USN | | | | | | | | | | | **18AS45**

Fourth Semester B.E. Degree Examination, July/August 2022
Introduction to Space Technology

Time: 3 hrs.   Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Derive Tsiolkovsky rocket equation which assumes that the specific impulse is constant in time. **(09 Marks)**
   b. Write the formula of velocity increase in the case of a two-stage launcher. **(06 Marks)**
   c. Describe specific impulses. **(05 Marks)**

OR

2 a. Derive the complete equation of motion for a rocket. **(06 Marks)**
   b. Derive Rocket equations for
       i)   Boast phase: Burnout time, velocity and altitude
       ii) Coast phase: altitude and time. **(14 Marks)**

Module-2

3 a. Draw and explain significant forces on a reentry vehicle. **(08 Marks)**
   b. Describe Aerobraking. **(06 Marks)**
   c. Explain different modes of heat transfer. **(06 Marks)**

OR

4 a. Explain high ballistic coefficient and low ballistic coefficient. **(08 Marks)**
   b. Describe heating rate. **(06 Marks)**
   c. Explain lifting body reentry. **(06 Marks)**

Module-3

5 a. Explain orbital elements with neat diagram. **(10 Marks)**
   b. Describe uniform circular motion. **(06 Marks)**
   c. Explain Elliptic orbit. **(04 Marks)**

OR

6 a. Explain Bi-elliptical transfer. **(10 Marks)**
   b. With neat diagram, explain Kepler laws of planetary motion. **(10 Marks)**

Module-4

7 a. Describe prigerade and retrograde precession. **(10 Marks)**
   b. Explain yo-yo mechanism. **(10 Marks)**

OR

8 a. Explain passive actuators used in attitude control. **(10 Marks)**
   b. Explain gravity gradient satellite with example. **(10 Marks)**

Module-5

9 a. Explain supporting ground system architecture and team interfaces. **(10 Marks)**
   b. Explain space mission operations architecture. **(10 Marks)**

OR

10 a. Explain space mission activities. **(12 Marks)**
    b. Describe mission diversity. **(08 Marks)**

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