CELLULAR AND SATELLITE COMMUNICATIONS
(ECEN 4281)

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) Which type of handoff is used in CDMA?
(a) Soft handoff (b) Hard handoff
(c) Soft & hard handoff (d) None of the above.

(ii) What is inter-system handoff?
(a) During a course of a call (b) Hard handoff
(c) Soft & hard handoff (d) None of the above.

(iii) The coverage & capacity of CDMA system is more than that of GSM system
(a) True (b) False
(c) Equal (d) None of the above.

(iv) What are the types of channel assignment?
(a) Fixed channel assignment, dynamic channel assignment.
(b) Moderate channel assignment
(c) Both (a) & (b)
(d) None of the above.

(v) Frequency factor of a cellular system is given by
(a) 1/N (b) 1/2N (c) 1/4N (d) 2N.

(vi) Which technique uses two different antennas to reduce traffic on the same frequency?
(a) Spatial isolation (b) Frequency reuse
(c) Multiplexing (d) Modulation.

(vii) Which of the following bands cannot be used for satellite communication?
(a) MF (b) Ku (c) X (d) C.

(viii) What is the reason for shifting from c band to ku band in satellite communication?
(a) Lesser attenuation (b) Less power requirements
(c) More bandwidth (d) Overcrowding.

(ix) Why are VHF, UHF, and microwave signals used in satellite communication?
(a) More bandwidth (b) More spectrum space
(c) Are not diffracted by the ionosphere (d) Economically viable

(x) The satellite that is used as a relay to extend communication distance is called as:
(a) Relay satellites (b) Communication satellites
(c) Repeater satellites (d) Geosynchronous satellites.

Group – B

2. (a) Prove that for a hexagonal geometry, the co-channel reuse ratio is given by Q=√3N, where $N = i^2+ij+j^2$.

(b) Show that the frequency reuse factor for a cellular system is given by k/S where k is the average no of channels per cell and S is the total number of channels available to the cellular service provider.

6 + 6 = 12

3. (a) Discuss Bluetooth and 4G- Mobile communication.

(b) Discuss microcell zone concept and cell spilitting.

(3 + 3) + 6 = 12

Group – C

4. (a) Discuss the role of VLR, HLR and AUC during call set up.

(b) Explain forward link and reverse link for IS-95.

6 + 6 = 12

5. (a) Draw and explain GSM architecture in brief.

(b) Discuss GSM multiple access scheme.

(2 + 6) + 4 = 12

Group – D

6. (a) Demonstrate the concept of frequency planning & explain the frequency considerations..

(b) Explain with a diagram the process of launching a satellite in orbits. What do you understand by “powered flight”?

6 + (4 + 2) = 12

7. (a) Explain the essential of thermal control segment for a spacecraft.

   (b) Outline the meaning of antenna noise temperature and system noise temperature referred to the input. Examine why noise temperature is a useful concept in communication receivers?

4 + (4 + 4) = 12

Group – E

8. (a) Give a one liner definition of a satellite. What are the different frequency bands allocated for satellite communication?

   (b) What are the various satellite subsystems that are common in any setup? Write an expression for Friis formula for received power using standard notations.

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

9. Write short notes on any three of the following: **(3 × 4) = 12**
   (i) Frequency planning.
   (ii) Principles of Rocket Propulsion
   (iii) 5G
   (iv) TDMA
   (v) Spin body stabilization.

Department & Section	Submission Link
AEIE	https://classroom.google.com/w/Mjk5MzU0MTEwMzE4/t/all