53 (EC 814) STCM

2017

SATELLITE COMMUNICATION

Paper : EC 814

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions out of **seven.***

1. *(a)* Name the first Artificial satellite launched by the USSR in October 1957. Also point out its main drawbacks for not using it too much in Satellite Communication. 1+6=7

   (b) Explain why repeater is used in satellite for the study of Satellite Communication. 7

   (c) In the year 1965, the first Intelsat Satellite was launched. Name it and briefly explain about it. 6

2. (a) Explain why Orbital Mechanics is required for the study of Satellite Communication. 5

(b) By using two different types of forces on the satellite find out the equation for the velocity and time required for a satellite to rotate around the planet in its orbit. 15

3. (a) Explain in details how six different orbital elements are needed for the orbital determination of a satellite with its proper diagram. 10

(b) What are the two parameters needed for the satellite to launched in its orbit? Also explain it. 5

(c) Define Doppler shift of orbital effect in Satellite Communication System Performance. 5

4. (a) Explain why Satellite subsystem is required for the Satellite Communication System. 4

(b) Explain in details about Telemetry, Tracking, Command and Monitoring (TTC&M) subsystem with its proper diagram. 12

(c) Define Solar Eclipse. 4

5. (a) What are the three different prototype models which are required for space qualification of a satellite in a Satellite Communication System ? 6

(b) Explain communication subsystem. Also explain the function of transponder present in it. 10

(c) Point out the main difference between power subsystem and communication subsystem. 4

6. (a) Describe basic transmission theory of a Satellite Communication System. 10

(b) Name different equatorial orbits for the orbit consideration in a Satellite Communication. 10

7. *(a)* What are the narrowband a wideband system in the context multiple access ?

(b) What are the main features of FDM system ?

(c) In a satellite telephone system t telephones transmit BPSK signals in band with a n occupied bandwidth $12kHz$ and an output power lev between 0·05 and 0·5W, such that t power level at the input to t transponder is always $-144dBW$ for a link signal. The resulting C/N ratio the clear air conditions for any o signal in the transponder is $16dB$. T transponder has a bandwidth of 1·0MH with gain of $134dB$ and maximu permitted output power of $5W$. T center frequencies of the telephon transmitters are spaced $16kHz$ apa to provide a $4kHz$ guard band betwee each signal.

4+4+12=2

7. *(a)* What are the narrowband and wideband system in the context of multiple access ?

(b) What are the main features of FDMA system ?

(c) In a satellite telephone system the telephones transmit BPSK signals in L band with a n occupied bandwidth of $12kHz$ and an output power level between $0{\cdot}05$ and $0{\cdot}5W$, such that the power level at the input to the transponder is always $-144dBW$ for any link signal. The resulting C/N ratio in the clear air conditions for any one signal in the transponder is $16dB$. The transponder has a bandwidth of $1{\cdot}0MHz$ with gain of $134dB$ and maximum permitted output power of $5W$. The center frequencies of the telephone transmitters are spaced $16kHz$ apart to provide a $4kHz$ guard band between each signal.

4+4+12=20
