[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7298 **L**

Unique Paper Code : 2513010025

Name of the Paper : Mobile and Satellite Communications

Name of the Course : **B.Sc. (Hons) Electronics (DSE)**

Semester : VIII

Duration : 3 Hours Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. There are **seven** questions in all. Question No. **1** is compulsory. Attempt any **four** more questions from the remaining **six.**
3. **All** questions carry equal marks.

Q1. Attempt all parts of this question.

(a) What are Spread Spectrum systems? Explain two of its important features.
(b) Comment on how and why the Spread Spectrum systems qualify for the improved Quality of Service (QoS) over the conventional FDM and TDM based systems. Give any three major reasons.
(c) An Orthogonal Frequency Division Multiplexing (OFDM) system improve upon the range and speed of signal transmission and reception in a WMAN network. Justify your answer.
(d) What is Bluetooth technology? Compare it with Wi-Fi IEEE 802.11 standard.
(e) What is a transponder in a satellite system? Write two main functions.
(f) What is ARFCN? Write its formula and explain its application.

(3x6=18)

Q2 (a) Write any three functional differences between Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).
(b) Give three main differences between Narrowband signal fading and Multipath signal fading.
(c) Explain three multiple access techniques - TDMA, FDMA and CDMA used in cellular networks. Discuss their role in the Spread Spectrum signal transmission and reception.

(6x3=18)

P.T.O.

Q3 (a) What are Hamming codes? Explain with the help of a suitable example. Why are they useful in cellular networks?
(b) Illustrate the working of Go-back-N protocol with the help of a suitable example.
(c) Establish the similarities between OSI reference model and the IEEE 802.11 protocol stack. How is the 802.11 different from 802.16? Give at least three major reasons.

(6x3=18)

Q4 (a) Discuss the architecture and working of Bluetooth technology. Explain the Bluetooth protocol stack with its two applications.
(b) What is WiMAX standard IEEE 802.16? Discuss its six main applications.

(12+6=18)

Q5 (a) Write and explain three Kepler's laws. How are they used in controlling the satellite systems?
(b) What is LEO, MEO and GEO satellite orbits? On what basis they are classified in this manner? Discuss the applications of placing satellites in these orbits.

(9+9=18)

Q6 (a) A satellite is in a 322 km high circular orbit. Determine
(i) The orbital angular velocity in radians per second
(ii) The orbital period in minutes; and
(iii) The orbital velocity in meters per second.
(b) Discuss the evolution of mobile radio communication systems from early radio systems to modern cellular networks.

(9+9=18)

Q7 (a) Discuss the architecture of Advanced Mobile Phone System (AMPS). How is it different from GSM architecture?
(b) What is cell splitting and cell sectoring? Comment on their relative importance to improve frequency allocation and channel capacity.
(c) What is frequency reuse concept? For what purpose it is used? Write the reuse equation and hence draw the frequency reuse pattern for N=7. Clearly demarcate the boundaries separating out the cell clusters in your diagram.

(6x3=18)