ADVANCED COMMUNICATION SYSTEMS
(ECEN 4103)

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)   In normal handoff procedure, the handoff request is based on
           (a) power level   (b) signal strength
           (c) peak current   (d) none of these.

    (ii)   Dynamic channel assignment is mainly done to take care of
           (a) increase in traffic capacity   (b) decrease in traffic capacity
           (c) increase in gain level   (d) decrease in transmit power.

    (iii) The process of transferring a mobile user from one base station to another is called
           (a) MSC   (b) activation
           (c) hand off   (d) forward channel linking.

    (iv)   Free Space Propagation Model is mathematically represented by
           (a) log distance path model   (b) Friis formula
           (c) log normal model   (d) Okumura Hata model.

    (v)   Inter symbol interference is characterised by
           (a) delayed replica of previous symbol (b) uncorrelated symbols
           (c) interference due to other mobiles   (d) none of these.

    (vi)   Soft hand-off is applicable for
           (a) CDMA cellular   (b) GSM cellular
           (c) both (a) and (b)   (d) GPRS cellular.

    (vii) The preamble in a TDMA frame contains
           (a) address and sync info for BS & MS   (b) parity bits
           (c) IMEI of MS   (d) none of these.

(viii) In a GSM network, the unit that facilitates roaming is called
(a) HLR   (b) EIR   (c) AuC   (d) VLR.

(ix) Every CDMA channel in any BTS is identified by
(a) an RF Carrier   (b) a pilot channel
(c) an RF carrier and a PN code   (d) a sync. code.

(x) Fading of signals is caused due to
(a) multipath propagation
(b) obstacles
(c) variation of amplitude and phase at receiver
(d) all of these.

Group - B

2. (a) Explain why square and circular cell structures are not suitable for ideal cell geometry. Why is frequency reuse concept useful in cellular communication?

(b) Why are cell splitting and sectoring very important for cellular network design? Explain briefly.

(4 + 4) + 4 = 12

3. (a) Differentiate between adjacent channel and co-channel interference. State at least two methods by which interference can be reduced and explain their working. Only increasing the cluster size (with more number of cells) to reduce interference is not a good approach- justify.

(b) Explain how handoff mechanism works in a cellular system. Why is the phenomenon termed as "make-before-break" for GSM networks? Why is handoff in CDMA called soft one?

(2 + 2 + 2) + 6 = 12

Group - C

4. (a) What are the features of CDMA based IS 95 system? Explain the forward link of CDMA based IS-95 system.

(b) What is near far problem in CDMA network? How can it be minimized?

(4+4) + (2+2) = 12

5. (a) What is the significance of MSC and MS in GSM architecture? How can call be routed to a mobile subscriber from BTS in GSM network?

(b) How does GPRS work? Explain briefly.

(4 + 3) + 5 = 12

Group - D

6. (a) Describe the WLAN architecture and its components.

(b) Why is CSMA/CD not suitable for wireless networks? How does use of RTS and CTS help in avoiding collisions?

6 + (3 + 3) = 12

7. (a) What are the differences between FHSS and DSSS? Why is DSSS suitable for networks with large number of nodes? Explain sniff and park modes of operation in Bluetooth networks.

(b) Expand WiMAX. Describe four features of an WiMAX system.

(4 + 4) + (1 + 3) = 12

Group - E

8. (a) Show with a schematic diagram the registration process in mobile IP. What is agent discovery? Describe the three steps required for this.

(b) Describe briefly the tunneling and reverse tunneling operations in a mobile IP.

6 + 6 = 12

9. (a) What do you mean by multipath phenomena in wireless communication? Explain briefly.

(b) What is Doppler Effect? How does it affect the data communication of a moving MS?

6 + (2 + 4) = 12