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Question Paper Code: 41482

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2017

Elective

Electronics and Communication Engineering

14UEC917 - SATELLITE COMMUNICATION PRINCIPLES AND APPLICATIONS

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Low-Earth-orbit (LEO) satellites have _____ orbits.
(a) equatorial (b) polar (c) inclined (d) none of these
2. The carrier to noise ratio for a satellite depends upon
(a) Effective Isotropic Radiated power (b) Bandwidth
(c) Free space path losses (d) All the above
3. Define Universal time day
(a) $UT \text{ day} = 1/24(\text{hours} + \text{minutes}/60 + \text{seconds}/3600)$
(b) $UT \text{ day} = 1/24(\text{hours} + \text{minutes} + \text{seconds}/3600)$
(c) $UT \text{ day} = 1/24(\text{hours} + \text{minutes}/6 + \text{seconds}/360)$
(d) None of these
4. Write the equations of losses for clear sky conditions.
(a) $\text{Losses} = (\text{FSL}) + (\text{RFL}) + (\text{AML}) + (\text{AA}) + (\text{PL})$
(b) $\text{Losses} = (\text{FSL}) + (\text{RFL})$
(c) $\text{Losses} = (\text{FSL}) + (\text{AML}) + (\text{AA}) + (\text{PL})$
(d) None of these

5. A satellite downlink at 12GHz operates with a transmit power of 6w & an antenna gain of 48.2db. Calculate the EIRP in dBw.
- (a) 56dBw (b) 16dBw (c) 56dB (d) None of these
6. What is ratio of bit rate IF bandwidth?
- (a) $R_b/BH=m/(1+p)$ (b) $R_b/BH=m^2/(1+p)$
(c) $R_b/BH=m/(1+p)^2$ (d) None of these
7. The frequencies for direct broadcast satellites vary from region to region throughout the world, although these are generally in the
- (a) Ku band (b) Ka band (c) C-band (d) None of these
8. The signal from a satellite is normally aimed at a specific area called the
- (a) path (b) effect (c) footprint (d) none of these
9. The CATV system employs a single _____, with separate feeds available for each sense of polarization.
- (a) Outdoor unit (b) Indoor unit (c) TV unit (d) None of these
10. A major difference between DBS TV and conventional TV is that with DBS, _____ is used, whereas with con-ventional TV, _____in the form of vestigial single side-band (VSSB) is used.
- (a) Frequency modulation, amplitude modulation
(b) Frequency modulation, digital modulation
(c) Phase modulation, amplitude modulation
(d) None of these

PART - B (5 x 2 = 10 Marks)

11. State Kepler's first law.
12. Why do we need thermal control satellites?
13. What is an TDMA? What are the advantages?
14. What is an inter modulation noise?
15. Give the types of satellite services.

PART - C (5 x 16 = 80 Marks)

16. (a) State Kepler's three laws for planetary motion. Illustrate in each case their relevance to artificial satellites orbiting the earth. (16)

Or

- (b) Explain in detail the geocentric equatorial coordinate system which is based on the earth's equatorial plane. (16)

17. (a) Describe briefly the most common type of high power amplifying device (TWTA) used aboard a communication satellite. (16)

Or

- (b) Draw the block diagram of TT and C and explain each and individual blocks. (16)

18. (a) (i) Explain the carrier to noise ratio of uplink and downlink frequency. (8)

- (ii) Draw the block diagram and explain the receiver only home TV systems. (8)

Or

- (b) (i) Draw the block diagram and explain the system noise temperature. (8)

- (ii) Explain the EIRP and transmission losses. (8)

19. (a) Explain the principal behind spectrum spreading and despreading and how this is used to minimize interference in a CDMA system. And also determine the throughput efficiency of the system. (16)

Or

- (b) Describe the general operating principles of a TDMA network. Show how the transmission bit rate is related to the input bit rate. (16)

20. (a) Explain in detail satellite navigational system. (16)

Or

- (b) Describe the operation of typical VSAT system. (16)

