

# GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019

**Subject Code:2180103**

**Date:09/05/2019**

**Subject Name:Space Dynamics**

**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.

		MARKS
<b>Q.1</b>	(a) Define Space. How physical fundamentals for space vehicle are different from those associated with airplanes?	<b>03</b>
	(b) Classify Space vehicles.	<b>04</b>
	(c) With neat sketch explain different phases of space mission.	<b>07</b>
<b>Q.2</b>	(a) Write a note on Gravitational potential energy.	<b>03</b>
	(b) With neat sketch explain terminology of elliptic orbit.	<b>04</b>
	(c) Explain Newton's law of gravitation in detail.	<b>07</b>
	<b>OR</b>	
	(c) Define Attitude Maneuver. How to measure it? Explain any one method of its measurement?	<b>07</b>
<b>Q.3</b>	(a) Explain Entry heating.	<b>03</b>
	(b) Derive an equation to calculate aerodynamic heating rate.	<b>04</b>
	(c) Derive general equation of motion for a vehicle entering the atmosphere.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Explain Escape velocity.	<b>03</b>
	(b) Compare Slender body and blunt body for entry heating performance.	<b>04</b>
	(c) Explain briefly magnetic disturbance torque acting on vehicle revolving in earth's orbit.	<b>07</b>
<b>Q.4</b>	(a) Explain zero potential energy configuration.	<b>03</b>
	(b) Explain Kepler's 1 <sup>st</sup> and 2 <sup>nd</sup> laws.	<b>04</b>
	(c) Explain different types of entry paths.	<b>07</b>
	<b>OR</b>	
<b>Q.4</b>	(a) Calculate escape velocity required for a body to escape from the earth's atmosphere.	<b>03</b>
	(b) With neat sketches explain different trajectories and its physical significance.	<b>04</b>
	(c) Using Newton's Law of motion derive, $\mathbf{F}_e = \mathbf{M} \times \frac{d^2 \mathbf{r}_c}{dt^2}, \text{ Where } \mathbf{r}_c = \text{Position of center of mass}$	<b>07</b>
<b>Q.5</b>	(a) Write a note on mechanics of circular orbits.	<b>03</b>
	(b) Derive an equation for eccentricity in terms of the difference between kinetic and potential energy.	<b>04</b>
	(c) Write a note on N-body problem.	<b>07</b>
	<b>OR</b>	
<b>Q.5</b>	(a) Explain the concept of Rigid body	<b>03</b>
	(b) State and prove Kepler's 3 <sup>rd</sup> law.	<b>04</b>
	(c) Write a short note on Hohmann transfer ellipse.	<b>07</b>

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