Reg. No.									

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

II SEMESTER M.TECH. (COMPUTER NETWORKING & ENGINEERING / SOFTWARE ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: PROGRAM ELECTIVE III – ADVANCED TELECOMMUNICATION TECHNOLOGIES

[ICT 5231]

REVISED CREDIT SYSTEM

(27/04/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. Describe the mobility management mechanisms in WiMAX. 5

1B. Differentiate between data rate and throughput with reference to wireless communication system and calculate the data rate and throughput using the data given below.

i. The total available channel bandwidth is 15 MHz.
ii. QPSK modulation scheme is used.
iii. OFDM frame structure is employed.
iv. Maximum number of TB/sub frame is 80 and TBS is 32 bits
v. 300 sub frames are transmitted in a second using 256 subcarriers. 3

1C. Differentiate between pathloss and shadowing effects in wireless communication. 2

2A. Explain the various downlink physical channels and reference signals defined in LTE technology. 5

2B. Elucidate the service flows supported by WiMAX using suitable applications and its QoS requirements. 3

2C. Calculate the bandwidth saving that can be achieved by the network service provider in an area when OFDM is used instead of FDM with 5 KHz guard band spacing. Given that: total available bandwidth of 20 MHz is distributed among 3 cells (frequency re-use factor is 3), such that each cell can support 100 subscribers and each subscriber gets a bandwidth of 20 KHz. 2

3A. Compute the link margin for a mobile station in outdoor scenario of WiMAX using the parameters as given in Table Q.3A. 5

3B. With a neat diagram, explain the IP based WiMAX network architecture. 3

3C. Elucidate how Hybrid ARQ and Adaptive Coding Modulation schemes help to increase the throughput of a user equipment in LTE network. 2

4A. Justify the statement "*There is a tradeoff between coverage area and capacity in wireless communication*" and explain the WiMAX PHY layer specifications that helps to reduce the effect of this tradeoff. 5

4B. Differentiate between Transmission Time Interval (TTI) and latency in LTE network and explain how ODFM scheme helps to achieve TTI of 1 ms. 3

4C. Justify why mobility and portability are considered technical challenges while device development and difference in global spectrum availability are considered as business challenges in wireless communication. 2

5A. Explain the OFDM radio access frame structure of LTE network using suitable diagrams and show that the smallest duration of a symbol is 66.67 μs. 5

5B. Compare and contrast the advantages and disadvantages of FDD and TDD frame structures with reference to LTE architecture. 3

5C. Enumerate the limitations of Mobile IP 2

Table Q.3A

Parameter	Downlink channel
Power amplifier output power	43 dB
Number of Tx antennas	2
Power amplifier backoff	0.5 dB
Transmit antenna gain	18 dBi
Transmitter losses	3 dB
Channel bandwidth	10 MHz
Number of subchannels	16
Receiver noise figure	8 dB
Required SNR	0.8 dB
Data rate per subchannel	151.2 kbps
Receiver antenna gain	2 dBi
Shadow-fade margin	10 dB
Building penetration loss	1 dB