USN | | | | | | | | | | |

06TE63

Sixth Semester B.E. Degree Examination, December 2010
Satellite Communications

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. ***Missing data may be suitably assumed.***

PART – A

1 a. What are the factors that affect the propagation of radio waves? Mention at least 6 factors. **(08 Marks)**

b. Obtain an expression for the received power taking into account the effect of ground reflection. **(12 Marks)**

2 a. Define the following terms: i) Virtual height ii) Skip distance iii) Duct propagation **(12 Marks)**

b. Discuss any two Ionospheric abnormalities. **(08 Marks)**

3 a. List the advantages of satellite communications. **(04 Marks)**

b. With the aid of neat sketch define each of these angles, i) inclination ii) argument of perigee iii) right ascension of ascending node. **(10 Marks)**

c. A satellite is orbiting in the equatorial plane with a period from perigee to perigee of 12 h. Given that eccentricity is 0.002, calculate the semimajor axis. Take earth's equatorial radius as 6378.14 km. **(06 Marks)**

4 a. Explain, in brief, satellite eclipse and sun transit outage. **(08 Marks)**

b. What are antenna look angles? The longitude and latitude of an earth station is 76°E and 13°N. Find the azimuth and elevation from this station to ASIASAT situated at 105°E. **(10 Marks)**

c. For the above geo satellite, calculate the range from earth station if satellite is at a distance of 42164 kms from ES. (Radius of earth = 6371 kms) **(02 Marks)**

PART – B

5 a. Explain the effect of rain attenuation in satellite communication. **(05 Marks)**

b. A satellite link operating at 14 GHz has receiver feeder losses of 1.5 dB and a free space loss of 207 dB. The atmospheric absorption loss is 0.5 dB and the antenna loss is 0.5 dB. Depolarisation loss can be neglected. Calculate the total link loss for clear sky conditions. **(05 Marks)**

c. Derive the expression for $\left[C/N_0\right]_u$ for the uplink. **(10 Marks)**

6 a. Explain how altitude control is achieved in spin and body stabilized satellites. **(10 Marks)**

b. With neat block diagram, list the functions of TT & C subsystem. **(05 Marks)**

c. What is a transponder? Explain frequency allocation of C band transponder channels. **(05 Marks)**

7 a. What are the different multiple access methods used in satellite communication? Briefly explain. **(06 Marks)**

b. A satellite transponder has a BW of 36 MHz and a saturation EIRP of 27 dBw. The earth station receiver has a $\left[G/T\right]$ of 30 dB/k and total link losses are 196 dB. The transponder is accessed by FDMA carriers each of 3 MHz bandwidth and 6 dB output back off is employed. Calculate downlink carrier to noise ratio for single carrier operation. **(06 Marks)**

c. Give the burst transmission details for a TDMA system with basic equipment blocks. **(08 Marks)**

8 a. Compare the MATV and CATV systems. **(10 Marks)**

b. Explain with block diagram, DBS TV/FM reception. **(10 Marks)**

* * * * *