

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI  
(END SEMESTER EXAMINATION)**

**CLASS: B.Tech  
BRANCH: ECE**

**SEMESTER : 7th  
SESSION : MO/2025**

**SUBJECT: EC417 SATELLITE COMMUNICATION**

**TIME: 3 Hours**

**FULL MARKS: 50**

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
- 

		<b>CO</b>	<b>BL</b>
Q.1(a)	Explain how Keplers's and Newton's law are used to describe the orbit.	[5]	1,2 II
Q.1(b)	A satellite moving in a circular orbit at a height of 150km above the surface of earth .If the radius of earth is 6360km,determine the orbital velocity and orbital period of the satellite.( $G=6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}$ , $M=5.58 \times 10^{24} \text{ kg}$ )	[2.5x2=5]	1,2 III
	Determine the orbit eccentricity of a satellite moving in a elliptical eccentric orbit having semi-major axis equals 16000km .If the difference between apogee and perigee is 25000km,and the earth radius is 6360km.		
Q.2(a)	How will you calculate system noise temperature in earth station receiver .Explain with diagram	[5]	2,3 III
Q.2(b)	An earth station antenna has a diameter of 40m,has an overall efficiency of 70%,and is used to receive a signal at 4000MHZ.The system noise temperature is 79 K at this frequency when antenna points at the satellite at an elevation angle of 28°.What is earth station G/T ratio? If system temperatures increases to 88K ,What is new G/T value?	[5]	2,3 III,IV
Q.3(a)	Explain how the attitude and orbit control system (AOCS) is achieved through spin stabilization system?	[5]	3 IV
Q.3(b)	What is the need to calculate the reliability of a satellite subsystem? What is bath tub curve? Prove that probability of a device failing exponentially with MTBF.	[5]	3 III,IV
Q.4(a)	What is the basic principle of TDMA used in satellite communication. Explain TDMA frame structure.	[5]	4 IV
Q.4(b)	What is CDMA scheme. Explain spread spectrum technique?	[5]	4 II,III
Q.5(a)	What are the different Network Architecture used in VSAT systems.? Explain in brief.	[5]	5 IV,V
Q.5(b)	What are the Principles used for GPS position locations? What type of code is used in GPS receiver. What is significance of GPS time?	[5]	5 IV

:::20/11/2025:::M