Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject code: 1721002 **Date: 18-06-2014**

Subject Name: Cryogenic Plants and Equipments

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)**	What is Cryostat? Discuss various types of Cryostats with their silent features.	**07**
	(b)	When vacuum insulated line is used in cryogenic fluid transfer line systems? Also write its limitations.	**07**
Q.2	**(a)**	The inner shell of a horizontal cylindrical Liquid Nitrogen Dewar has a cylindrical length of 24 m and inside diameter of 2.0 m. The inner vessel is constructed of SS 304 with full radiographed welds. The working pressure for inner vessel is 650 kPa absolute. Elliptical heads with axis ration of 2 are used as the end closures. For 10 % ullage space find out minimum thickness of inner shell and heads.	**07**
	(b)	Explain with the help of neat sketch Xenon and Krypton purification system.	**07**
		OR	
	(b)	Dicuss the contribution of Heylandt in gas-separation system.	**07**
Q.3	**(a)**	Explain Fabrication and joining techniques used in cryogenic plants.	**07**
	(b)	Describe the following typical butt weld preparations for 16 mm thick S.S.316L material with neat sketches : (i) Single óVô (ii) Double óVô (iii) Double óUô (iv) Single óUô	**07**
		OR	
Q.3	**(a)**	With neat sketch explain Argon separation system.	**07**
	(b)	Write comparison between Linde double column system and Linde-Frankl system of gas separations.	**07**
Q.4	**(a)**	Calculate the ideal work required to separate reversibly and isothermally 3 kg mixture of 92 % gaseous Hydrogen and 8 % gaseous Methane by volume at 300 K. Assume that both gases obey the ideal-gas equation of state.	**07**
	(b)	Which method is used for theoretical plate calculation? Discuss it.	**07**
		OR	
Q.4	**(a)**	Write note on : (1) Cryogenic vales (2) Design of transfer line	**10**
	(b)	Write different methods of reducing the boil-off rate in cryogenic piping.	**04**
Q.5	**(a)**	Explain Helium separation system in detail. Also discuss Helium isotopes.	**09**
	(b)	Differentiate clearly between perforated plate and bubble cap plate used in rectification column.	**05**
		OR	
Q.5	**(a)**	Explain in brief ñDifferent types of rectification columnsò.	**09**
	(b)	Give Classification of Dewars. Draw only neat sketch of Dewar vessel.	**05**

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