WIRELESS AND MOBILE COMMUNICATION
(ECEN 5102)

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)   AMPS stands for
           (a) Advanced Multiple Paging System   (b) Advanced Mobile Phone System
           (c) Advanced Mobile Phone Service   (d) Associated Mobile Phone Service

    (ii)   Co-channel cells use the _____ set of frequencies
           (a) same   (b) different
           (c) random   (d) none of these

    (iii) If a normal GSM time slot consists of six training bits, 8.25 guard bits 26 training bits, and two traffic bursts of 58 bits of data, find the frame efficiency.
           (a) 85%   (b) 84%
           (c) 75%   (d) 74%

    (iv)   Roaming in a mobile network is supported by
           (a) AUC   (b) VLR
           (c) MS   (d) None of these

    (v)   Frequency reuse strategy is used
           (a) For limited availability of spectrum   (b) limited geographical area
           (c) to employ frequency hopping   (d) all of these

    (vi)   GPRS network evolved in
           (a) 2G   (b) 2.5G
           (c) 3G   (d) 4.5G

    (vii) IEEE 802.11 sets standard for
           (a) LAN   (b) LAN Security
           (c) Bluetooth   (d) PAN

(viii) The major function of MSCs are
(a) Switching (b) Handoff
(c) Call handling (d) All of these

(ix) IS-95 stands for
(a) International Standards 95 (b) Interim Standards 95
(c) Indian Standard 95 (d) None of these

(x) The main entity of packet data network is
(a) GGSN (b) PCU
(c) MSC (d) none of these.

Group- B

2. (a) In mobile communication system, what do you understand by "Generation"? Explain the 2.5G GSM network highlighting its features and applications. [(CO1) (Remember/LOCQ)]
   (b) Explain the frequency reuse concept in cellular communication. How has it helped in proliferation of cellular networks? [(CO2) (Understand/IOCQ)]

   (2 + 4) + 6 = 12

3. (a) What is Co-channel and adjacent- channel Interference in cellular system? How they can be minimized? [CO1,CO2][Analyze/IOCQ, Remember/LOCQ]
   (b) Cell sectoring reduces interference and increases capacity – justify the statement. [CO1,CO2, CO6][Analyze/IOCQ]
   (c) If 20 MHz of the total bandwidth is allocated for a duplex channels in a cellular wireless system with frequency reuse factor 4 and each simplex channel is 25 kHz radio frequency bandwidth, and then find
       (i) the available number of duplex channels,
       (ii) the number of channels per cell, and
       (iii) if the system allocates 40 kHz bandwidth for guard band, then what will be the effective number of available duplex channels for voice communication? [CO1,CO2, CO6] [Evaluate / HOCQ]

   (2 + 2) + 3 + 5 = 12

Group - C

4. (a) With the help of block diagram briefly describe the GSM system architecture. [(CO4) (Explain/IOCQ)]
   (b) Explain how a GSM call is setup when a subscriber calls from mobile to another subscriber in PSTN network. [(CO2) (Analyze/IOCQ)]

   6 + 6 = 12

5. (a) What are the features of 3G CDMA 2000 based system? Why is handoff in CDMA called soft one? Explain the process. [CO3, CO6]Analyze/IOCQ]]
   (b) Explain the attachment-detachment procedure in GPRS system. [CO3, CO6] [Analyze/IOCQ]

   (3 + 3) + 6 = 12

Group - D

6. (a) What is the received power for a given distance and frequency using Friis' equation? Explain clearly with the equation. Why so many propagation models are in use? [(CO4) (Analyse/IOCQ)]

(b) If a transmitter produces 10 Watts of power, express the power in (a) dBm and in (b) dBµ. If this power is applied to an unity gain antenna with a 900 MHz carrier frequency, determine the received power at a free space distance of 0.5 km. from the antenna. Also find the received power at a distance of 10 kms.Assume gain of 2.0 for receiver antenna and a loss factor of 1.
[(CO2) (Evaluate/HOCQ)]

6 + 6 = 12

7. (a) What are the main transmission technologies for WLAN? [CO5,CO6] [Apply/IOCQ]

(b) Why is CSMA/CD not suitable for wireless networks?How does use of RTS and CTS help in avoiding collisions. [CO5,CO6], Evaluate / HOCQ]

(c) What are the functions of DCF and PCF? [CO5,CO6]Understand/LOCQ]

4 + 4 + 4 = 12

Group - E

8. (a) Explain the concept of "Care of address" in a mobile IP network. What are the 4 basic entities of MIPv4? [(CO4) (Remember/LOCQ)]

(b) Describe briefly the tunneling and reverse tunneling operations in amobile IP.
[(CO4, ,CO5, CO6)(Analyse/IOCQ)]

(c) What would be the probable features of a future 5G network?
[(CO4)(Analyse/IOCQ)]

(3 + 3) + 4 + 2 = 12

9. (a) Define the terms (i) Home address, (ii) Home agent and (iii) Foreign agent inrelation to mobile IP. [(CO4) (Remember/LOCQ)]

(b) What is snooping TCP? Explain the operation with a schematic diagram.
[(CO6) (Understand/IOCQ)]

(2 + 2 + 2) + 6 = 12

Cognition Level	LOCQ	IOCQ	HOCQ
Percentage distribution	37%	47%	16%

Course Outcome (CO):
After the completion of the course students will be able
1. The students will understand the challenges of wireless and mobile communication.
2. They will be able to analyse the factors like fading, SNR.
3. The students should be able to explain the working of a cellular system- both GSM and CDMA.
4. They will have knowledge about protocols like TCP/IP.

5. The students will be able to apply suitable routing for a transfer.
6. They will be able to analyse performance of cellular and other wireless networks.

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

Department & Section	Submission Link
ECE	https://classroom.google.com/u/1/w/NDYzMjgzODU5NzQ4/tc/NDc3MzIwMTQ0MzE1