

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOV/DEC, 2009
ROCKETS AND MISSILES
(AERONAUTICAL ENGINEERING)

Time: 3hours

Max.Marks:80

Answer any FIVE questions
All questions carry equal marks

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- 1.a) Describe the ignition process in a solid propellant rocket motor.
b) Differentiate between pyrotechnique ignition and spark plug ignition. [8+8]
- 2.a) Sketch and explain the configuration of a liquid engine.
b) Describe and discuss the advantages of different types of injectors.[10+6]
- 3.a) What are the forces acting on a rocket in atmospheric flight?
b) Explain the methods used to theoretically estimate the drag coefficients of a rocket.
c) Discuss what is meant by 'rocket dispersions' and how they are estimated. [4+8+4]
- 4.a) Derive Tsiolkovsky's equation.
b) Derive an expression for the culmination altitude of a rocket in gravity turn. Make suitable assumptions for the expression of thrust. [6+10]
- 5.a) Derive the expression for the maximum ideal burn-out velocity of a multi-stage rocket of 'n' stages in free space.
b) Derive the expression for the maximum ideal burn-out velocity of a two stage rocket of identical structural efficiencies. [10+6]
6. Explain with neat sketches attitude control of solid and liquid propellant rockets. What are the problems encountered in each of them? [16]
- 7.a) Describe 'safe separation' of stages of a multi-stage rocket system.
b) Set up the equations of dynamics of separation of parallel stages and of pay load. [4+12]
8. Explain how you would select materials for different parts of a nozzle of a solid or liquid rocket. What are the materials that are used? [16]
