PRN:

Course Code :

AER 4705A

Final Year **B. Tech** End Semester Examination Summer 2024

Rocket Propulsion

Day and Date: 13 MAY 2024, Friday Max Marks: **100**

Time : 10:30AM To 01:30PM Duration: **03** hrs

Instructions: All questions are compulsory.

			Marks	Bloom's Level	CO
Q.1		**Attempt the following**			
	a)	Explain the operating principle of rocket propulsion.	08	2	1
	b)	What is Rocket propulsion? List of its applications.	08	2	1
		OR			
	b)	Explain the following parameters • Thrust exhaust velocity • Energy and efficiencies • Typical performance values.	08	2	1
Q.2		**Attempt the following**			
	a)	Derive an expression for Nozzle area ratio.	08	3	2
	b)	Derive an expression for isentropic flow and explain isentropic flow through nozzle.	08	3	2
		OR			
	b)	Calculate Nozzle area ratio with varying mach number and plot on a graph.	08	3	2
Q.3		**Attempt any two from the following**			
	a)	Explain the following • Thrust chamber and its cooling. • Injectors and types • Propellent feed system	08	2	3
	b)	Explain with neat sketch working principle of Liquid Propellant rocket engine with pump feed system and its advantages and disadvantages.	08	2	3
	c)	What is cryogenic propulsion system, explain special features of cryogenic system.	08	2	3
Q.4		**Attempt any two from the following**			
	a)	Explain the following • Propellent Burning rate • Grain Design	08	2	4
	b)	Briefly explain propellent grains and grain configurations.	08	2	4
	c)	Explain the solid propellent rocket motors.	08	2	4
Q.5		**Attempt any Two of the following**			
	a)	Explain working principle of Hybrid rocket engine with neat sketch and its advantages and disadvantages.	09	2	5

Backlog

SHIVAJI UNIVERSITY, KOLHAPUR
SGU Library Copy

	b)	Explain the manufacturing methods for low and high thrust engines.	09	2	5
	c)	A Rocket flies at a speed of 20000kmph with an effective exhaust jet velocity of 1400 m/s and the heat produced by the propellant is 7000 kJ/kg. If the propellant flow rate is 5.4 kg/s. Determine i) Propulsive efficiency ii) Propulsion power iii) Engine output iv) Overall efficiency.	09	3	5
Q.6		**Attempt any Two of the following**			
	a)	Explain the following • Electric propulsion • Nuclear rocket • Ion propulsion	09	2	5
	b)	Compare the performance of Electric, Nuclear and ion propulsion system with chemical rocket propulsion.	09	2	5
	c)	Listout the Applications of electrical and nuclear rocket propulsion.	09	2	5

*****

Backlog