



INSTITUTE OF AERONAUTICAL ENGINEERING (Autonomous)

B.Tech VI Semester End Examinations (Regular), November – 2020

Regulation: IARE–R16

SPACE PROPULSION

Time: 2 Hours

(AE)

Max Marks: 70

Answer any Four Questions from Part A

Answer any Five Questions from Part B

PART – A

1. Explain Kepler's law of planetary motion. [5M]
2. Illustrate the general principle of a rocket motor with the help of a suitable diagram. [5M]
3. Classify various types of propellant grain configuration. [5M]
4. Compare the features of large liquid propulsion engines and small auxiliary engines and explain them. [5M]
5. Enumerate the future applications of electric propulsion systems. [5M]
6. Describe thermal rockets with diagram. [5M]
7. Explain the various applications of the rockets. [5M]
8. Mention the selection criteria of solid propellant rocket engine and give its importance. [5M]

PART – B

9. Discuss about classical orbit elements (COE) with a neat sketch. [10M]
10. A rocket of total mass 80 tonnes, carrying a spacecraft of 0.75 tonne. The engine develop a constant exhaust velocity of 2800 m/s. The structural mass is assumed to be 10% of the fuel mass. Find out the velocity of the rocket if it is a i) single stage rocket and ii) two stage rocket. [10M]
11. How space engines are different from the regular combustion engines? [10M]
12. Determine the equation for estimation of solid propellant adiabatic flame temperature. [10M]
13. Describe the concept of Erosive burning in solid propellant rockets. [10M]
14. Elaborate briefly the components of a typical thrust chamber with the help of adiagram. What are the types of injectors used in the thrust chamber? [10M]
15. Explain the concept of hybrid propellant rockets and mention its merits and demerits. [10M]
16. Elucidate the operating principle of arc jet propulsion with neat sketches. [10M]
17. Describe the principle of nuclear rockets. Explain solar sail and its advantages. [10M]
18. Classify various types of rocket nozzles. Explain the operating principle of pulsed rocket motor. [10M]