## **GUJARAT TECHNOLOGICAL UNIVERSITY** ME – SEMESTER II– EXAMINATION – WINTER - 2016

Subject Code: 2720502Date: 18/11/ 2016Subject Name: WIRELESS AND MOBILE COMMUNICATIONTime: 2:30 pm to 5:00 pmTotal Marks: 70

Instructions:

Q.1

Q.3

**Q.4** 

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- (a) Explain in detail block diagram of IFFT based OFDM system and 07 state importance of each block.
  - (b) Why routing is needed in adhoc networks? Discuss various routing 07 algorithms.
- Q.2 (a) Explain various types of antenna which are used for mobile station 07 along with their advantages and weaknesses.
  - (b) Define co channel interference and derive necessary equation for S/I 07 assuming all co channel cells are equidistance from the desired base station. Also discuss worst case situation for the same.

## OR

- (b) Show that if n=4, a cell can be split into four smaller cells, each with 07 half the radius and 1/16 of the transmitter power of the original cell. If the extensive measurements show that the path loss exponent is 3, how should the transmitter power be changed in order to split a cell into four smaller cells?
- Q.3 (a) Explain the concept of umbrella cell and cell dragging.
- (b) A mobile is located 5 km away from a base station and uses a vertical λ/4 07 monopole antenna with a gain of 2.55 dB to receive cellular radio signals. The E field at 1 km from the transmitter is measured to be 10<sup>-3</sup> V/m. The carrier frequency used for this system is 900 Mhz. Find (1) The length and the effective aperture of the receiving antenna. (2) The received power in dBW and dBm at the mobile using the two-ray ground reflection model assuming the height of the transmitting antenna is 50 m and the receiving antenna is 1.5 m above ground.

## OR

- (a) What is the limitation of Log-distance path loss model? Explain the 07 model which overcomes this limitation. Also define the Q –function.
  - (b) Derive Feher's upper bound on the round trip propagation delay with 07 necessary diagram.
- (a) What do you mean by Channel state of Information (CSI) .Derive 07 channel capacity for Full CSI available at both transmitter and receiver side.
  - (b) Justify that OFDM is spectrally efficient technique compared to 07 FDM. How can we remove ISI and ICI in OFDM by adding cyclic prefix or guard interval in the OFDM symbol? For OFDM signaling with  $N_c$ =64, find out the bandwidth of this OFDM signal if the input data rate is 10 Mbps and each carrier uses 16 PSK modulation.

07

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Q.4	<b>(a)</b>	Explain in detail Maximal Ratio combining techniques and Equal	07
	<b>(b)</b>	Explain space diversity and spatial multiplexing in MIMO system	07
Q.5	(a)	What is cognitive radio? Discuss various functionalities of cognitive radio for secondary users.	07
	<b>(b)</b>	Discuss Wi-MAX standard along with its features and applications.	07
		OR	
Q.5	<b>(a)</b>	Explain hybrid protocols and justify that they take advantage of best reactive and proactive schemes.	07
	<b>(b)</b>	Discuss security issues in wireless networks.	07
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