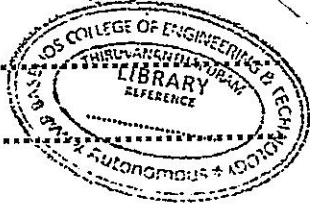


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N – 5760

Reg. No. :

Name :



Eighth Semester B.Tech. Degree Examination, April 2022

(2013 Scheme)

(Elective VI)

13.806.6 : SATELLITE COMMUNICATIONS (T)

Time : 3 Hours

Max. Marks : 100

PART – A

Answer all questions.

1. What is meant by line of apsides and line of nodes?
2. What is sun transit outage?
3. Define antenna pointing loss.
4. State the ways by which rainfall degrades the received $[C/N_0]$.
5. What is power limited transponder?
6. A satellite link in clear sky is using 8-PSK modulation scheme. It is needed to change the modulation scheme to counter the rain fade. Find out which modulation scheme is suitable : 4-PSK or 16-PSK and justify your answer.
7. Define the terms telephone load activity factor and digital speech interpolation.
8. A 70-MHz carrier is frequency modulated by a 1-kHz tone of 5V peak amplitude. The frequency deviation constant is 15 kHz/V. Use Carson's rule to estimate the bandwidth required.

P.T.O.



9. State the need for a Hub with large antenna in a VSAT network.
10. What are the types of antenna losses?

(10 × 2 = 20 Marks)

PART – B

Answer **any one full** questions from **each** Module.

Module – I

11. State Kepler's three laws of planetary motion. Illustrate in each case their relevance to artificial satellites orbiting the earth. 20

OR

12. (a) Write short notes on station keeping. 10
- (b) Explain about frequency allocations for satellite services. 10

Module – II

13. (a) An RF amplifier has 20 dB gain and 1 GHz bandwidth. Hot and cold load temperatures (T_1 and T_2) and corresponding amplifier output powers (N_1 and N_2) were measured as at $T_1 = 290$ K, N_1 is -62 dBm and at $T_2 = 77$ K, N_2 is -64.7 dBm. If the amplifier is used with input source temperature $T_s = 450$ K, Find the output noise power. 10
- (b) A satellite at a distance of 40000 Km from a point on the Earth's surface radiates a power of 2 Watts from an antenna with a gain of 17 dB in the direction of the observer. Find the power received by an antenna with an effective area of 10 m^2 . 10

OR

14. A multiple carrier satellite Transponder operating at 6 GHz uplink and 4 GHz downlink has Transponder Saturation Flux Density = -67.5 dBW/m^2 and corresponding saturated EIRP = 26.6 dBW . The transponder is operating at Input Back Off = 12 dB. The satellite power amplifier characteristics specify that for every dB of Input back-off, the Output Back-off changes by 0.5 dB. If Satellite G/T = -11.6 dB/K , satellite to earth station range = 40,800 Km and Earth Station G/T = 40.7 dB/K , find total C/N₀. 20



N – 5760



Module – III

15. (a) Explain the principle behind spectrum spreading and despreading and how this is used to minimize interference in a CDMA system. **10**
- (b) Describe how signal acquisition and tracking are achieved in a DS/SS system. **10**

OR

16. Discuss briefly how demand assignment may be implemented in a TDMA network. What is the advantage of TDMA over FDMA in this respect? **20**

Module – IV

17. (a) Describe the main features of Radarsat. Explain what is meant by a "dawn to dusk" orbit and why the Radarsat follows such an orbit. **10**
- (b) Write brief notes on the advantages and disadvantages of onboard switching and routing compared to the "bent pipe" mode of operation for satellite mobile communications. **10**

OR

18. (a) Write the steps involved in the Satellite Communication Link Design procedure. **10**
- (b) Explain remote sensing satellite in detail. **10**

(4 × 20 = 80 Marks)

