Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – SUMMER • 2013

Subject code: 733903 **Date: 15-05-2013**

Subject Name: Cryogenics Engineering

Time: 10.30 am – 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.**

Q.1	**(a)**	Explain different methods of production of low temperature.	**07**
	(b)	Explain the use of cryogenics in blood and bio-cell preservations.	**07**
Q.2	**(a)**	Explain following phenomenon of superconductivity 1. Meissner effect 2.Critical current 3. Critical flux density	**07**
	(b)	Explain the concept of ortho-hydrogen and para-hydrogen. Also Explain difference between ortho-hydrogen and para-hydrogen.	**07**
		OR	
	(b)	Write short note on criteriaôs of selection of cryogenic fluids.	**07**
Q.3	**(a)**	Linde-Hampson cycle cannot be used as it is for Neon, Hydrogen and Helium. Explain.	**07**
	(b)	Determine the liquid yield, the amount of nitrogen boiled away per unit mass of hydrogen liquefied, and the work requirement per unit mass of hydrogen liquefied for a precooled Linde-Hampson system operating from 101.3 kPa (1 atm) and 300 K (80 ºF) to 5.066 Mpa (50atm). The nitrogen bath is at a temperature of 70 K (-334 ºF), corresponding to a saturation pressure of 38.5 kPa (0.380 atm or 5.58 psia)	**07**
		OR	
Q.3	**(a)**	Explain Heylandt system and its thermodynamic analysis.	**07**
	(b)	Explain Gifford McMahon cryocooler system.	**07**
Q.4	**(a)**	Explain in detail about Turbine flow meters with neat sketch.	**07**
	(b)	Discuss behavior of alloys and non-metals at cryogenic temperature	**07**
		OR	
Q.4	**(a)**	Explain Claude system .	**07**
	(b)	Briefly describe any one cryogenic liquid level measuring device.	**07**
Q.5	**(a)**	Explain briefly the significance of cryogenics applications for space technology.	**07**
	(b)	Explain Eye surgery Probe	**07**
		OR	
Q.5	**(a)**	Explain the applications of cryogenics in space simulation. Discuss in detail.	**07**
	(b)	What are the various Safety criteria to be considered for handling of cryogens? Discuss in detail.	**07**