Reg. No. :

Question Paper Code : 41230

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2013.

Seventh Semester

Electronics and Communication Engineering

EC 1403 – SATELLITE COMMUNICATION

(Regulation 2008)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How is the world divided to facilitate frequency planning for satellite services?

2. What are Julian dates?

3. Distinguish between Geosynchronous and Geostationary orbits.

4. What are the needs for station keeping?

5. What are the effects of rain over space link?

6. Define : Fade margin.

7. List the advantages of CDMA especially where VSAT type terminals are involved.

8. What is meant by thin route service?

9. List the types of maps.

10. How many satellites are in the space for providing GPS data?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Describe the effect of orbit perturbations due to the effects of a nonspherical Earth and atmospheric drag.   (8)

    (ii) Explain what is meant by apogee height and perigee height. A satellite has an apogee of 39, 342 km and a perigee of 613 km. Determine the semi major axis and the eccentricity of its orbit (Earth radius = 6371 km).   (8)

Or

(b) (i) Describe the method of finding the position vector R of the Earth relative to the IJK frame. (8)

(ii) Calculate the magnitude of the position vector in the PQW frame for the orbit with $\Omega = 300°$, $w = 60°$, $i = 65°$, $r_p = -6500$ km and $r_Q = 4000$ km. Calculate also the position vector in the IJK frame and its magnitude. Confirm the magnitude of r vector unchanged in both frames. (8)

12. (a) (i) An earth station is located at latitude 12°S and longitude 52°W. Calculate the antenna look angles for a satellite at 70°W. (8)

(ii) Show and explain the Earth eclipse of satellite. How this can be overcome by the satellites? (8)

Or

(b) Explain attitude control of satellites. With neat diagrams explain the spinning satellite stabilization and momentum wheel stabilization. (16)

13. (a) (i) Draw the detailed block diagram of a transmit receive earth station and explain. (8)

(ii) Describe and compare MATV and CATV systems. (8)

Or

(b) (i) Derive expression for the link power budget of a satellite system. (8)

(ii) What is saturation flux density? If the power received by a 1.8 m parabolic antenna at 14 GHz is 250pW, then calculate the saturation flux density. (8)

14. (a) (i) What is a SPADE system? Explain its channeling scheme and operation. (8)

(ii) Explain preassigned TDMA and Demand assigned TDMA in detail. (8)

Or

(b) (i) Describe the conventional approach and group signal processing of on-board signal processing for FDMA/TDM operation. (8)

(ii) Describe how signal acquisition and tracking are achieved in a DS/SS system. (8)

15. (a) (i) Describe the visual interpretation of satellite images. What are the elements of interpretation? Explain. (8)

(ii) Explain the various image enhancement schemes. (8)

Or

(b) (i) Explain the significance of integrating GIS and remote sensing. What are their applications? (8)

(ii) Write a detailed notes on GPS and its application in GIS. (8)