Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEM-VI Examination-Nov/Dec-2011

Subject code: 160501 **Date: 21/11/2011**
Subject Name: Mass Transfer Operations-II
Time: 10.30 am -1.00 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)**	Write short note on optimum reflux ratio.	**04**
	(b)	Discuss principle of steam distillation and give applications of it.	**05**
	(c)	State any three important adsorbents and list out their applications.	**05**
Q.2	**(a)**	Compare Extractive and Azeotropic distillation.	**07**
	(b)	A liquid (50 mole % Acetone and 50 mole % Ethanol) is flash vaporized with 70 mole % of liquid vaporized. Compute the composition of liquid and vapor. Relative volatility of Acetone to Ethanol: 2.17	**07**
		OR	
	(b)	Explain differential distillation and derive Rayleigh equitation.	**07**
Q.3	**(a)**	What is Azeotrope? Distinguish between minimum and maximum boiling azeotropes with examples of each.	**07**
	(b)	A fractionation column has been installed to distillate 30000 kg/hr of a mixture of 40 % Benzene & 60% Toluene (by weight). The overhead and bottom products are found to contain 97 % benzene and 97% toluene respectively. Carry out overall material balance.	**07**
		OR	
Q.3	**(a)**	Explain with suitable examples the difference in physical adsorption and chemisorption.	**07**
	(b)	Explain Adsorption isotherm and hysteresis.	**07**
Q.4	**(a)**	Explain the concept of wet-bulb temperature and adiabatic saturation temperature.	
	(b)	List out various types of cooling towers and discuss their selection criteria in detail.	
		OR	
Q.4	**(a)**	Define Humidity, Humid Heat and Humid volume.	**06**
	(b)	Unsaturated air-vapor mixture is cooled out of contact of liquid at constant total pressure of 760 mm Hg from 65 ºC to 10 ºC. At 10 ºC it becomes saturated. Explain psychometric chart and show above changes on it. What will be the Dew point for it?	**08**
Q.5	**(a)**	Differentiate between Bound, Unbound and Free moisture in context with the drying operations.	**06**

(b) A porous solid is dried in a batch dryer under constant drying conditions. Six hours are required to reduce the moisture content from 30 to 10%. The critical moisture content was found to be 16% and the equilibrium moisture 2%. All moisture contents are on the dry basis. Assuming that the rate of drying during falling rate period is proportional to the free moisture content, how long should it take to dry a sample of same solid from 35 to 6% under the same drying conditions? **08**

OR

Q.5 **(a)** Explain rate of drying curve. **06**

(b) Classify driers and discuss selection criteria for dryers. **08**

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