Printed Pages—3   **EEC021**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2882   **Roll No.** [ ][ ][ ][ ][ ][ ][ ][ ][ ]

B.Tech.

(SEM. VII) ODD SEMESTER THEORY EXAMINATION 2012-13

SATELLITE COMMUNICATION

Time : 3 Hours   *Total Marks : 100*

Note :— *(1)* *Attempt **all** questions.*

            (2) *All questions carry equal marks.*

1. Attempt any **FOUR** parts of the following :—   **(5×4=20)**

   (a) Write short note on history of development of satellite launch vehicles.

   (b) Satellite-1 in an elliptical orbit has the orbit semi major axis equal to 18000 km and satellite-2 has semi major axis equal to 24000 km. Determine the relationship between their orbital periods.

   (c) Explain briefly what is meant by sun transit outage.

   (d) What is meant by look angles ? Explain them with reference to a geostationary satellite and the earth station.

   (e) The semi major and semi minor axis of an elliptical satellite orbit are 20000 km and 1600 km respectively. Determine the apogee and perigee distance.

   (f) Explain geostationary orbit and geostationary satellite in short.

EEC021/DLT-44169   1   *[Turn Over*

2. Attempt any **FOUR** parts of the following :— **(5×4=20)**

   (a) Derive general link equation. Find out expression for C/N and G/T ratio.

   (b) What are the various interferences that may affect the satellite link performance ? Explain in short.

   (c) The EIRP of a 240 W transponder is 57 dB W. Calculate the approximate gain of the antenna if the transponder is switched to 120 W. Also calculate the new EIRP assuming that the same antenna is used.

   (d) How is the uplink design different from the downlink design ?

   (e) Three amplifiers are connected in cascade having a gain of 20 dB each. If the noise temperature is 100 K, determine the overall gain.

   (f) With the help of a suitable block diagram explain the function of telemetry, tracking and command (TTC) sub-system.

3. Attempt any **TWO** parts of the following :— **(10×2=20)**

   (a) Describe in detail the rain, cloud and ice effect on propagation in satellite communication.

   (b) With the help of suitable diagram explain the satellite communication system architecture using VSAT. Also write the applications of VSAT.

   (c) A satellite carrying a 11.7 GHz continuous wave (CW) beacon transmitter is located in a geostationary orbit 38000 km from an earth station. The beacon's output

EEC021/DLT-44169   2

power is 200 MW and it feeds an antenna with a 18.9 dB gain towards the earth station. The earth station receiving antenna aperture efficiency is 50 percent. Calculate the path loss in dB and receiving antenna gain in dB.

4. Attempt any **TWO** parts of the following :   **(10×2=20)**

   (a) With the help of suitable diagram describe the working of home receiver units in DBS television.

   (b) Explain the position location principle of GPS. Also draw the block diagram of a GPS receiver and explain its working.

   (c) Write short note on satellite signal acquisition.

5. Attempt any **TWO** parts of the following :— **(10×2=20)**

   (a) Write short note on antenna systems for mobile satellite broadcasting.

   (b) Describe in brief different types of antennas used in satellite communication.

   (c) Write short note on Wire Quadrifilar Helix Antenna (WQHA) for hand held terminals.