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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Eighth Semester

Electronics and Communication Engineering

EC 2045/EC 810 — SATELLITE COMMUNICATION

(Regulation 2008)

(Common to PTEC 2045 — Satellite Communication for B.E (Part- Time) Seventh Semester – Electronics and Communication Engineering — Regulation 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Differentiate geo synchronous and geostationary satellites.
2. A satellite moving is orbiting in the equatorial plane with a period from period from perigee to perigee of 12 hr . Given the eccentricity is 0.002. Calculate the semi major axis. The earth's equatorial radius is 6378.1414 km.
3. What is the need for thermal control and propulsion?
4. Mention about the functions of AOCs.
5. Distinguish between preassigned and demand assigned traffic.
6. What is frequency reuse in satellites?
7. What is terrestrial interface?
8. An antenna has a noise temperature of 35 K and it is matched into a receiver which has a noise temperature of 100 K. Calculate the noise power density and the noise power for a BW of 36 MHz.
9. What is DBS?
10. List out the regions covered by INMARSAT.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Determine the look angles and the range for a geostationary satellite at 30 degrees for an ES at latitude -20 degrees. The ES is situated 1000 m above mean sea level. (6)
- (ii) State Kepler's laws as applied to satellite communication. Briefly describe the orbital parameters with the help of a diagram. (10)

Or

- (b) (i) Briefly discuss about the eclipse effect and other outages that affect the working of a geo satellite. (8)
- (ii) Determine the limits of visibility for an ES situated at mean sea level at latitude 48.42 degrees north and longitude 89.26 degrees west. (8)
12. (a) (i) Starting from fundamentals develop the Friis transmission equation for a satellite system. Discuss about the various noise sources which affects a satellite link design and develop the expression for C/N ratio at the input of an Earth station demodulator. (10)
- (ii) In a link budget calculation at 12 GHz the free space loss is 206 dB, the antenna pointing loss is 1 dB and antenna absorption is 2 dB. The receiver G/T ratio is 19.5 dB/K and receiver feeder losses are 1 dB. The EIRP is 48 dBW. Calculate the carrier-to-noise spectral density ratio. (6)

Or

- (b) What are the various elements used in the space segment of a satellite system? Explain the need and functions of each element in the satellite system. (16)
13. (a) (i) Explain the need for a reference burst and preamble in a TDMA system. Describe and compare the channels carried in a preamble with those carried in a reference burst. (12)
- (ii) Explain initial acquisition, burst synchronization, frame efficiency in relation to TDMA operation. For a TDMA network, calculate the frame efficiency given the following information. (4)
- Total Frame length = 120,832 symbols
Traffic bursts per frame = 14
Reference bursts per frame = 2
Guard interval = 103 symbols.

Or

- (b) Explain the principle behind spectrum spreading and despreading. How are these techniques used to minimize interference in CDMA systems? Also determine its throughput.

14. (a) (i) Describe and compare the master TV and community antenna TV systems. (8)
- (ii) Explain about the direct broadcast satellite service. How does it differ from home reception of satellite TV signals in the C band? (8)

Or

- (b) Write notes on:
- (i) TVRO. (8)
- (ii) Antenna gain. (8)
15. (a) (i) Discuss in detail about the GPS and GSM Mobile satellite services. (8)
- (ii) Write notes on: LEO and MEO. (8)

Or

- (b) Write in detail about the satellite services like E-mail, Video conferencing, Internet and Digital Audio Broadcast. (4 × 4)