

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – SUMMER 2021****Subject Code:2180103****Date:03/08/2021****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.

	<b>MARKS</b>
<b>Q.1</b> (a) Define: Space, Apogee & Perigee.	<b>03</b>
(b) Explain Newton's law of gravity.	<b>04</b>
(c) Classify Space vehicles	<b>07</b>
<b>Q.2</b> (a) Write a note on Gravitational potential energy.	<b>03</b>
(b) Write a note on Circular orbits.	<b>04</b>
(c) Derive Orbit equation.	<b>07</b>
<b>OR</b>	
(c) Explain the following equation of external force acting on rigid body using Newton's Law of Motion.	<b>07</b>
$F_e = M \times \frac{d^2 r_c}{dt^2}$ , Where $r_c$ = Position of Centre of mass	
<b>Q.3</b> (a) What is Escape Velocity? Calculate escape velocity for an object on the earth.	<b>03</b>
(b) Write a note on Elliptic Orbits.	<b>04</b>
(c) Prove that aerodynamic heating rate varies as the cube of the velocity.	<b>07</b>
<b>OR</b>	
<b>Q.3</b> (a) How would you define zero potential energy? Explain	<b>03</b>
(b) Explain Kepler's 1 <sup>st</sup> and 2 <sup>nd</sup> laws.	<b>04</b>
(c) With neat sketches explain different trajectories and its physical significance.	<b>07</b>
<b>Q.4</b> (a) Explain Zero potential energy concept.	<b>03</b>
(b) Write a note on Dual Spin Satellite.	<b>04</b>
(c) Discuss different types of Entry paths.	<b>07</b>
<b>OR</b>	
<b>Q.4</b> (a) What is Attitude Maneuver? Explain.	<b>03</b>
(b) Compare Slender body and blunt body for entry heating performance.	<b>04</b>
(c) Explain Kepler's 3 <sup>rd</sup> law.	<b>07</b>
<b>Q.5</b> (a) Explain reentry dynamics in short.	<b>03</b>
(b) Explain briefly magnetic disturbance torque acting on vehicle revolving in earth's orbit.	<b>04</b>
(c) Write a note on Two-body problem.	<b>07</b>
<b>OR</b>	
<b>Q.5</b> (a) Calculate Circular velocity for a satellite to remain in circular orbit about the earth.	<b>03</b>
(b) Write a note on characteristics of Central force motion.	<b>04</b>
(c) Write a short note on Hohmann transfer ellipse.	<b>07</b>

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