Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 170104 **Date: 27/12/2012**

Subject Name: Rocket and Missile Configurations Design

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Draw the different types of design and controls, and explain any four.	**07**
	(b)	1. Why Ullage is required in propellant tank? 2. What is *Gelled Propellants*? 3. What is centripetal force? Write an equation of centripetal force. 4. Define an Oxidizer. 5. What is the meaning of propellant inventory? 6. At which condition Outage will be zero? And Define Outage. 7. What is the meaning of Optimum bias?	**07**
Q.2	**(a)**	Explain the effect of Aspect Ratio on the wing of missile.	**07**
	(b)	Classify the different types of missiles and explain briefly. **OR**	**07**
	(b)	What is boattail? And describe the aerodynamics characteristics of the body of revolutions.	**07**
Q.3	**(a)**	Define Cruciform and Monowing. And explain Cruciform**.**	**07**
	(b)	Explain long range cruise trajectory with neat sketch.	**07**
		OR	
Q.3	**(a)**	Explain liquid propellant rocket engine with neat sketch.	**07**
	(b)	Write a short note on Loading measurement and control.	**07**
Q.4	**(a)**	Describe boost phase of flight for a free flight ballistic missile.	**07**
	(b)	What is the volume concept and mass concept? Relationship between mixture ratio loaded and mixture ratio burned.	**07**
		OR	
Q.4	**(a)**	Define the phenomenon geysering? What are the different approaches in solving the geysering? Explain any one approach.	**07**
	(b)	A missile having launch weight 20,000 lb, rocket motor weight 14150 lb, propellant weight 12,000lb and specific impulse of 240sec is considered for multi staging. If two stages are employed in the same missile having the weight of each rocket motor is 7075lb and weight of propellant in each motor is 6000lb. what would be the rise in the burn-out velocity in percentage?	**07**
Q.5	**(a)**	Classify the different types of chemical rockets on the basis of the type of propellant. And also explain difference between solid propellant rocket engine and liquid propellant rocket engine.	**07**
	(b)	Discuss the ingredients of solid propellant.	**07**
		OR	
Q.5	**(a)**	Which are the desired physical properties of liquid propellant?	**07**
	(b)	Explain liquid propellant combustion process and different zones of it.	**07**

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