Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent institution of MAHE, Manipal)

VI SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

MAKEUP EXAMINATIONS, JUNE 2018

SUBJECT: WIRELESS COMMUNICATION AND COMPUTING [ICT 3251]

REVISED CREDIT SYSTEM

(13/06/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data if any, may be suitably assumed.

1A. Write the need of cell sectoring and cell splitting in cellular communication. A cellular service provider decides to use a digital TDMA scheme which can tolerate a Signal to Interference Ratio of 18 dB in the worst case. Assume that path loss exponent is 4 and number of co-channels is 6. Find the optimal value of N for
(i) Omnidirectional antennas, (ii) 120° sectoring, and (iii) 60° sectoring.
In the given scenario which type of sectoring serves the system the best and why? **5**

1B. Explain various logical channels used in IS-95 CDMA. **3**

1C. Differentiate between interweave and underlay spectrum access strategies. **2**

2A. Write the steps involved in (i) Location update (ii) Call establishment in GSM. Specify the logical channels used at every step. **5**

2B. Why is OFDM more robust against Inter Symbol Interference? Explain. **3**

2C. Explain the following with one limitation for each.
(i) Time Diversity
(ii) Frequency Diversity **2**

3A. Explain MIMO-OFDM technology with a neat transmitter-receiver block diagram and explain the role of Space Time Coding technique using Alamouti's code in MIMO system. **5**

3B. Explain how Doppler Effect and Delay Spread affects wireless communication. An aircraft is

travelling at a speed of 500 km/hr towards the control room with an elevation of 25°. Compute the number of fades per second and average duration of fade for the given scenario when the threshold level is assumed to be $1/10^{th}$ of the rms level. Assume frequency = 900 Mhz. 3

3C. Give the function of the following GSM logical channels
(i) Synchronization Channel
(ii) Standalone Dedicated Control Channel 2

4A. Explain the types of small-scale fading experienced by a signal in a mobile radio channel. Given that the height of transmitting and receiving antenna are 100 m and 1.4 m respectively with transmitting power of 10 W, having a gain of 3 dBi and 2 dBi respectively separated by a distance of 5 km. Frequency of operation is 800 MHz. Compute the free space and reflected surface loss in dB. 5

4B. List and explain three different spectrum sensing techniques in cognitive radio. 3

4C. What is demand assigned multiple access and packet reservation multiple access protocol? 2

5A. What is adjacent channel interference and Co-channel interference in cellular communication? How can it be minimized? Derive the expression for Co-channel interference. 5

5B. List and explain various categories of mobile data networks. Explain how CDPD shares AMPS architecture and spectrum. 3

5C. The spacing between two subcarriers in OFDM system is 312.5 kHz. The maximum delay spread of the multipath radio environment is 25 μs. What is the OFDM symbol duration
(i) without cyclic prefix and (ii) with cyclic prefix? 2