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ANNA UNIVERSITY, CHENNAI - 25
B.E. (FULL TIME) DEGREE ARREAR EXAMINATIONS, NOV./DEC.2013
ELECTRONICS AND COMMUNICATION ENGINEERING
EIGHTH SEMESTER
EC 9031 SATELLITE COMMUNICATION
(Regulation 2008)

Time: 3 Hours

Answer ALL Questions

Max.marks: 100

Part-A (10x2=20 marks)

1. State Kepler's laws of planetary motion.
2. What are the orbital elements required to specify the absolute coordinates of a satellite at a given time t ?
3. What are the effects of earth's oblateness on the orbiting satellite? Explain.
4. Differentiate between GEO and LEO.
5. Distinguish between Noise temperature and noise figure of a system.
6. Draw T1 carrier 24-channel TDM frame format and explain.
7. What do you understand by Intermodulation? How is its effect reduced in FDMA system?
8. What is the purpose of using unique word in a TDMA burst?
9. What do you understand by Global star satellite constellation? Explain.
10. List various applications of satellite systems.

Part-B (5x16=80 marks)

11. A 14/11 GHz satellite communication link has a transponder with a bandwidth of 52 MHz which is operated at an output power level of 20 W. The satellite transmit antenna gain at 11 GHz is 30 dB toward a particular earth station. Path loss to this station is 206 dB including clear air atmospheric loss. The transponder is used in FDMA mode to send 500 BPSK voice channels with half rate FEC coding. Each coded BPSK signal has a symbol rate of 50 kbps and requires a receiver with a noise bandwidth of 50 KHz per channel. The earth stations used to receive the voice signals have antennas with a gain of 40 dB (1 m diameter) and a receiver with system noise temperature of 150 K in clear air, and IF noise bandwidth of 50 KHz.
 - (i) Calculate the power transmitted by the satellite in one voice channel. (7)
 - (ii) Calculate the C/N in clear air for an earth station receiving one BPSK voice signal. (6)
 - (iii) What is the margin over a coded BPSK threshold of 6 dB? (3)

12.(a) Calculate the look angles for an earth station located at Chennai (13.1° N, 80.16° E) to the geostationary satellite EDUSAT positioned at 74° E longitude. Also comment about the visibility of EDUSAT from an earth station located at (42° N, 273° E).

OR

12.(b) Explain briefly the following for an orbital satellite

(i) Telemetry and telecommand system. (8)

(ii) Expendable and reusable launch vehicles. (8)

13.(a)(i) With the help of block diagrams, explain the QPSK modulator and demodulator. (10)

(ii) Compare the BER performance of BPSK and QPSK schemes. (6)

OR

13.(b) Explain concatenated coding and interleaving techniques used in satellite broadcasting.

14.(a) Explain the principle of operation of FDMA, TDMA and CDMA schemes used in satellite communication and compare their merits and demerits.

OR

14.(b) Explain FDM-FM-FDMA Satellite system with the help of a block diagram.

15.(a) Explain VSAT network architecture and VSAT earth station with the help of block diagrams.

OR

15.(b) Write notes on the following:

(i) Global Positioning System

(ii) DBS – TV receiver.
