GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) EXAMINATION – WINTER 2018

Subject Code: 171004   **Date: 29/11/2018**

Subject Name: Wireless Communication

Time: 10:30 AM TO 01:00 PM   **Total Marks: 70**

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

			MARKS
Q.1	**(a)**	Give full forms of the following acronyms: HSCSD, GPRS, WLL, CDMA, WLAN, MAN, WAN.	**07**
	(b)	Draw a neat sketch of GSM architecture and state the functions of the following: BSC, MSC, VLR, HLR, AUC.	**07**
Q.2	**(a)**	Explain the salient features of Bluetooth technology.	**07**
	(b)	Briefly discuss security threats in wireless network and suggest possible ways of protection.	**07**
		OR	
	(b)	Explain the hidden-node problem and exposed-node problem in context of mobile ad-hoc networks.	**07**
Q.3	**(a)**	Explain practical handoff considerations.	
	(b)	A spectrum of 30 MHz is allocated to a wireless FDD cellular system which uses two 25 kHz simplex channels to provide full duplex voice and control channels. Compute the number of channels available per cell if a system uses (i) 4-cell reuse (ii) 7-cell reuse and (iii) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.	**07**
		OR	
Q.3	**(a)**	Explain the concept of cell sectoring and how it affects interference and system capacity.	**07**
	(b)	For given path loss exponent (A) n=4 and (B) n=3, find the frequency reuse factor and the cluster size that should be used for maximum capacity. The signal to interference ratio (S/I) is required to be at least 15 dB for satisfactory system performance. There are six co-channel cells in the first tier and all of them are at the same distance from the mobile. Use suitable approximations.	**07**
Q.4	**(a)**	Explain salient features of CDMA.	**07**
	(b)	Prove that for a regular hexagonal geometry, the frequency reuse ratio and cluster size are related by the relationship $Q = (3N)^{1/2}$, where $N= i^2 + j^2 + ij$.	**07**
		OR	
Q.4	**(a)**	Explain the working of RAKE receiver with neat diagram.	**07**
	(b)	Derive an expression for total received field at a distance d for ground reflection model.	**07**
Q.5	**(a)**	Discuss GSM channel types in details.	**07**
	(b)	In a cellular radio operating at 800 MHz, the transmitter and the receiver are separated by 500m from each other. The knife-edge diffraction object between them has a height of 30 m. The diffraction object is 100 m from transmitter. Find: (i) The excess path length (ii) The phase difference corresponding to the excess path length. (iii) The Fresnel-Kirchhoff diffraction parameter. (iv) The radius of the second Fresnel zone.	**07**

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OR

Q.5 **(a)** List types of diversity techniques and explain any two of them in 3-4 sentences.   **07**

(b) If a baseband binary message with a bit rate of 100 kbps is modulated by an RF carrier using BPSK. Calculate the following: **07**

(i) Find the range of values required for rms delay spread of the channel such that the received signal is a flat-fading signal.

(ii) If the modulation carrier frequency is 5.8 GHz, what is the coherence time of the channel for vehicle speed of 50 km/h.

(iii) For your answer in part (ii), is the channel "fast" or "slow" fading?

(iv) Given your answer in (ii), how many bits are sent while the channel appears static?

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