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Total No. of Printed Pages: [01]

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B. Tech. (Aerospace Engg.) (Semester – 5th)

SPACE FLIGHT MECHANICS

Subject Code: BASES1-501

Paper ID: [19113013]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a) Define Newton's law of motion.
- b) write the Equations of relative motion.
- c) Define the energy law.
- d) Compare between circular & elliptical orbits.
- e) Write the Kepler equation.
- f) What is two body motion?
- g) Define Non-Keplerian Motion.
- h) Write about the orbit maneuvers.
- i) Define the earth spherical potential.
- j) Discuss about the Interplanetary Trajectories.

Section – B

(5 marks each)

- Q2. Explain, how a spacecraft's position changes over time relative to its surroundings?
- Q3. Derive the Equations of relative motion, and the orbit formulas.
- Q4. Illustrate the different methods of solution to Lambert problem.
- Q5. Discuss about the atmospheric drag effects on non-Keplerian Motion.
- Q6. Explain the Interplanetary Hohmann transfers.

Section – C

(10 marks each)

- Q7. (a) Explain the Heun's predictor-corrector numerical technique.
(b) How Heun's predictor-corrector method is more accurate than the Euler method.
- Q8. Explain the following.
(a) Circular orbits (b) Elliptical orbits (c) Parabolic trajectories (d) Hyperbolic trajectories.
- Q9. (a) How planetary flyby is useful in space missions to alter the trajectory of spacecraft.
(b) Discuss about the non-Hohmann interplanetary trajectories.