Seat No.: _____ Enrolment No.



# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–VIII (NEW) - EXAMINATION – SUMMER 2018**

**Subject Code: 2180103 Date: 30/04/2018**

**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.**

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|---|---|---|---|
| **Q.1** | **(a)** | What is Space? Why the dynamics of space objects are important to study? | **03** |
| | **(b)** | Is there gravity in Space? Yes or No. Explain in detail. | **04** |
| | **(c)** | Explain different types of entry paths. | **07** |
| **Q.2** | **(a)** | What are the different phases of Space mission? | **03** |
| | **(b)** | Explain zero potential energy configurations. | **04** |
| | **(c)** | Derive Angular momentum and Energy using wheel and axle theory. | **07** |
| | | **OR** | |
| | **(c)** | Find the values of velocity required to obtain a circular orbit and parabolic trajectory for earth. | **07** |
| **Q.3** | **(a)** | Explain different types of space vehicles. | **03** |
| | **(b)** | Write difference between Elliptical and Circular orbit. | **04** |
| | **(c)** | Write a note on Elliptic orbit. | **07** |
| | | **OR** | |
| **Q.3** | **(a)** | Explain initial stages of any space mission. | **03** |
| | **(b)** | Explain the Concept of Entry Corridor. | **04** |
| | **(c)** | Explain mechanics of Circular orbit. Also list important points for the same. | **07** |
| **Q.4** | **(a)** | Define Entry heating. | **03** |
| | **(b)** | What do you mean by Rigid Body? | **04** |
| | **(c)** | Derive general equation of motion for a vehicle entering the atmosphere. | **07** |
| | | **OR** | |
| **Q.4** | **(a)** | What is Gyrostat? | **03** |
| | **(b)** | Explain the working of Rotor and Platform with neat sketch. | **04** |
| | **(c)** | Derive an expression for aerodynamic heating rate. | **07** |
| **Q.5** | **(a)** | What do you mean by dual spin satellite? | **03** |
| | **(b)** | Comment on Two body problem. | **04** |
| | **(c)** | Explain the working of dual spin satellite with neat sketch. | **07** |
| | | **OR** | |
| **Q.5** | **(a)** | What do you mean by Deep space? | **03** |
| | **(b)** | What is Escape velocity of Spacecraft? | **04** |
| | **(c)** | From orbit equation, derive formula to calculate eccentricity in terms of the difference between kinetic energy and potential energy. | **07** |

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