Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-II Examination July 2010

Subject code: 721002
Subject Name: Cryogenic plants and Equipments

Date: 06 /07 /2010 **Time: 11.00am – 1.30pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of charts and Tables is permissible.**

Q-1		You are hired by a cryogenic fluid storage vessels manufacturer to design 1, 00,000 lits. capacity storage vessels. Discussed the design procedure of this vessel in detail step by step. Justify your assumptions.	**12**
Q-2			
	(a)	With neat sketch explain Argon purification system using catalytic combustion.	**06**
	(b)	Write note on Bayonet joint for vacuum jacketed transfer line.	**06**
		OR	
	(b)	Write note on Flange and bolted joint used in cryogenic fabrication technique.	**06**
Q-3			
	(a)	Explain thermodynamically ideal gas separation system.	**05**
	(b)	Explain the principles of rectification and hence define murphee efficiency. Discuss the factors effecting Murphy efficiency.	**07**
		OR	
Q-3		Determine the number of theoretical plates required to yield 98% nitrogen as the top product stream and 95% oxygen (5% nitrogen) as the bottom product stream. The feed stream has a composition of 79% nitrogen and 21% oxygen, and the molar fraction of liquid in the feed stream is 0.831 mol liquid/mol mixture. The bottoms product and the top product streams leave the column as saturated liquids. The desired flow rate of bottoms product is 25 mol/s. The heat removed in the condenser at the top column is 1071 kW. The mean pressure within the column is 101.3 kPa.	**12**
Q-4			
	(a)	Compare perforated plate and bubble cap plate used in rectification column.	**04**
	(b)	With the neat sketch explain Linde-Frankle gas-separation system.	**08**
		OR	
Q-4	**(a)**	Determine the composition of the liquid and vapor phases for a mixture of oxygen and nitrogen at 202.6 kPa and 90 K using the distribution coefficients.	**04**
	(b)	Write a note on Heylandt system of gas separation.	**08**
Q-5			
	(a)	Compare cryostat and Dewar.	**06**
	(b)	Write a note on classifications of cryogenic fluid storage vessels	**06**
		OR	
Q-5	**(a)**	Write a note on cryogenic valve.	**05**
	(b)	Discuss welding of aluminum and stainless steels used in the construction of cryogenic equipment.	**07**

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