Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

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

END SEMESTER EXAMINATIONS, APRIL 2017

SUBJECT: Wireless Communication and Computing [ICT 3251]

REVISED CREDIT SYSTEM
(20/4/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitably assumed.

1A. A mobile user is moving from Cell Site A to Cell site B at the speed of 50km/hr .The radius of the cell site is 800m. Assume path loss exponent = 4. Consider the time at which handoff occurs is 8s.

i. Calculate the minimum required margin for handoff.
ii. Compute the distance at which handoff is initiated [Assume d_0 =1 P_0=0dBm].
iii. Recalculate (i) and (ii) if the duration over which handoff occurs is 5s. 5

1B. Explain various types of services offered in a GSM network with suitable examples. 3

1C. "Presence of multipath components (MPCs) could be advantageous or disadvantageous in wireless communication". Comment on this statement with valid reasons. 2

2A. With a neat diagram elucidate the call processing states in CDMA. Also exemplify the use of logical channels (forward and reverse) in CDMA. 5

2B. Estimate the feasibility of a 10 km link between a Base Station (BS) and a Mobile Station (MS). The BS is connected to an antenna with 8 dBi gain, with a transmitting power of 40 dBm and a receive sensitivity of -75 dBm. The MS is connected to an antenna with 2 dBi gain, with a transmitting power of 15 dBm and a receive sensitivity of -35 dBm. The system operates at 900 MHz. The cables in both systems are short, with a loss of 4dB. If the link is not feasible, compute the receiving antenna gain required to make the link feasible. 3

2C. Differentiate between Base Station Assisted Hand Over and Mobile Assisted Hand Over in cellular theory of wireless communication. 2

3A. A wireless sensor network is arrayed for a Green House System. Sensors are deployed in various places to measure humidity, soil moisture and wind levels. A trigger circuit which controls the on/off of water sprinklers based on the data collected from sensors is installed in the Green House.
For the network scenario given above, identify suitable routing algorithm. Justify your answer and illustrate the working of the same. 5

3B. Explain the network elements of GPRS reference architecture with a neat diagram. 3

3C. A satellite link is established between the Earth and satellite transponder with a RF frequency of 4 GHz. The Earth station transmits with a transmitter power of 1kW and transponder receives with a power of -104 dB. If the transmitter and receiver gains are 0 dB each respectively, compute the distance between the two stations in meters. 2

4A. Justify the statement: "MIMO-OFDM is the ultimate solution of wireless transmission" and explain the role of Space Time Coding technique using Alamouti's code in MIMO system. 5

4B. List the advantages and drawbacks of random access schemes to support multiple user access. Describe the possible solutions to overcome the limitations of random access scheme. 3

4C. Elucidate the significance of cognitive radio in wireless communication and explain transceiver architecture with a neat diagram. 2

5A. Differentiate between MIMO system and Smart Antenna. Explain the approaches used for antenna selection in MIMO system 5

5B. A service provider has installed cellular system with 100 sites, a frequency reuse factor of N = 7 and 500 overall two-way channels (total number of channels per cluster) for voice and control information. Compute the number of channels per cell, total number of channels available to the service provider and the minimum signal-to-interference ratio (S/I) of the system in dB. Assumes a path loss exponent of 4. Also show how sectoring reduces the cluster size requirements for the above scenario. 3

5C. Compare and contrast OFDM with TDM and FDM. State the suitable multiplexing technique(s) for the following scenarios.

i. multicarrier system with respect to users
ii. multicarrier system with respect to providers
iii. single carrier system with respect to users 2