Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VIII.EXAMINATION – WINTER 2016

Subject Code: 180103 **Date: 20/10/2016**

Subject Name: Space Dynamics

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.**

Q.1	**(a)**	Write a note on Newton's Law of Gravitation in detail.	**07**
	(b)	State and Prove Kepler's laws.	**07**
Q.2	**(a)**	What is Space? What are the types of space vehicles?	**07**
	(b)	Explain the Concept of Entry Corridor.	**07**
		OR	
	(b)	1. Determine the mass of the space dynamics student if the force of attraction between earth and the student is 800 N. 2. With neat sketches explain primary phases of space mission.	**07**
Q.3	**(a)**	What do you mean by Entry heating? Derive an expression for aerodynamic heating rate.	**07**
	(b)	Write a note on Deep Space.	**07**
		OR	
Q.3	**(a)**	Write a short note on Different types of Entry Paths.	**07**
	(b)	Write a short note on Hohmann transfer ellipse.	**07**
Q.4	**(a)**	Derive Orbit equation.	**07**
	(b)	With neat sketch explain an elliptic orbit.	**07**
		OR	
Q.4	**(a)**	1. What is Zero Potential Energy configuration? 2. It is possible to simulate "weightless" conditions by flying a plane in an arc such that the centripetal acceleration exactly cancels the acceleration due to gravity. Such a plane was used by NASA while training astronauts. What would be the required speed at the top of an arc of radius 900 m?	**07**
	(b)	Explain India's Mars Orbiter Mission in your own words.	**07**
Q.5	**(a)**	Derive equation of motion for a vehicle entering into the atmosphere.	**07**
	(b)	1. Find velocities required to obtain a circular orbit and parabolic trajectory for earth. 2. Explain Gravitational Potential Energy.	**07**
		OR	
Q.5	**(a)**	From Orbit equation derive eccentricity in terms of difference between kinetic energy and potential energy.	**07**
	(b)	Write a note on Escape Velocity in detail.	**07**

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