Reg. No. : | | | | | | | | | | |

Question Paper Code: 92022

M.E. DEGREE EXAMINATION, APRIL 2015.

Elective

Communication Systems

01PCM511 - SATELLITE COMMUNICATION

(Regulation 2013)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. List the factors that are considered in selecting a launch vehicle.
2. Define antenna look angles.
3. Define guard time.
4. What is meant by frequency reuse?
5. Define EIRP.
6. What is inter-modulation noise?
7. What is dilution of precision?
8. State the principle of differential GPS.
9. Define frequency masking.
10. What is the function of a shared network?

PART - B (5 x 14 = 70 Marks)

11. (a) (i) Write notes on limits of visibility. (7)

(ii) Calculate the slant range of a geostationary orbit orbiting at 42,200 *km* from an earth station making an elevation angle of 25˚. (7)

Or

(b) Draw the block diagram of communication subsystem of a communication satellite and explain each block in detail. (14)

12. (a) (i) Explain the function of the burst-code word and the carrier and bit-timing recovery channel in a TDMA burst. (7)

(ii) Explain the methods of demand assignment in a TDMA system. (7)

Or

(b) (i) Explain how signal acquisition and tracking could be achieved in a CDMA system. (7)

(ii) Explain the principle of spectrum spreading and de-spreading in a CDMA system. (7)

13. (a) (i) The following parameters apply to a satellite downlink: saturation [EIRP] 22.5 *dBW*, free-space loss 195 *dB*, other losses and margins 1.5 *dB*, earth station [*G*/*T*] 37.5 *dB/K*. Calculate the [*C*/*N*0] at the earth station. Assuming an output BO of 6 *dB* is applied, what is the new value of [*C*/*N*0]? (9)

(ii) Write notes on different modes of interference in a satellite communication system. (5)

Or

(b) (i) Calculate the free-space loss as a power ratio and in decibels for transmission at frequencies of (a) 4 *GHz*, (b) 6 *GHz*, (c) 12 *GHz*, and (d) 14 *GHz*; the range being 42,000 *km*. (7)

(ii) A receiving system consists of an antenna having a noise temperature of 60 *K*, feeding directly into a LNA. The amplifier has a noise temperature of 120 *K* and a gain of 45 *dB*. The coaxial feeder between the LNA and the main receiver has a loss of 2 *dB*, and the main receiver has a noise figure of 9 *dB*. Calculate the system noise temperature referred to input. (7)

14. (a) (i) Describe the components of a GPS system. (7)

(ii) Explain how a GPS system determines the position information. (7)

Or

(b) (i) Describe the different types of errors involved in position location. (7)

(ii) What is satellite signal acquisition? Describe the satellite signal acquisition process with necessary diagram. (7)

15. (a) (i) Explain the role of INMARSAT. (7)

(ii) With required block diagram describe the function of DTH system. (7)

Or

(b) (i) Describe the operation of VSAT system. (7)

(ii) With neat block diagram describe the function of cable television system. (7)

PART - C (1 x 10 = 10 Marks)

16. (a) An earth station antenna has a diameter of 30 *m*, has an overall efficiency of 68%, and is used to receive a signal at 4150 *MHz*. At this frequency, the system noise temperature is 79 *K* when the antenna points at the satellite at an elevation angle of 28˚. What is the earth station G/T under these conditions? If heavy rain causes the sky temperature to increase so that the system noise temperature rises to 88 *K*, what is the new G/T value? (10)

Or

(b) Describe the different rain attenuation models used to estimate the attenuation due to rain. (10)

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