Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/M.Tech(ECE-COMM)/SEM-2/MCE-203/2012

2012

MOBILE COMMUNICATION

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : 14 × 1 = 14

i) GSM uses ..... for multiplexing.

a) CDMA b) TDMA

c) FDMA d) both (b) and (c).

ii) The access method of wireless LAN defined by 802·11 is based on

a) CSMA/CD b) Token passing

c) CSMA d) CSMA/CA.

iii) FHSS, DSSS are ..... layer protocol.

a) Physical b) Data link

c) Network d) Transport.

iv) Microwave is suitable for

a) point to point b) omni directional

c) broadcast d) none of these.

v) EDGE has data transfer rate in GSM network

a) 144 kbps b) 384 kbps

c) 9·6 kbps d) none of these.

vi) If N is the number of cells per cluster then frequency reuse factor of a cellular system is given by

a) N b) $1/N$

c) $\sqrt{N}$ d) $N \times N$.

vii) Stations do not sense the medium during

a) RTS b) CTS

c) SIFS d) NAV.

viii) Near Far problems occur in

a) TDMA b) FDMA

c) CDMA d) CSMA.

ix) Hand over and device location is done in

a) Physical layer

b) Data link layer

c) Transport layer

d) Network layer.

x) A Bluetooth frame needs ..... μs for hopping and control mechanism.

a) 625 b) 259

c) 3 d) a multiple of 259.

xi) The multiple access technique used in AMPS is

a) FDMA b) CDMA

c) TDMA d) FHMA.

xii) Bluetooth supports roaming

a) True

b) False

c) Partially true

d) Depends on technology.

xiii) Low frequency needs ..... antennas.

a) large

b) small

c) does not depend on frequency

d) none of these.

xiv) IS 95 has frequency reuse factor

a) 4 b) 9

c) 7 d) 11.

GROUP – B

Answer any *four* of the following.

2. a) State the problem of hidden and exposed terminals. What happens in the case of such terminals if Aloha, slotted Aloha, reservation Aloha or MACA is used ? 6

   b) Explain the term interference in the space, time, frequency and code domain. What are countermeasures in SDMA, TDMA, FDMA and CDMA system ? 5

   c) Assume all stations can hear all other stations. One station wants to transmit and senses the carrier idle. Why can a collision still occur after the start of transmission ? 3

3. a) Name the main elements of the GSM system architecture and describe their functions. What are the advantages of specifying not only the radio interface but also all internal interfaces of the GSM system ? 6

   b) Looking at the HLR/VLR database approach used in GSM — how does this architecture limit the scalability in terms of users, especially moving users ? 4

   c) What are the limitations of a GSM cell in terms of diameter and capacity (voice, data) for the traditional GSM, HSCSD, GPRS ? How can the capacity be increased ? 4

4. a) In what situations can collisions occur in all three networks ? Distinguish between collisions on PHY and MAC layer. How do the three wireless networks try to solve the collisions or minimize the probability of collisions ? 6

   b) How is roaming on layer 2 achieved and how are changes in topology reflected ? What are the differences between infrastructure based and ad hoc networks regarding roaming ? 5

   c) What are advantages and problems of forwarding mechanisms in Bluetooth networks regarding security. power saving and network stability ? 3

5. a) What are general problems of mobile IP regarding security and support of quality of service ? 5

   b) How does dynamic source routing handle routing ? What is the motivation behind dynamic source routing compared to other routing algorithms from fixed networks ? 5

   c) What are the benefits of location information for routing in ad hoc network, which problems do arise ? 4

6. a) Compare the different types of transmission errors that can occur in wireless and wired networks. What additional role does mobility play ? 4

b) Can the problems using TCP be solved by replacing TCP with UDP ? Where could this be useful and why is it quite often dangerous for network stability ? 5

c) Assume a fixed Internet connection with a round trip time of 20 ms and an error rate of 10_{-10}. Calculate the upper bound on TCP's bandwidth for a maximum segment size of 1000 byte. Now two different wrieless access networks are added. A WLAN with 2 ms additional one-way delay and an error rate of 10_{-3}, and a GPRS network with an additional RTT of 2 *s* and an error rate of 10_{-7}. Redo the calculation ignoring the fixed network's error rate. Compare these results with the ones derived from the second formula (use RTO = 5 RTT). 5

7. a) What is the differences between care-of-address and co located care-of-address ? 3

b) What are the differences between reverse tunneling and bi-directional tunneling ? 3

c) How does a reverse tunnel differ from forward tunnel in the of mobile ip protocol ? 3

d) How does the reverse tunnel help when the time to live for the packets at a foreign agent is small. 5