Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014

Subject code: 732102 Date: 27-11-2014

Subject Name: Cryogenic Engineering

Time: 02:30 pm - 05:00 pm Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of Thermodynamic Diagrams of Cryogenic Fluids is permissible.**

Q.1	**(a)**	Describe the salient features of super insulation. How all the modes of heat transfer are reduced to bare minimum for super insulation?	**07**
	(b)	Discuss the variation in magnetic properties of material at cryogenic temperature.	**07**
Q.2	**(a)**	Discuss the change in any three mechanical properties at cryogenic temperature.	**07**
	(b)	Explain the following effect for helium II: i) Second sound ii) Fountain effect iii) Superfluidity effect	**07**
		OR	
	(b)	Explain cryogenic application in Rocket propulsion systems.	**07**
Q.3	**(a)**	Write note on superconducting motor and gyroscopes	**07**
	(b)	Discuss the applications of cryogenic in biology and medicine field.	**07**
		OR	
Q.3	**(a)**	Discuss the applications of cryogenics in food and organ preservation	**07**
	(b)	Write note on space simulation chamber.	**07**
Q.4	**(a)**	Discuss the various factors which govern the selection of cryogenic insulations.	**07**
	(b)	Compare expanded foams and evacuated powder-fibrous insulation.	**07**
		OR	
Q.4	**(a)**	With neat sketch explain Joule-Thomson refrigeration systems.	**07**
Q.4	**(b)**	What do you mean by isothermal-source and isobaric-source system with reference to cryogenic refrigeration systems? Compare both the systems.	**07**
Q.5	**(a)**	What is Magnetic cooling? With neat sketch explain an apparatus to carry out the adiabatic demagnetization process.	**07**
	(b)	Write note on pulse tube refrigerators.	**07**
		OR	
Q.5	**(a)**	With neat sketch explain Precooled Linde-Hampson Gas Liquefaction systems.	**07**
	(b)	Discuss the importance of regenerator effectiveness for the Philips refrigerators.	**07**

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