff situations.	**07**
Q.5	**(a)**	Describe GPRS system architecture.	**07**
	(b)	Comparison of TDMA and CDMA multiple Access Techniques in detail.	**07**
		OR	
Q.5	**(a)**	Discuss the need and features of Ad hoc wireless network	**05**
	(b)	List the security issues of wireless networks.	**03**
	(c)	Write a brief note on OFDM.	**06**

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