

**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
any 5 (five) from Group B to E, taking at least one 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) Hexagon shape is used for radio coverage for a cell because of
 - (a) maximum coverage area
 - (b) fewer number of cells
 - (c) approximate circular radiation pattern
 - (d) all the above.
- (ii) The time over which a call is maintained within a cell without handoff is the
 - (a) settling time
 - (b) signalling time
 - (c) dwell time
 - (d) blank time.
- (iii) LTE – the full form is
 - (a) Long Term Evolution
 - (b) Low Term Evaluation
 - (c) Link Time Establishment
 - (d) none of these.
- (iv) Capacity of a cellular system is increased by
 - (a) fixed channel assignment strategy
 - (b) dynamic channel assignment strategy
 - (c) cell splitting
 - (d) frequency reuse.
- (v) Free Space Propagation Model is mathematically represented by
 - (a) Log distance path model
 - (b) Friis formula
 - (c) Log normal model
 - (d) Okumura Hata model.
- (vi) In GSM system, the same pair of frequencies can be shared by
 - (a) an adjoining cell of same cluster
 - (b) same cell number of an adjoining cluster
 - (c) any cell of an adjoining cluster
 - (d) (b) or (c).

- (vii) Fading is caused due to
 - (a) multipath propagation
 - (b) obstacles
 - (c) variation of amplitude and phase at receiver
 - (d) all of these.
- (viii) First generation cellular was called hybrid as
 - (a) the traffic channel was digital and control channel was analog
 - (b) only the traffic channel was analog
 - (c) TDMA/FDMA was applied
 - (d) none of these.
- (ix) Fixed WiMAX provides
 - (a) multipoint to multipoint technology
 - (b) multipoint to point technology
 - (c) point to multipoint technology
 - (d) (b) or (c).
- (x) Soft hand-off is applicable for:
 - (a) CDMA cellular
 - (b) GSM cellular
 - (c) both (a) and (b)
 - (d) GPRS cellular.

Group – B

2. (a) Explain why Hexagonal geometry is chosen for ideal cell structure. Define the term “co channel reuse ratio”.
 - (b) What is the purpose of “handoff” in a cellular network? Explain the terms “hard” & “soft” handoff.
- (3 + 2) + (2 + 5) = 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) Why is the phenomenon termed as “make-before-break” for GSM networks? Why is handoff in CDMA called soft one? Explain mobility management and location management.

(2 + 2 + 2) + 6 = 12

Group – C

4. (a) What is direct sequence spread spectrum? How is it related to the number of subscribers in a CDMA network? What is near-far problem in CDMA network? How is it solved?

(b) How does GPRS work? Explain briefly.

$$(2 + 1 + 2 + 2) + 5 = 12$$

5. (a) Explain the concepts of Large scale and small scale fading with examples.

(b) Derive an expression for Free space propagation model considering a clear and undisturbed LOS path between the transmitter and receiver.

$$7 + 5 = 12$$

Group – D

6. (a) What are the differences between wireless and wired transmission? Give some examples of WLANs.

(b) Differentiate between DCF and PCF in 802.11. How does RTS-CTS handshaking work?

$$(3 + 3) + (4 + 2) = 12$$

7. (a) Explain, with the help of a diagram, the GPRS network architecture.

(b) How are GPRS attach and detach procedure initiated during GPRS mobility management?

$$8 + 4 = 12$$

Group – E

8. (a) What are the features of CDMA based IS 95 system? Explain multi, super and hyper frames.

(b) What is Universal mobile telecom system (UMTS) 99? On which technology is it based?

$$(4 + 3) + 5 = 12$$

9. (a) Show with the help of a neat diagram the Mobile IP operation. Explain briefly the 4 steps.

(b) What are the differences between MIPv4 and MIPv6? Define Home Agent and Foreign agent.

$$(2 + 4) + (3 + 3) = 12$$