Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 711001 **Date: 13-06-2014**

Subject Name: Cryogenic Fundamentals

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 mark.**

Q.1	**(a)**	Write note on ñBrief Overview of Cryogenic Fundamentalsò	**07**
	(b)	State and explain Necessary properties of Engineering materials at cryogenic temperature.	**07**
Q.2	**(a)**	Enlist various measurement systems used in cryogenic engineering.	**07**
	(b)	What is Cryogenics? Write note on ñApplications of Cryogenics.ò	**07**
		OR	
	(b)	Explain the following phenomenon of superconductivity (1) Meissner effect (2) Critical current (3) Critical flux density	**07**
Q.3	**(a)**	Give brief overview of Cryogenic insulation used in cryogenic equipment.	**07**
	(b)	Explain the concept of ortho-hydrogen and para-hydrogen. Write down difference between ortho-hydrogen and para-hydrogen.	**07**
		OR	
Q.3	**(a)**	Mention different six properties which can be used to measure temperature. Give measurement ranges for various types of thermometer.	**07**
	(b)	Explain following phenomenon for He II, 1. Fountain effect 2. Roll-in film 3. Second sound.	**07**
Q.4	**(a)**	Why safety is necessary at Cryogenic temperature? Explain in brief Safety measures in Cryogenic industries.	**08**
	(b)	Explain in brief various commercial pressure transducers used for pressure measurements at low temperature.	**06**
		OR	
Q.4	**(a)**	With a neat sketch explain the method of fluid quality measurement.	**06**
	(b)	Explain the following : 1. Eye surgery Probe 2. Working of space simulation chamber	**08**
Q.5	**(a)**	Write short note on : 1. Super conducting motor 2. Blood and Bio cell preservation	**08**
	(b)	Explain in detail about cryotrons.	**06**
		OR	
Q.5	**(a)**	Explain various hazards observed in Cryogenic plants. Also discuss prevention steps used to overcome these hazards.	**08**
	(b)	Why hydrogen finds its place in nuclear rockets? With a neat diagram explain the working of chemical propulsion space engine.	**06**

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