GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2160501   **Date:10/05/2019**

Subject Name:Mass Transfer Operation - II

Time:10:30 AM TO 01:00 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 a short note on types of reflux ratio.	**03**
	(b)	Discuss positive deviations from ideality with neat sketch.	**04**
	(c)	Derive the equation of adiabatic saturation curve.	**07**
Q.2	**(a)**	Discuss applications of steam distillation.	**03**
	(b)	Write in brief about Azeotropic distillation.	**04**
	(c)	A liquid mixture of 50 mole% n-heptane (i) and 50 mole% n-octane (ii) were subjected to differential distillation at atmospheric pressure with 55 mole% of the liquid distilled. Compute the composition of the composite distillate and the residue.	**07**

"x"	1.00	0.50	0.46	0.42	0.38	0.34	0.32	0.00
"y"	1.00	0.689	0.648	0.608	0.567	0.523	0.497	0.00

OR

	(c)	A fractionation column has been installed to distillate 5000 kg/hr of a mixture of 50 % methanol & 50% water (by weight). The overhead and bottom products are found to contain 95 % methanol and 1 % methanol respectively. Carry out material balances. Data: Mol. wt. of methanol: 32 and Mol. wt. of water: 18.	**07**
Q.3	**(a)**	Write a note on flash distillation.	**03**
	(b)	With reference to Raoults's law, explain characteristics of ideal solutions.	**04**
	(c)	Define quantity 'q'. Derive equation for q-line and discuss location of 'q' line for typical feed conditions in brief.	**07**

OR

Q.3	**(a)**	Discuss importance of vacuum distillation.	**03**
	(b)	Explain the following terms: i) Bound moisture ii) Free moisture iii) Equilibrium moisture iv) Critical moisture	**04**
	(c)	Write Freundlich equation. How is it applied to two-stage cross current adsorption?	**07**
Q.4	**(a)**	Explain Adsorption hysteresis.	**03**
	(b)	Write a note on drying at low temperature.	**04**
	(c)	Explain construction, working, advantages & disadvantages of tray dryer.	**07**

OR

Q.4	**(a)**	Write applications of rotary drier.	**03**
	(b)	Explain rate of drying curve with neat diagram.	**04**
	(c)	What do you mean by Ion Exchange? Describe techniques and applications of ion exchange and list out the factors on which rate of ion exchange is dependent.	**07**

Q.5 **(a)** Explain relative volatility and its relationship with vapor pressure. **03**

(b) Qualitatively, explain the apparent adsorption of solute from concentrated solution. **04**

(c) Derive the equation for the rate of adsorption in a fixed bed and explain the concept of degree of saturation **07**

OR

Q.5 **(a)** Explain nature of adsorbents. **03**

(b) Write down the assumptions of McCabe-Thiele method. **04**

(c) Explain various types of cooling towers and discuss their selection criteria. **07**

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