Name : ....

Roll No. : ....

Invigilator's Signature : ....

CS/M.TECH (ECE)/SEM-2/MCE-205A/2013
2013
SATELLITE COMMUNICATION

Time Allotted : 3 Hours   Full Marks : 70

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer Question No. **1** compulsorily and
any *four* from the rest.

1. Answer any *seven* questions of the following :   7 × 2

    a) In Retrograde orbit of satellite the angle of inclination
        lies between .... degree to .... degree.

    b) State the uplink and downlink frequencies of *Ku* band.

    c) What is meant by satellite graveyard ?

    d) What is the value of telephone load activity factor
        recommended by CCIIT ?

    e) Define line of apsides.

30025 (M.Tech)   [Turn over

f) What is meant by frequency hopping ?

g) In which type of multiple access Intermodulation distortion is the main disadvantage ?

h) How path loss varies with wavelength is satellite link design ?

i) Which type of antenna is generally used for TTC & M system ? Mention its frequency band.

j) State the advantages of VSAT network.

2. a) Deduce the second order linear differential equation of satellite orbit. (Assume all motions are in orbital plane). 7

b) State and prove Kepler's 3rd Law from the above equation. 4

c) State the conditions to be fulfilled by a perfectly geostationary satellite orbit. 3

3. a) Discuss about the effects of non-spherical earth on satellite motion. 5

b) Discuss about attitude and orbit control subsystem of communication sastellite. 6

c) What are the beamwidth and gain of an aperture antenna of diameter 25 cm. operating at 4 GHz. 3

4. a) Deduce an expression of power received by an earth station from a satellite transmitter in an ideal link. Extend the expression to consider the losses due to atmosphere and antenna. 6 + 1

   b) A satellite at a distance of 40,000 km from a point on the earth's surface radiates a power of 10W from on antenna with a gain of 17 dB in the direction of observer. The satellite operates at a frequency of 11 GHz. The receiving antenna has a gain of 52·3 dB. Find the received power. 3

   c) What is the G/T ratio of an earth station antenna ? 2

   d) Calculate the system noise temperature of a receiving system containing RF state, mixer and IF stages. 2

5. a) Discuss about the effectof rain on satellite link design.

   7

   b) Deduce Basic Traffic equation and using Erlong *B* model write the expression for the probability that the last available channel is busy. 7

6. a) What is speech interpolation ? 4

   b) Discuss about a TDMA frame structure. 4

   c) Discuss how synchronization can be achieved among different earth stations in a TDMA communication network. 4

   d) What is the advantage of voice activation ? 2

7. a) Describe VSAT network configuration. 7

b) Discuss about the method of placing the satellite in Geostationary orbit. 7

8. Write short notes on any *two* of the following : 2 × 7

a) TTC and M system

b) Intermodulation products in FDMA.

c) The operating environment of mobile satellite network.

―――――――