Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS / M.TECH (ECE-COMM) / SEM-2 / MCE-205-A / 2011

2011

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** and any *four* questions from the rest.

1. Write and explain Kepler's three laws of planetary motion. Illustrate in each case their relevance to artificial satellite orbiting the earth. Calculate the radius of the circular orbit of a satellite which rotates the earth in 12 hours. 3 + 6 + 5

2. What is look angle ? Derive the expression for azimuth & elevation. 4 + 10

3. Explain what is meant by effective path length in connection with the rain attenuation. Explain what is rain rate. How is it a specific attenuation ? Calculate for a frequency of 10 GHz and for circular polarization, the rain attenuation which is exceeded for 0·01% of the time in a year for a point rain rate of 10 mm/h. The earth station altitude is 400 m & the antenna elevation angle is 50 degrees. The rain height is 3 km. 3 + 3 + 8

(Given : $a_h = 0 \cdot 0188$, $a_v = 0 \cdot 0168$, $b_v = 1 \cdot 2$, $b_h = 1 \cdot 217$)

4. What do you mean by Antenna Polarization ? Explain Ionospheric Depolarization, Rain Depolarization & Ice Depolarization. 5 + (3 × 3)

5. State & explain Reciprocity theorem for antenna. Draw the block diagram of home terminal for DBS TV reception. Explain Master Antenna TV system & Community Antenna TV system. 4 + 4 + 6

6. What is EIRP ? A satellite down link at 14 GHz operates with a transmit power of 6 W and an antenna gain of 48·2 dB. Calculate the EIRP in dBW. Explain different transmission losses. 3 + 4 + 7

7. Write notes on the following :

   a) Horn Antennas 4

   b) Reflector Antennas 4

   c) Transmit & receive earth station. 6

==========