Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering - SEMESTER - VII EXAMINATION - WINTER 2025

Subject Code: 3170114 **Date: 13-11-2025**

Subject Name: Space Flight Mechanics

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

			Marks
Q.1	**(a)**	Define Space and mention the types of space vehicles.	**03**
	(b)	Explain Newton's law of Gravitation.	**04**
	(c)	Describe the geometry of conic sections in detail.	**07**
Q.2	**(a)**	State and explain Kepler's Laws of planetary motion.	**03**
	(b)	Explain the mechanics of circular orbits.	**04**
	(c)	Explain the Hohmann Transfer with a neat sketch.	**07**
		OR	
	(c)	Derive the Orbit Equation.	**07**
Q.3	**(a)**	What is a Dual Spin Satellite?	**03**
	(b)	Differentiate between rigid body dynamics and attitude dynamics.	**04**
	(c)	Explain different methods of Attitude Control for a satellite.	**07**
		OR	
	(a)	Define a dual-spin satellite.	**03**
	(b)	Describe the principles of rigid body dynamics	**04**
	(c)	Explain the need for attitude control in a spacecraft.	**07**
Q.4	**(a)**	List the different types of atmospheric entry paths.	**03**
	(b)	Explain the concept of entry heating during atmospheric reentry.	**04**
	(c)	Discuss the equation of motion for atmospheric entry.	**07**
		OR	
	(a)	Differentiate between ballistic entry and lifting reentry.	**03**
	(b)	Explain the application of lifting reentry to the Space Shuttle.	**04**
	(c)	Describe the challenges of reentry dynamics.	**07**
Q.5	**(a)**	Describe the geometry of conic sections as applied to orbits.	**03**

(b)	Explain the two-body problem in space flight mechanics.	**04**
(c)	Explain the energy balance in orbits.	**07**

OR

(a)	What is the definition of space?	**03**
(b)	Briefly explain the concept of Central Force motion.	**04**
(c)	Explain the concept of re-entry of space vehicles.	**07**

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