



Mid Term Evaluation (Even) Semester Examination March 2025

Roll no.

Name of the Course: B.Tech
Semester: VIII
Name of the Paper: Satellite Communications
Paper Code: TEC 801
Time: 1.5 hour

Maximum Marks: 50

Note:

- (i) Answer all the questions by choosing any one of the sub-questions
- (ii) Each question carries 10 marks.

Q1. (10 Marks) CO: 1
a. Explain the key satellite parameters such as altitude, inclination, orbital period, and footprint. How do these parameters influence satellite communication performance?

OR

b. The orbital for a satellite orbit has an eccentricity of 0.15 and a semi-major axis of 9000 km. Determine (1) Periodic Time (2) Apogee Height (3) Perigee height. Assuming earth radius 6370 km, $\mu = 3.986 \times 10^{14} \text{ Nm}^2/\text{kg}$

Q2. (10 Marks) CO: 1
a. Explain the Kepler's law of planetary motion. Briefly discuss the various types of orbits.

OR

b. The apogee and perigee of an elliptical satellite orbits are 3000 km and 200 km. Determine the eccentricity and semi-minor axis.

Q3. (10 Marks) CO: 1, 2
a. Explain the following with respect to Satellite: (i) Satellite Axis (ii) Ascending Node (iii) Descending Node (iv) Perigee (v) Apogee.

OR

b. A geostationary satellite orbits the Earth at an altitude of 35,786 km above the Earth's surface. Given that the Earth's radius is 6378 km and using Kepler's Third Law, calculate the orbital period of the satellite. Assume $G = 6.674 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$ and $M = 5.972 \times 10^{24} \text{ kg}$. (10 marks)

Q4. (10 Marks) CO: 2
a. Describe the telemetry, tracking and command facilities of a satellite communication system.

OR

b. What do you understand by satellite subsystems? Explain the Altitude and Orbit Control (AOC) Subsystem.

Q5. (10 Marks) CO: 2
a. Write short notes on Reliability and spot beam.

OR

b. What is meant by look angle? Explain them with reference to a geostationary satellite and earth station.