	Reg. No.				
MANIPAL INSTIT	UTE OF	TECH	NOL	OGY	



## V SEMESTER B.Tech. (CHEMICAL ENGINEERING)

## END SEMESTER EXAMINATIONS, NOV 2017

SUBJECT: MASS TRANSFER-II [CHE 3101]

## REVISED CREDIT SYSTEM (20/11/2017)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates: Answer ALL the questions. Missing data may be suitably assumed.

1A.	A mixture of 50% Benzene, 25% Toluene and 25% p-Xylene is differentially distilled at 1 atm with a vaporization of 32.5 mole% of charge. Raoults law applies. Calculate the residual liquid and composite distillate. Saturated vapor pressures of Benzene, Toluene and p-Xylene is 1370, 550, 200 mm Hg respectively.								
1B.									3
2	A dilute aq. solution of Ethanol is to be concentrated from 30% to 80% in a tray tower at atmospheric pressure. The feed rate is 200 Kmoles/hr with an enthalpy of 20000 kJ/kmol. The bottom product must not contain more than 3.5 % Ethanol (all are in mole %). Determine Minimum reflux ratio. Obtain the theoretical stages and calculate the condenser and reboiler heat loads at 1.5 times of minimum reflux ratio. $H_{GI}$ =45000 kJ/kmol; $H_{L0}$ = $H_{D}$ = 8900 kJ/kmol; $H_{W}$ =8450 kJ/kmol $ \frac{\text{X}  0  0.016  0.020  0.0891  0.143  0.281  0.477  0.7  0.89 \\ \text{Y}  0  0.158  0.191  0.427  0.493  0.568  0.644  0.756  0.89 \\ \text{If } 100  kg of solution Pyridine (C) and water (A) containing 30% of 'C' is to be extracted wird Chlorobenzene (B) in two stages at 20 °C, using 30 kg of solvent in each stage. Determine the quantities and compositions of the various streams. How much solvent would you required the same final raffinate concentration were to be obtained with one stage.$							J/kmol. The termine nd reboiler 900 kJ/kmol;	
3	quanti	ties and con	on Pyridine (C) and in two stages at appositions of the	0 0.158 nd water 20 °C, us various st	(A) consing 30 treams.	0.427 0.49 taining 30% kg of solver How much	of 'C' is to be at in each stage.	0.756 0.89 extracted with	
3	quanti	ties and con	on Pyridine (C) and in two stages at appositions of the	0 0.158 nd water 20 °C, us various st	(A) consing 30 treams.	0.427 0.49 taining 30% kg of solver How much	of 'C' is to be at in each stage.  Chloro-benzene	0.756 0.89 extracted with	
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3	quanti	Pyridine (wt%)  0  11.05	on Pyridine (C) and in two stages at appositions of the sinate concentration (wt%)  99.95  88.28	0 0.158 nd water 20 °C, us various st n were to  Water (wt%)  0.05  0.67	(A) consing 30 treams. be obtains.	0.427 0.49 taining 30% kg of solver How much med with on Pyridine (wt%)  0  5.02	of 'C' is to be at in each stage. solvent would ye stage.  Chloro-benzene (wt%)  0.08  0.16	0.756 0.89 extracted with Determine the ou required if  Water (wt%) 99.92	
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3	quanti	Pyridine (wt%)  11.05  18.95  24.1	on Pyridine (C) at positions of the inate concentration (wt%)  99.95  88.28  79.9  74.28	0 0.158 nd water 20 °C, us various stan were to  Water (wt%) 0.05 0.67 1.15	0.191 (A) con sing 30 treams. be obtain s.no.	0.427 0.49 taining 30% kg of solver How much med with on Pyridine (wt%)  0 5.02 11.05	of 'C' is to be at in each stage. solvent would ye stage.  Chloro-benzene (wt%)  0.08  0.16  0.24  0.38	0.756 0.89 extracted with Determine the rou required if  Water (wt%) 99.92 94.82 88.71 80.72	

4B.	A solution is prepared by dissolving 35.0 g of hemoglobin in enough water to make up 1.00 L in				
	volume. The osmotic pressure of the solution is found to be 10 mmHg at 25.0 °C. Calculate the				
	molar mass of hemoglobin				
	Explain the types of modules used in membrane separations? (atleast three)	3			
5A.	Explain various types of equilibrium diagrams encounter in Leaching with diagram	3			
5B.	Define bound, unbound and free moisture	2			
	With the help of graph explain the drying phenomena for CuSO <sub>4</sub> solution	2			
5C.	Give the component and complete balance in Leaching for single stage (all three components)	3			

\*\*\*\*\*\* END \*\*\*\*\*\*

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