Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 60428

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Eighth Semester

Electronics and Communication Engineering

EC 2045/EC 810/10144 ECE 52 — SATELLITE COMMUNICATION

(Regulations 2008/2010)

(Common to PTEC 2045 – Satellite Communication for B.E. (Part-Time)
Seventh Semester – Electronics and Communication Engineering –
Regulations 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. How is the attitude of a satellite controlled through active control?

4. Why the operation near the saturation point of a TWTA is to be avoided when multiple carriers are being amplified simultaneously?

5. What are spreading sequences?

6. What is meant by encryption?

7. Why is the LNA in a satellite receiving system placed at the antenna end of the feeder cable?

8. Calculate the gain and the effective area of a 30-m parabolic antenna at a frequency of 4 GHz.

9. Write the four kinds of communications that the network structure of MSAT can accommodate?

10. Write the two areas of satellite communications which are gaining major thrust from leading satellite industries and organisations in recent years.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Explain about the various Orbit perturbations. (8)

     (ii) With a neat sketch show the various stages involved in satellite launch. (8)

Or

    (b) Derive from basic principles, the orbital velocity of a satellite and calculate the same, if it is a circular orbit. (16)

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) Briefly discuss about analog voice transmission. (16)

Or

    (b) Compare the salient features of FDMA, TDMA and CDMA. (16)

14. (a) Show how MATV is used to provide reception of DDS to a small group of users. When this group is large what type of antenna should be used? Explain.

Or

    (b) Analyse the functioning of Transmit-Receive Earth stations. With a block diagram explain how the redundant earth station functions.

15. (a) In detail, discuss on a complete and detailed overview on various mobile satellite services. Provide all required diagrams. (16)

Or

    (b) Give a detailed note on :

     (i) DTH and world space receivers. (10)

     (ii) Satellite Navigation System. (6)