Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2024

Subject Code:3170104 Date:19-11-2024

Subject Name: Rocket and Missile Technology

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	List the types of igniters used in rocket propulsion systems.	**03**
	(b)	Differentiate between solid and liquid propellant rocket engines.	**04**
	(c)	Compare and contrast the performance characteristics of solid, liquid, and hybrid rocket	**07**
Q.2	**(a)**	Explain the term "propellant loading tolerance".	**03**
	(b)	What are the key factors to consider when designing a propellant tank outlet in a liquid rocket engine?	**04**
	(c)	Compare the advantages and disadvantages of mass loading versus volume loading methods for liquid propellants.	**07**
		OR	
	(c)	Describe the fundamental components and function of a liquid rocket combustion chamber. How does it ensure efficient combustion?	**07**
Q.3	**(a)**	How are liquid propellants selected for rocket propulsion systems? Mention two common propellants.	**03**
	(b)	What is ullage, and how does it relate to propellant loading in rockets?	**04**
	(c)	Explain the liquid rockets propulsion engine with neat diagram.	**07**
		OR	
Q.3	**(a)**	What is hybrid rocket propulsion?	**03**
	(b)	What are the key features of liquid propellant rockets that make them widely used in space missions?	**04**
	(c)	Explain the hybrid rockets propulsion engine with neat diagram.	**07**
Q.4	**(a)**	What are the main features of solid propellant rockets that make them suitable for certain missions?	**03**
	(b)	Explain the factors that influence the design of propellant grains in solid rockets.	**04**
	(c)	Explain the solid rockets propulsion engine with neat diagram.	**07**
		OR	
Q.4	**(a)**	What is a missile, and how are missiles generally classified?	**03**
	(b)	What are aerodynamic controls in missiles, and how do they help in flight stability?	**04**
	(c)	Compare the uses of strand burners and T-burners in evaluating the combustion characteristics of solid propellants.	**07**
Q.5	**(a)**	What is friction drag, and how does it affect missile performance?	**03**
	(b)	Briefly describe the difference between a conical and an ogival missile forebody.	**04**
	(c)	Explain the significance of aspect ratio and wing planform design in the aerodynamics of a missile.	**07**
		OR	
Q.5	**(a)**	Which are the different causes to form pressure loss in missile?	**03**
	(b)	What is a boost-glide trajectory in missile flight?	**04**
	(c)	Explain the different types of drag (friction, pressure, induced, and interference) and their combined effect on missile performance.	**07**

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