

B.E. (Electronics Engineering) Eighth Semester (C.B.S.)  
**Elective-II : Satellite Communication**

P. Pages : 2

NRJ/KW/17/4692

Time : Three Hours



Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.
  9. Assume suitable data whenever necessary.
  10. Illustrate your answers whenever necessary with the help of neat sketches.
  11. Use of non programmable calculator is permitted.

1. a) State and explain the Kepler's laws of planetary motion. 7
- b) What is altitude and orbit control system. Explain in details. 7

**OR**

2. a) What do you understand by the satellite subsystem? Explain the various subsystem in brief. 8
- b) Explain how will you locate a satellite in the orbit. 6
3. a) Derive the expression for  $P_r$  received power from a satellite at a given distance  $R$  from transmitting antenna. 8
- b) A satellite at a distance of 40,000km from a point on the earth's surface radiates a power of 10watts from an antenna with a gain of 17dB in the direction of the observer. Find the flux density at the receiving point, and the power received by an antenna at this point with an effective area of  $10\text{m}^2$ . 5

**OR**

4. a) What do you understand by noise temperature? How the performance of a receiving system is determined. 6
- b) Suppose we have a 4GHz receiver with the following gains and noise temperatures: 7  
 $T_{in} = 25\text{k}$ ,  $T_{RF} = 50\text{k}$ ,  $T_{IF} = 1000\text{K}$ ,  $T_m = 500\text{k}$ ,  $G_{RF} = 23\text{dB}$ ,  $G_{IF} = 30\text{dB}$ .  
 Calculate the system noise temperature assuming that the mixer has a gain  $G_m = 0\text{dB}$ .  
 Recalculate the system noise temperature when a mixer has a 10 dB loss. How can the noise temperature of the receiver be minimized when the mixer has a loss of 10dB?

5. a) What do you understand by FDMA. Explain the FDMA technique used in satellite communication. 7
- b) Explain in brief code division multiple Access with suitable diagram. 7

**OR**

6. a) Write short notes on DAMA. 7
- b) Compare FDMA, TDMA and CDMA. 7
7. a) What do you mean by propagation effects? Explain briefly. 6
- b) Explain rain and ice effect on satellite communication. 7

**OR**

8. a) Write short notes on: 8
- i) Rain depolarization
- ii) Ice depolarization
- b) Explain the effect of atmospheric absorption on satellite communication. 5
9. a) What do you mean by error detection and correction methods. 5
- b) What are convolution codes? Explain how they are generated? State its advantages over linear block codes. 8

**OR**

10. a) Explain the term channel capacity with suitable example. 6
- b) The given generator matrix, for (6, 3) block code. 7
- $$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 0 & 1 & 1 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$
- Find all the code words.

11. a) Explain the earth station design requirements in details. 7
- b) Draw the block diagram of a tracking system and explain its function. 6

**OR**

12. a) Write short notes on: 13
- i) Antenna Tracking
- ii) LNA
- iii) HPA

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