Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170114 Date:08-05-2025

Subject Name:Space Flight Mechanics

Time:02:30 PM TO 05:00 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)**	What is Space? Is there gravity in space?	**03**
	(b)	What is zero potential energy configuration?	**04**
	(c)	Derive orbit equation.	**07**
Q.2	**(a)**	Is there gravity in space? Justify.	**03**
	(b)	Write difference between Elliptical and Circular orbit.	**04**
	(c)	Write a short note Escape Velocity.	**07**
		OR	
	(c)	Explain The Two body problem.	**07**
Q.3	**(a)**	Derive the external force acting on rigid body by using Newton's second law of motion.	**03**
	(b)	State and Prove Kepler's 3rd law.	**04**
	(c)	Briefly classify Space vehicles.	**07**
		OR	
Q.3	**(a)**	Explain Mechanics of Circular Orbit.	**03**
	(b)	Explain Gravitational potential energy.	**04**
	(c)	Explain Hohmann transfer ellipse.	**07**
Q.4	**(a)**	Write a short note on Rigid body.	**03**
	(b)	Write a note on skip reentry dynamics.	**04**
	(c)	Explain different types of entry paths.	**07**
		OR	
Q.4	**(a)**	Explain Entry heating.	**03**
	(b)	Explain steep ballistic reentry.	**04**
	(c)	With neat sketches explain different space trajectories and its physical significance.	**07**
Q.5	**(a)**	What is gyrostat?	**03**
	(b)	Explain non spinning satellite of attitude control.	**04**
	(c)	Establish a relation between Impulse and change in momentum.	**07**
		OR	
Q.5	**(a)**	Explain Escape velocity. Calculate the same for an object escaping from the earth's surface.	**03**
	(b)	What are the functions of (a) Heat Shield & (b) Back Shell?	**04**
	(c)	Define Entry heating. Derive an expression for aerodynamic heating rate.	**07**

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