ECE
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Reg. No. | | | | | | | | | | | | |

**Question Paper Code : 52581**

**B.E/B.Tech. DEGREE EXAMINATION, APRIL 2016**

**Eighth Semester**

**Electronics and Communication Engineering**

**EC 2045 / EC 810 / 10144 ECE 52 – SATELLITE COMMUNICATION**

**(Regulations 2008/2010)**

**Time : Three Hours** **Maximum : 100 Marks**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. Identify the basic factors affecting satellite position.

2. The limits of visibility depends on what factors ? Considering an earth station at the equator, with the antenna pointing either west or east along the horizontal calculate the limiting angle.

3. Why should an omnidirectional antenna be used aboard a satellite for telemetry and command during the launch phase ?

4. Define the Station keeping process.

5. Distinguish centrally controlled random access for satellite access from distributed – control random access.

6. Television transmission may be classified as full-transponder or half-transponder transmission. State what this means in terms of transponder access.

7. State the reason for the high power amplifier in earth stations deploying some sort of redundancy configuration.

8. What is the basic form of a cassegrain antenna ?

9. Write the principle behind DTH and GPS.

10. An intelligent VSAT must use what type of networking to permit the maximum utilization of the satellite capacity ?

## PART – B (5 × 16 = 80 Marks)

11. (a) (i) Derive suitable equations for look angles and the range for geostationary satellite. **(8)**

(ii) Write down the three Kepler's laws of planetary motion and enlist the various orbital parameters. **(8)**

**OR**

(b) (i) Explain any one type of launching procedure. **(8)**

(ii) A satellite in polar orbit has a perigee height of 600 km and an apogee height of 1200 km. Calculate the mean motion and the rate of regression of the nodes. Assume the polar radius of the earth to be equal to 6357 kms. **(8)**

12. (a) (i) Consider a transmit earth station operating at an uplink frequency of 6 GHz. The antenna diameter is 7 m with an efficiency of 60%. The antenna tracking loss and atmospheric attenuation is 1.2 dB. The uplink slant range is 37506 km. What is the required output power (dBW) of the HPA system at the antenna feed to provide a – 80 dBW/$m^2$ power flux density at the satellite ? **(8)**

(ii) Write a brief note on the Communication payload and supporting subsystems. **(8)**

**OR**

(b) (i) For a satellite circuit the carrier-to-noise ratios are : uplink 23 dB, downlink 20 dB, intermodulation 24 dB. Calculate the overall carrier-to-noise ratio in decibels. Suggest a method to reduce intermodulation noise. **(8)**

(ii) Discuss about the system reliability and design life time of the space segment. **(8)**

13. (a) (i) Give the diagrammatic representation of a spade communication system and explain how this is used on Intelsat satellites. **(8)**

(ii) Analyse the "frequency reuse" process and give the merits of spread spectrum communication. **(8)**

**OR**

(b) Compare the features of the various multiple access schemes deployed for satellite access. **(16)**

14. (a) With a neat block diagram explain the functional elements of a basic digital earth station and also the main elements of a satellite tracking system. **(16)**

**OR**

(b) Summarise the procedures involved in Test equipment measurements on G/T, C/No and EIRP with reference to the Earth segment. **(16)**

15. (a) Discuss how the specialised services like E-mail, Video conferencing and Internet have revolutionised the present day communication scenario along with their working principle respectively. **(16)**

**OR**

(b) Describe the main features and services offered by Mobile Satellite Systems. **(16)**

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