

Register No : _____

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fifth Semester

Chemical Engineering

CH3551 – Mass Transfer II
(Usage of Data Book is Permitted)

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	What do you mean by flooding in plate columns?	UN	1	2
2.	Mention any two advantages of plate column over packed column.	UN	1	2
3.	What is meant by relative volatility?	UN	2	2
4.	Why is distillation treated as a direct separation method?	UN	2	2
5.	What do you mean by raffinate and extract in liquid-liquid extraction process.	UN	3	2
6.	What do you mean by super critical fluids?	UN	3	2
7.	Name the four important factors that determine the rate of leaching.	RE	4	2
8.	Mention any two industrial applications of leaching.	RE	4	2
9.	Distinguish between adsorbent and adsorbate.	UN	5	2
10.	What do you mean by adsorption isotherm?	UN	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)*

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Explain briefly about the various Industrial absorption equipment with neat diagrams and indicates their relative merits and demerits.	AN	1	13
	Or			
	b A mixture containing 10% (mole) solute and rest inert is fed to a packed tower in which 90% of the solute is absorbed. Solute-free water used for absorption contains 5% (mole) solute when it leaves the tower at the bottom. If the equilibrium relationship is $Y_e = 0.05 X_e$ and $H_y = 0.5$ m and $H_x = 0.4$ m, what is the height of the packed section.	AN	1	13
12.	a i Explain the McCabe- Thiele method to find out the number of theoretical stages in distillation.	UN	2	8
	ii Explain with a neat sketch about the working principle of Flash Distillation.	UN	2	5
	Or			
	b 100 moles of benzene and toluene mixture containing 50% benzene is subjected to a differential distillation at atmospheric pressure till the composition of the benzene in the residue is 33%. Calculate the total moles of the mixture distilled. Average relative volatility is 2.16.	UN	2	13

13.	a i	Explain in briefly the selection criteria for solvent to be used for liquid-liquid extraction.	AN	3	5
	ii	Explain the construction and working principle of mechanically agitated contactor with its neat sketch.	AN	3	8
Or					
	b	Explain in detail about the working principle of Super critical extraction along with its applications.	AN	3	13
14.	a i	Explain with neat sketch the Shanks system of continuous counter current leaching (solid-liquid extraction) process.	AN	4	8
	ii	What are the factors to be considered in the choice of solvent for leaching?	AN	4	5
Or					
	b	Explain in detail about Ponchon-Savarit graphical method for determining the number of stages for countercurrent leaching.	AN	4	13
15.	a	Discuss briefly about various types of Adsorption isotherms along with the effect of pressure and temperature on Adsorption isotherms.	UN	5	13
	Or				
	b	Explain in detail the working principle of Electro-Dialysis with a neat diagram indicating its industrial applications.	UN	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a	150 kg of a nicotine-water solution containing 1% nicotine is to be extracted using 250 kg of kerosene at 293 K. Water and Kerosene are essentially immiscible in each other. Calculate the percentage extraction of nicotine after a single-stage extraction. The equilibrium relationship for this system is $Y^* = 0.798 X$ where Y and X are expressed as kg nicotine/kg kerosene and kg nicotine/kg water, respectively.	AN	3	15
Or					
	b	A liquid mixture has a relative volatility of 2.5. Compute the vapor-liquid equilibria for the liquid mixture. The above-mentioned liquid mixture is fed to a distillation column for separation purpose. Feed is a liquid at its bubble point containing 50 mole % of A (the more volatile component). The product/distillate is to contain 95 mole % of A and residue is to contain 10 mole % of A. Reflux ratio is 2.5. Calculate the number of ideal plates required and the position of feed plate.	AN	2	15