



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 148856

Roll No.

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B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15
ROCKETS & MISSILES

Time : 3 Hours]

[Total Marks : 100

Note : Attempt all the questions.

1 Attempt any one of the following. **20x1=20**

- (a) Explain how rockets are classified. Discuss characteristics and stage of development of each type.
- (b) A rocket projectile has following characteristics.
Initial mass = 300 kg
Mass after rocket operation = 200 kg
Payload, non propulsive structure etc. = 110 kg
Rocket operating duration = 3.0 sec.
Average Isp of propellant = 240 sec.
Determine :
- (a) vehicle's mass ratio
 - (b) propellant mass fraction
 - (c) propellant flow rate
 - (d) Thrust
 - (e) Thrust-to-weight ratio.

2 Attempt any two of the following. **10x2=20**

- (a) What are the desirable characteristics of liquid propellant?
- (b) State the desirable requirements of a solid propellant for rockets?
- (c) Briefly explain the propellant properties in view of economic factors.

3 Attempt any two of the following: **10x2=20**

- (a) Explain the need of cooling system in thrust chambers. Describe different cooling methods used.
- (b) Describe briefly gas pressurization feed system used in liquid rocket propulsion system.
- (c) Explain the basic equations for evaluating propellant performance.

4 Attempt any two of the following. **10x2=20**

- (a) With the help of a schematic diagram describe the performance of a convergent-divergent nozzle.
- (b) Derive the basic equations of flow through nozzles. Discuss thrust vectoring.
- (c) Write short notes on:
 - (i) Inert components
 - (ii) Gas Generators
 - (iii) Back pressure on nozzle flow
 - (iv) Nozzle shapes
 - (v) Combustion characteristics of propellants

5 Attempt any two of the following. **10x2=20**

- (a) Briefly explain the materials used in nozzles manufacturing? Give reasons in your support.
 - (b) Explain how flow and temperature measurements can be done for rockets.
 - (c) Describe the principle of nuclear Rocket.
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