Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 733903 **Date: 05-06-2014**

Subject Name: Cryogenics 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.**

Q.1	**(a)**	List and describe different methods of production of low temperature.	**07**
	(b)	Discuss the following properties that change either abruptly or gradually when a material makes the transition from the normal to the superconducting state. 1. Specific heat 2. Thermoelectric effects 3. Thermal conductivity 4. Electric resistance 5. Magnetic permeability	**07**
Q.2	**(a)**	Explain following phenomenon of superconductivity 1. Meissner effect 2. Critical current 3. Critical flux density	**07**
	(b)	What is super fluidity? List consideration for selection of cryogenic fluid.	**07**
		OR	
	(b)	Determine the yield, work requirement per unit mass compressed in the high-pressure compressor and work requirement per unit mass liquefied for a Linde dual-pressure system operating with nitrogen as the working fluid between 101.3 KPa (1 atm) and 300 K(80° F) and 20.3 MPa (200 atm). The intermediate pressure is 5.07 MPa (50 atm) and the intermediate pressure flow rate ratio is 0.80.	**07**
Q.3	**(a)**	Derive an expression for yield and figure of Merit of a simple Linde Hampson system	**07**
	(b)	Explain the applications of cryogenics in blood preservations and biocell preservation.	**07**
		OR	
Q.3	**(a)**	Describe Heylandt system and derive equation for thermal analysis.	**07**
	(b)	With the help of neat sketch explain the construction of a Dewar vessel for storing cryogens.	**07**
Q.4	**(a)**	Explain Gifford McMahon cryocooler.	**07**
	(b)	Explain construction and working of Vapour Pressure Thermometer with neat figure. Also state its limitations.	**07**
		OR	
Q.4	**(a)**	Describe cryostats in detail.	**07**
	(b)	Explain construction and working of Magnetic Thermometer having sensing element of paramagnetic material	**07**
Q.5	**(a)**	What are the various types of Hazards relevant to the cryogenic industries? Discuss in brief.	**07**
	(b)	Explain in detail about Capacitance quality meter with neat sketch.	**07**
		OR	
Q.5	**(a)**	Discuss thermal, electrical and magnetic properties of metals, alloys and non-metals at cryogenic temperature	**07**
	(b)	Explain Eye cryogenic Probe and its application.	**07**

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