Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

DIPLOMA ENGINEERING – SEMESTER – V • EXAMINATION – SUMMER 2016

Subject Code: 3350502 **Date: 11/05/2016**

Subject Name: Mass transfer-II

Time: 02:30 PM TO 05:00 PM **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Each question carry equal marks (14 marks)**

Q.1 Answer any seven out of ten. **14**

1. Define Mass transfer operation and classify them.
2. Justify the need of gas-liquid contact equipment.
3. Define vapor pressure and relative volatility.
4. Define the term Equilibrium moisture and free moisture content of solid
5. Define humidity &What is meant by percentage humidity?
6. Express Rault's law and Henry's law.
7. State the types of Adsorption and application.
8. List out various adsorbent.
9. What is the effect of temperature on Adsorption?
10. Classify Drying equipments.

Q.2 (a) Classify Gas-liquid contact equipment. **03**

OR

(a) Differentiate extractive and azeotropic distillation. **03**

(b) Define WBT, DBT and Relative saturation. **03**

OR

(b) Derive the equation for drying time for constant rate period. **03**

(c) Explain the Spray Dryer with figure. **04**

OR

(c) Draw the sketches of different Reboilers. **04**

(d) Explain the operating problems in tray tower. **04**

OR

(d) Derive Rayleigh equation for differential distillation. **04**

Q.3 (a) State the Meir's theory and discuss. **03**

OR

(a) Explain q-line. **03**

(b) A solution of $NaNO_3$ in water containing 48 % $NaNO_3$ by weight at 40 ºC. Calculate % yield of $NaNO_3$ crystals that may be obtained when temperature is reduced to 10 ºC. Data: Solubility of Na NO3 at 10 ºC is 80.18 kg/100 kg water. **03**

OR

(b) Justify the need and importance of steam distillation. **03**

(c) Describe construction and working of Pressure swing Adsorber. **04**

OR

(c) Explain the constant temperature equilibrium. **04**

(d) Differentiate between physical adsorption and chemisorptions. **04**

OR

(d) Explain Adsorption hysteresis. **04**

Q.4	(a)	Define Ion exchange and state the principle and application.	**03**
		OR	
	(a)	Prove that $\alpha = p_A/p_B$.	**03**
	(b)	Explain working principle and operation of DTB crystallizer with sketch.	**04**
		OR	
	(b)	Explain Drying Curve.	**04**
	(c)	A liquid mixture of 60 mole % heptanes and 40 mole % n-octane were subjected to a differential distillation at atmospheric pressure, with 60 mole % of the liquid distilled. Compute the composition of the distillate and the residue. Data: B.P of n-heptane =98.4 ºC and n-octane=125.6ºC,take α =2.2	**07**
Q.5	(a)	An air (B)-water vapor (A) system has DBT is 55 ºC and an absolute humidity 0.030 kg water /kg dry air at 1 std atm pressure. Find out percentage humidity, WBT and Dew point using psychometric chart.	**04**
	(b)	Describe flash vaporization.	**04**
	(c)	List out method of super saturation and explain any one.	**03**
	(d)	Explain types of packing in packed tower.	**03**

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