Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 733903 Date: 28-11-2013

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 briefly the significance of cryogenics applications for space technology.	**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 different methods of production of low temperature	**07**
	(b)	Derive an expression for yield and figure of Merit of a simple Linde Hampson system.	**07**
		OR	
	(b)	Explain Stirlingcryocooler and its thermodynamic analysis.	**07**
Q.3	**(a)**	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**
	(b)	Describe cryostats in detail.	**07**
		OR	
Q.3	**(a)**	With the help of neat sketch explain the construction of a Dewar vessel for storing cryogens.	**07**
	(b)	Explain Gifford McMahon cryocooler.	**07**
Q.4	**(a)**	Describe briefly about various commercial pressure transducers used for pressure measurements at low temperature.	**07**
	(b)	Explain construction and working of Magnetic Thermometer having sensing element of paramagnetic material.	**07**
		OR	
Q.4	**(a)**	Explain construction and working of Vapour Pressure Thermometer with neat figure. Also state its limitations.	**07**
	(b)	Explain in detail about Metallic resistance thermometers.	**07**
Q.5	**(a)**	Discuss in detail about the applications of cryogenics in food preservations.	**07**
	(b)	What are the various types of Hazards relevant to the cryogenic industries? Discuss in brief.	**07**
		OR	
Q.5	**(a)**	With a neat sketch explain the method of cryogenic fluid flow measurement.	**07**
	(b)	Explain the applications of cryogenics in blood preservations and biocell preservation.	**07**

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