Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–III • EXAMINATION – SUMMER • 2015

Subject Code: 733903 **Date:02-05-2015**

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)**	Explain the effect of temperature in cryogenic range of 0 to 250 K on Ultimate and Yield strength of following materials. (i) S.S. 304 (ii) Carbon steel and (iii) Teflon	**07**
	(b)	Explain Joule-Thomson effect for producing lower temperature using throttling process. Explain using inversion curve	**07**
Q.2	**(a)**	Discuss the importance of critical temperature and critical magnetic field in super conductivity. Write short note on applications of super conductivity.	**07**
	(b)	Explain briefly the significance of cryogenics applications for space technology.	**07**
		OR	
	(b)	Explain the applications of cryogenics in blood preservations and bio- cell preservation	**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 °F) to 5.066 Mpa (50atm). The nitrogen bath is at a temperature of 70 K (-334 °F), corresponding to a saturation pressure of 38.5 kPa (0.380 atm or 5.58 psia)	**07**
		OR	
Q.3	**(a)**	Compare the constant volume gas thermometer and vapour pressure thermometer. State different corrections made for high precision of the thermometers. What are precautions that must considered for use of such thermometers.	**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)	Discuss about the precautions to be taken during handling of cryogens.	**07**
		OR	
Q.4	**(a)**	Explain in detail about Metallic resistance thermometers.	**07**
	(b)	Briefly describe any one cryogenic liquid level measuring device.	**07**
Q.5	**(a)**	Prove that the calibration curve of a capacitance type cryogenic liquid-level indicator is a straight line of the type $Y= m*x +C$	**07**
	(b)	What are the various types of Hazards relevant to the cryogenic industries? Discuss in brief.	**07**
		OR	
Q.5	**(a)**	Discuss in detail about the applications of cryogenics in food preservations.	**07**
	(b)	Explain construction and working of Magnetic Thermometer having sensing element of paramagnetic material	**07**

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