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**06EC662**

# Sixth Semester B.E. Degree Examination, June 2012
## Satellite Communication

Time: 3 hrs. Max. Marks:100

**Note:** ***Answer FIVE full questions, selecting at least TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

## PART – A

**1** a. List the frequency-band designations. Which are in common use for satellite services? **(06 Marks)**

b. What is INTELSAT? How it covers the 'International traffic'? **(04 Marks)**

c. State and explain the Kepler's laws of planetary motion with neat diagrams and necessary equations. **(10 Marks)**

**2** a. Determine the limits of visibility for an earth-station situated at mean sea level at latitude 48.42°N and longitude 89.26°W. Assume a minimum angle of elevation of 5°. **(06 Marks)**

b. Explain the Keplerian element set with their meanings with respect to satellite orbit. **(04 Marks)**

c. What are antenna look angles? How these are determined? **(06 Marks)**

d. Determine which of the followings years are leap years:
i) 1987 ii) 1988 iii) 2000 iv) 2100. **(04 Marks)**

**3** a. Explain atmospheric and ionospheric losses for satellites. **(06 Marks)**

b. Briefly explain uplink-and-downlink rain-fade margin. **(04 Marks)**

c. Calculate 'horizontal, vertical and circular' polarizations for a frequency of 12 GHz, the rain attenuation is exceeded for 0.01% of the time in any year, for a point rain rate of 10 mm/h. The earth station attitude is 600 meter, and the antenna elevation angle is 50°. The rain height is 03 km and $a_h = 0.0188$; $b_h = 1.217$; $a_v = 0.168$; $b_v = 1.2$.
Note: All lengths and heights are in kms, and rain-rate is in mm/hour. **(10 Marks)**

**4** a. What is a satellite transponder? With a neat diagram explain the overall frequency arrangement of typical C-band communication satellite. **(06 Marks)**

b. A satellite downlink at 12 GHz operates with a transit power of 6 watts and on antenna-gain of 48.2 dB. Calculate EIRP in dBW. **(04 Marks)**

c. What is meant by satellite attitude? Briefly describe three-axis method of satellite satelelization. **(10 Marks)**

## PART – B

**5** a. With a neat diagram, explain the outdoor-and indoor units of a receive-only home TV system. **(10 Marks)**

b. What is meant by pre-assigned FDMA? With a neat diagram, explain single channel per carrier. **(10 Marks)**

**6** a. The carrier-to-interference ratio at the ground receiving antenna is 23.3 dB. For the uplink [C/I] ratio is 27.53 dB. Find the overall ratio $[C/I]_{ant}$ for $(I/C)_U = 0.001766$ and $(I/C)_D = 0.004436$. **(06 Marks)**

b. Calculate the $[C/N]_D$ for $[EIRP]_D = 27$, $[G/T]_D = 30$, $[LOSSES]_D = 196$, $[k] = -228.6$ and $[B]_{TR} = 75.56$. **(04 Marks)**

c. Explain the 'frame and burst formats' for a TDMA system. **(10 Marks)**

**7** a. Explain:
   i) Transponder capacity
   ii) Frequency and polarization.
   iii) Bit-rate for digital TV. **(10 Marks)**

b. Explain in detail the satellite mobile services. **(10 Marks)**

**8** Write short notes on any three choosing any one from c. and d. :

a. Geo-stationary orbit.
b. VSAT and its applications.
c. GPS and its uses.
d. Radarsat. **(20 Marks)**

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