

USN

--	--	--	--	--	--	--	--	--	--

10AE666

Sixth Semester B.E. Degree Examination, June/July 2015
Rockets and Missiles

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1
 - a. Define Rocket propulsion systems and classify them. (04 Marks)
 - b. With a neat sketch, explain the electric rocket propulsion system. (07 Marks)
 - c. A rocket projectile has the following characteristics :
 Initial mass – 200kg ; Mass after rocket operation – 130kg ; Payload, non propulsive structure – 110 kg ; Rocket operating duration – 3.0 sec ; Average specific impulse of propellant – 240 sec. Determine the vehicles 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. (09 Marks)
- 2
 - a. Define the terms : i) Thrust co-efficient ii) Characteristic velocity. (05 Marks)
 - b. What are principal losses in real Nozzles? (05 Marks)
 - c. Explain with a neat sketch, what is the necessity to align nozzle axis of all propulsion system with fixed (non – gimbal) nozzle very accurately. List the types of nozzle misalignments. (10 Marks)
- 3
 - a. List and explain desirable physical properties of rocket propellants. (08 Marks)
 - b. List out the liquid oxidizers and liquid monopropellants used in rocket engine. (05 Marks)
 - c. Explain briefly hybrid rocket propulsion with its applications and grain - configuration. (07 Marks)
- 4
 - a. Explain briefly the sequence in idealized process for selecting propulsion system? (10 Marks)
 - b. List out the typical criteria used in selection of particular rocket propulsion system. (06 Marks)
 - c. List out the advantages and disadvantages of solid propellants. (04 Marks)

PART - B

- 5
 - a. Briefly describe the lift distributions for slender bodies of revolution. (10 Marks)
 - b. Describe the generalized nature of Aerodynamic forces and stability derivatives. (10 Marks)
- 6
 - a. Discuss the pitching effectiveness of the cruciform configuration with all movable controls. (10 Marks)
 - b. Name the various types of missile controls and also discuss about change in missile attitude due to impulsive pitch control. (10 Marks)
- 7
 - a. Mention the merits and demerits of various Thrust vector control mechanisms. (08 Marks)
 - b. Write a short note on :
 i) TVC with multiple thrust chamber or Nozzle ii) Testing of TVC iii) Integration of TVC with vehicle. (12 Marks)
- 8
 - a. Outline the different types of Rocket testing in the sequence in which they are normally performed. (05 Marks)
 - b. Explain briefly : i) Instrumentation and data management ii) Flight testing iii) Post accident procedure. (15 Marks)

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.