EC-702

B.E. VII Semester

Examination, December 2016

Satellite Communication

Time : Three Hours

Maximum Marks : 70

Note : i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max.50 words) carry 2 marks, part C (Max.100 words) carry 3 marks, part D (Max.400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) Why is it preferable for a remote sensing satellite to be in a sun-synchronous orbit?

   b) Describe the characteristics and uses of geostationary orbit.

   c) Define the following parameters with reference to satellite orbits :

      i) Apogee and perigee

      ii) Eccentricity

      iii) Ascending and descending nodes

   d) Define Kepler's laws of orbiting bodies and derive an equation to show that the third law is true for any orbiting satellite.

OR

A satellite is orbiting in a geosynchronous orbit of radius 41500km. Find the velocity and time of orbit. What will be the change in velocity if the radius reduces to 36000 km. If $g_o = 398600.5 km^3 S^2$.

Unit - II

2. a) How does the earth coverage provided by a satellite depend upon its altitude?

   b) Explain sun transit outage.

   c) What is polarization of an antenna? Also explain linear polarization and elliptical polarization.

   d) Describe and explain different steps involved in launching a Geostationary satellite.

OR

Explain :

i) Polarization of satellite signals

ii) Cross-polarization discriminations

iii) Depolarization

Unit - III

3. a) What is a transponder? Why is it referred to as the brain of a communication satellite?

   b) Why thermal control is used in space segment?

   c) What are the important components of an earth station?

   d) With the help of block schematic explain in detail TT and C (Tracking, Telemetry and Command) Subsystem.

OR

With the help of block diagram explain receive only home TV system. Also describe working and use of master antenna TV system and community antenna TV system.

Unit - IV

4. a) What are the factors that affect the link design of a satellite?

b) What is antenna noise temperature? What are the main factors that decide the antenna noise temperature?

c) What is antenna gain to noise temperature (G/T) ratio. What is the significance of Earth stations antenna gain to noise temperature ratio.

d) Derive general link equation find out an expression for C/N and G/T ratio. Explain the importance of these ratios on satellite link design.

OR

A satellite at a distance of 36000km from the surface of the earth radiates a power of 4 watts from an antenna of gain 15dB. Find the flux density and power received by an antenna of effective area $12m^2$. If the receiving antenna has a gain of 50 dB, then also calculate the received power.

Unit - V

5. a) Mention the services available from DBS system.

b) List some of the short comings of present day VSAT system.

c) What is VSAT system? How does a VSAT work? Who uses VSAT system?

d) With the help of block diagram explain the operation of DBS system.

OR

What are VSAT networks? Explain various VSAT network topologies.

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