Code.No: 37168 | R05 | SET-3

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. Describe pyrotechnique and pyrogen igniters and the design processes involved. [16]

2.a] Explain the advantages and disadvantages of pressure feed and turbo-pump feed liquid propellant rocket engines. Describe one of them fully.
b] Which system (pressure or turbofed) do you recommend for a large booster of a rocket and why? [12+4]

3.a] Describe and explain the aerodynamic forces and moments affecting the lateral motion of a rocket.
b] Describe the various aerodynamic configurations of the different external components of a rocket or a satellite launch vehicle. [8+8]

4.a] Set up the equations of motion for rocket in free space and in homogeneous gravitational field. The rocket may be assumed to be a point mass in vacuum.
b] Derive the expression for culmination altitude of a rocket in homogeneous space, assuming a constant pitch angle. Suitable assumption may be made for the thrust. [6+10]

5. Explain the following. :
[a] Advantage of multi-staging [b] Forces acting on a rocket in vertical ascent
[c] Constant specific force [d] Parallel staging [4+4+4+4]

6.a] Explain secondary injection thrust vector control in a solid propellant motor.
b] A rocket flight requires thrust variation during its flight, but the variation of thrust with time is known before the design. Should a liquid engine be used or a solid motor can serve the purpose? Explain clearly. [8+8]

7. Describe the various separation systems used in a rocket, clearly identifying the separations that can be accomplished by these systems (e.g., separation of parallel stages, heat shield separation.). [16]

8. Write short notes on
a] Super alloys b] Ablatives c] Managing steels
d] Cryogenic temperatures and material requirement [4+4+4+4]

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