R09

Code No: 58095

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, April - 2018
LAUNCH VEHICLE AND MISSILE TECHNOLOGY
(Aeronautical Engineering)

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

Answer any Five Questions
All Questions Carry Equal Marks
- - -

1.a) Describe the mission profile of a typical satellite launch vehicle flight.
b) Compare the different propulsion systems used in a rocket.
c) Why is staging necessary for a missiles and satellite vehicles? [5+5+5]

2.a) Describe the Solid Booster of Space Shuttle of USA.
b) Describe the different types of igniters for solid rocket motors.
c) Explain the design of a nozzle of a solid motor. [5+5+5]

3.a) Sketch the layout of a liquid propellant rocket, show all the parts and explain them in detail.
b) What is the need for valves in a liquid rocket? Describe in detail.
c) What is geysering? What is its effect on the performance of the propulsion?
d) What is a cryogenic stage? Describe its parts. [15]

4.a) What are the effects of wind on a rocket structure and on the flight of a rocket?
b) Explain the design considerations for the reentry vehicle.
c) What are the airframe components of a satellite launch vehicle? What are the forces acting on them? [5+5+5]

5.a) Derive the rocket equation. State your assumptions clearly.
b) Derive an expression for the cut-off velocity of a rocket in vertical flight in vacuum in terms of the motor exhaust jet velocity, initial mass of the rocket and propellant mass. State your assumptions clearly. [6+9]

6.a) Describe the different techniques used to separate a stage, after its burn-out, from the main rocket system.
b) Sketch the different thrust vector control systems used in a solid propellant system and explain their functioning. [9+6]

7.a) Describe the instrumentation required for flight testing of a liquid rocket engine performance.
b) Describe the procedure involved in launching a typical space launch vehicle. [9+6]

8.a) What are the materials used in structures of a rocket that have to endure high temperatures? State their compositions and properties.
b) What are the materials used in cryogenic stages? Explain in detail. [8+7]

--ooOoo--