Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 170403 Date: 01/01/2013

Subject Name: Bioprocess Plant Design

Time: 10.30 am - 01.00 pm Total Marks: 70

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Draw neat sketches of various supports.	**07**
	(b)	Give the major design consideration of evaporator.	**07**
Q.2	**(a)**	How to calculate min. reflux ratio and numbers of plates for distillation column?	**07**
	(b)	What are the steps in design of piping systems?	**07**
		OR	
	(b)	Enlist the types of heat exchanger and give the major equations of design.	**07**
Q.3	**(a)**	A spherical vessel is to be designed for max. Operating pressure of 2.5 kgf/cm^2.outside diameter of vessel is 1100 mm and made up of SS.(allowable stress values is 12 kgf/cm^2). Find out the standard plate thickness to fabricate the vessel.J=0.85, If a cylindrical vessel having the same outside diameter	**07**
	(b)	Write all equations for designing reactor for the reactor with half coil jacket.	**07**
		OR	
Q.3	**(a)**	Write suitable equations for designing reactor for the reactor with plain jacket.	**07**
	(b)	What advantage does “multiple effects” in evaporator offers?	**07**
Q.4	**(a)**	What are the types of different pumps used in biotech industries?	**07**
	(b)	Define: Stress, Strain, Modulus of Elasticity, Joint Efficiency, ultimate stress, yield stress, brittleness.	**07**
		OR	
Q.4	**(a)**	Discuss the valves giving neat sketch.	**07**
Q.4	**(b)**	Enlist various stresses to be considered while designing and installing equipments.	**07**
Q.5	**(a)**	Write down the numbers of dependent and independent variables in design of shell and tube heat exchanger.	**07**
	(b)	Discuss the characteristics of flow diagram.	**07**
		OR	
Q.5	**(a)**	Define NPSH. Explain “heads” with equations.	**07**
	(b)	What are the factors to reduce power requirements due to pums?	**07**

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