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Question Paper Code : 80511

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

Fifth/Sixth/Seventh/Eighth Semester

Electronics and Communication Engineering

EC 8094 – SATELLITE COMMUNICATION

(Common to: Electronics and Telecommunication Engineering/Geoinformatics Engineering)

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. A satellite is orbiting in the equatorial plane with a period from perigee to the perigee of 15 hours. The eccentricity is 0.002 and the inclination of the orbit is zero degree $K_1 = 66063 \text{ km}^2$, $\mu = 4 \times 10^{14} \text{ m}^3/\text{s}^2$ and the earth's equatorial radius 6378014 km. Calculate the semi major axis.
2. State Kepler's third law.
3. How azimuth angle is important? Brief the concept.
4. Define Input back-off.
5. Outline the impact of system noise and write about noise factor.
6. Specify the effects of rain fall over the satellite space link.
7. Whether FDMA satellite access is limited? Justify.
8. Classify multiple access techniques based on the assignment of users.
9. Mention the components and services of GPS.
10. What do you mean by Digital audio broadcast and Digital broadcast satellite? How do they differ?

PART B — (5 × 13 = 65 marks)

11. (a) Derive the necessary equation for a satellite orbit and the launching procedures methods explain in detail.

Or

- (b) Give explanation in detail about the geocentric-equatorial coordinate system which is based on the earth's equatorial plane.

12. (a) Specify the systems essential for tracking satellites? How tracking a satellite could be affected? Explain the main functions of TTC subsystem in detail.

Or

- (b) What do you mean by satellite attitude. Elucidate in detail the attitude control with a relevant diagrams.

13. (a) Explain the effects of rain in satellite communication with necessary equations.

Or

- (b) (i) How intermodulation noise arises in the satellite link? How it is eliminated? Explain in detail. (7)

- (ii) Why various budgets in a communication transceiver are considered in the design? Obtain the various budget equations. (6)

14. (a) Compare and contrast various modulation schemes in detail. Discuss the functional block diagram of digital modulation transmitter and receiver in detail.

Or

- (b) Explain TDMA burst and frame structure of satellite system and support with a neat sketch.

15. (a) Why satellite navigation system is required? Discuss on the global positioning system services in detail.

Or

- (b) Present and discuss the functional block diagram of a Digital TV broadcast receiver in detail.

PART C — (1 × 15 = 15 marks)

16. (a) Statement: A "STUDUSAT" satellite requires variety of antennas to establish communication. Discuss on the design and performance of various antennas with their parameters.

Or

- (b) How mobility and frequency reuse play a major role in communication? Discuss in detail the mobile services that are utilized in satellite communication.
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