

CBCS SCHEME

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15AE564

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019 Basics of Rockets and Missiles

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Classify different types of rockets. (06 Marks)
b. A rocket projectile has the following characteristics initial Mass : 200kg; Mass after rocket operation 130 kg; Payload 110kg; Rocket operating, Duration 3.0sec. Average specific impulse of propellant 240sec. Determine the vehicle mass ratio, propellant mass fraction, propellant flow rate thrust, thrust to weight ratio, acceleration of vehicle, effective exhaust velocity, total impulse, and the impulse to weight ratio. (10 Marks)

OR

- 2 a. What are the different criterias for the selection of rocket propulsion systems? (08 Marks)
b. Write short notes on : i) Tsiolkovsky rocket equation ii) Multi state rocket. (08 Marks)

Module-2

- 3 a. Briefly explain how solid propellants are classified. (10 Marks)
b. Explain the different ingredients used in the preparation of solid propellant. (06 Marks)

OR

- 4 a. With a neat diagram explain the working of liquid propellant rocket. (08 Marks)
b. List and briefly explain the interfaces between rocket propulsion system and flight vehicle. (08 Marks)

Module-3

- 5 a. Briefly describe the lift distributions for slender bodies of revolution. (08 Marks)
b. Explain the generalized nature of aero dynamic forces and stability derivatives. (08 Marks)

OR

- 6 a. Discuss the pitching effectiveness of the cruciform configuration with all movable controls. (08 Marks)
b. Name the various types of missiles controls and also explain. (08 Marks)

Module-4

- 7 a. What are the different earth launch trajectories used. (09 Marks)
b. Explain the launching trajectory of Pegasus 3 stage launcher. (07 Marks)

OR

- 8 a. Explain TVC mechanisms with a single nozzle with a help of a sketch. (06 Marks)
b. Mention the merits and demerits of various thrust vector control mechanisms. (10 Marks)

Module-5

- 9 a. Explain the different types of test performed before qualifying a rocket propulsion systems. (08 Marks)
b. Explain with a help of sketch vertical static test stand for a large liquid propellant thruster. (08 Marks)

OR

- 10 a. List the specifications of insulating materials used in the rocket. (10 Marks)
b. Describe the preparation of the case and the liner. (06 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.