WIRELESS AND CELLULAR COMMUNICATION
(ECEN 3211)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
<u>any 5 (five)</u> from Group B to E, taking <u>at least one</u> from each group.

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

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

    (i)   The concept of MAHO is applicable in
          (a) IG analog cellular system   (b) Base station antennas
          (c) 2G cellular system   (d) None of these.

    (ii) The basic frequency regions for GSM-900 is around
          (a) 900 MHz   (b) 1800 MHz
          (c) 1900 MHz   (d) All the above.

    (iii) In small scale fading random fluctuation in signal strength is observed for
          (a) large period of time   (b) small period of time
          (c) moderately high period of time   (d) none of the above.

    (iv) A full-duplex communication is _____ way communication.
          (a) single   (b) two
          (c) multiple   (d) all the above

    (v)   GPRS stands for _____
          (a) Geo Packet Radio Receiver   (b) General Packet Radio Receiver
          (c) Gradient Packet Radio Receiver   (d) None of these.

    (vi) Co-channel reuse ratio (Q) is
          (a) $3\sqrt{N}$ (b) $\sqrt{3N}$
          (c) $\sqrt{N/3}$ (d) $\sqrt{3/N}$

    (vii) In normal handoff procedure, the handoff request is based on
          (a) Peak traffic   (b) Signal strength
          (c) Peak current   (d) None of these.

    (Viii) Determine no of cells in cluster when i = 2 and j = 4
          (a) 7   (b) 14
          (c) 28   (d) 35.

(ix)   A copy of the user's secret key ia kept in the
    (a) AuC   (b) EIR
    (c) TRAU   (d) OMC

(x)   In GPRS packet data services, mobility is managed by
    (a) MSC   (b) SGSN
    (c) GGSN   (d) PGSN.

Group- B

2. (a) Classify channel assignment strategies and explain briefly.
[(CO1)(Understand/LOCQ)]
(b) How is frequency reuse concept useful in cellular communication?
[(CO1)(Understand/LOCQ)]
(c) Why square and circular cell structure is not suitable for ideal cell geometry? Justify your answer with pictorial representation.   *[(CO1)(Analyze/IOCQ)]*
4 + 4 + 4 = 12

3. (a) What do you mean by Co-Channel Interference and Hand-off?
[(CO1)(Understand/LOCQ)]
(b) 40 MHz bandwidth is allocated to a FDD cellular system which uses two 20 kHz simplex channels to provide full duplex operation. Compute the number of channels available per cell if a system uses a) 4 cell reuse b) 7 cell reuse c) 12 cell reuse.   *[(CO1)(Evaluate/HOCQ)]*
(c) Justify how umbrella-cell approach improves the quality of service in cellular system.   *[(CO1)(Analyze/IOCQ)]*
3 + 6 + 3 = 12

Group - C

4. (a) Describe the major functionalities of MSC. Why is GMSC needed in GSM architecture?   *[(CO3)(Understand/LOCQ)]*
(b) How the authentication and security operations are maintained in GSM networks?   *[(CO3)(Apply/IOCQ)]*
(c) Explain attach detach procedures with pictorial representation of GPRS network.   *[(CO3)(Remember/LOCQ)]*
(4 + 2) + 3 + 3 = 12

5. (a) Explain the call setup procedure of GSM network.   *[(CO3)(Apply/IOCQ)]*
(b) Write short notes on GPRS.   *[(CO3)(Remember/LOCQ)]*
(c) Explain the GSM multi frame structure with suitable diagram.
[(CO3,CO4)(Analyse/IOCQ)]
5 + 4 + 3 = 12

Group - D

6. (a) What are the features of CDMA based IS 95 system?   *[(CO4,CO6)(Remember/LOCQ)]*

(b) Why downlink frequency is always kept higher than the uplink frequency in cellular communication system? *[(CO3)(Analyse/IOCQ)]*

(c) Explain the Forward link of CDMA based IS-95 system. *[(CO1)(Remember/LOCQ)]*

4 + 3 + 5 = 12

7. (a) Explain near-far problem of CDMA and the ways to mitigate the same. *[(CO3)(Understand/LOCQ)]*

(b) Differentiate between soft-handoff and hard-handoff in CDMA. *[(CO3)(Analyze/IOCQ)]*

(3 + 3) + 6 = 12

Group – E

8. (a) Explain the principle of operation of a Bluetooth Network. *[(CO5)(Understand/LOCQ)]*

(b) Differentiate between MIPV4 and MIPV6. *[(CO5)(Analyze/IOCQ)]*

(c) Explain triangular routing with the help of diagram. *[(CO5)(Understand /LOCQ)]*

4 + 4 + 4 = 12

9. (a) Explain the salient feature of IEEE 802.11g and IEEE 802.11n. *[(CO3)(Remember/LOCQ)]*

(b) What are the four basic entities for MIPV4? How is "Agent Discovery" performed by Mobile IPv4? *[(CO5)(Apply/IOCQ)]*

(c) Write a short note on tunnelling in IPv4. *[(CO5)(Understand/LOCQ)]*

2 + (4 + 3) + 3 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	55.12	35.5	9.38

Course Outcome (CO):

After the completion of the course students will be able to
1. The students will learn about the evolution of radio communication.
2. They will be able to appreciate the challenges of RF communication.
3. Different wireless networks and their operations will be clear to them.
4. The students will learn about the current multiplexing and modulation schemes.
5. They will be able to understand the functioning of internet protocols.
6. Our students will be able to take up research work in communication domain.

LOCQ: Lower Order Cognitive Question; IOCQ: Intermediate Order Cognitive Question; HOCQ: Higher Order Cognitive Question.