Code No: 56072 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, June - 2022
AEROSPACE PROPULSION - II
(Aeronautical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
- - -

1.a) What is the enabling Technologies essential for high-speed vehicles?
b) Explain the need for Trans-atmospheric vehicle. What are the enabling technologies essential for hypersonic speeds? [7+8]

2.a) Explain the concept and use of Dual-mode engines. With neat diagrams of the shock pattern in the isolator, explain the operation of the dual-mode Ram/Scram jet engine.
b) Explain the need for supersonic combustion beyond flight speeds of Mach 4.0. [7+8]

3.a) What are the requirements of chemical rocket propellants?
b) What is meant by chemical equilibrium of the expansion process? Differentiate between frozen equilibrium and shifting equilibrium conditions in the expansion process. [7+8]

4.a) What is the function of an injector in liquid propellant rocket? Explain different types of injectors used.
b) What are different types of feed systems in liquid propellant rocket? Draw a neat diagram and indicate different parts. [7+8]

5.a) Discuss the desirable characteristics of solid propellants.
b) Define solid propellant burning rate. What are the parameters that control the burning rate? Explain the effect of propellant grain temperature on the burning rate. [7+8]

6.a) Explain the operation of Resisto-jet and Arc-jet engines with neat diagrams. What are applications of electro-thermal thrusters?
b) Explain briefly the operating principles of different types of electrical thrusters. With a neat diagram, explain the operation of a Hall Effect Thruster. [7+8]

7.a) Briefly explain the operation of solid core nuclear rocket with a neat sketch.
b) Explain the nuclear propulsion briefly. [7+8]

8.a) What is meant by the space-charge limitation of Ion Thruster?
b) Explain the functioning of an electric microthruster with a neat diagram. What are the applications of electric microthrusters? [7+8]

---ooOoo---