MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. END SEMESTER EXAMINATIONS DEC 2020

SUBJECT: MASS TRANSFER II [CHE 3101]

REVISED CREDIT SYSTEM (02/01/2020)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ✤ Answer ALL the questions.
- ✤ Missing data may be suitable assumed.

1A.	trays if the re	-	ity remain	s reasonably o	e minimum nu constant throu		3	
1B.	determine he a neat schem	at load on co	ndenser, re (marking a	boiler and the all the streams	eoretical expre e hypothetic s s). Also discu	stream with	5	
1C.	What is the significance of introducing open steam in a distillation column? Also derive an expression to determine the slope of the lower operating line.							
2A.	100 moles of benzene and toluene containing 50 mole% benzene is subjected to a differential distillation at atmospheric pressure till the composition of the benzene in the residue is 33% by mole. Calculate the total moles of the mixture distilled. Assume $\alpha = 2.4$							
	1000 kg of crushed oil seeds (19.5% oil, 80.5% meal) is extracted in a three-stage cross-current unit using 500 kg of pure hexane in each stage. The equilibrium data are as follows:Overflow (100 kg) solutionUnderflow (100 kg) slurry							
	W _A (kg)	$W_B (kg)$	Wc	W' _A (kg)	$W'_{B}(kg)$	W'c		
2B.			(kg)			(kg)		
	0.3	99.7	0	67.2	32.8	0		
	0.45	90.6	8.95	67.1	29.94	2.96	5	
	0.54	84.54	14.92	66.93	28.11	4.96		
	0.70	74.47	24.83	66.58	25.06	8.36		
	0.77	69.46	29.77	66.26	23.62	10.12		
	0.91	60.44	38.65	65.75	20.9	13.35		
	0.99	54.45	44.56	65.33	19.07	15.6		
	1.19 1.28	44.46 38.50	54.35 60.22	64.39 63.77	16.02 14.13	19.59 22.10		
	1.20	30.30	00.22	05.77	14.13	$\angle \angle .10$		

							1
	1.28	34.55	64.17	63.23	12.87	23.90	
	1.48	24.63	73.89	61.54	9.61	28.85	
	Calculate the f	raction of c	oil extracted	l using PS me	ethod.		
2C.		at 50°C, as	suming tha	t hexane and	water are con		2
3A.	A mixture of distillation co distillate. The is half vapor a equilibrium sta	lumn. 96% concentrati nd reflux ra	of the co on of A in atio is 4. Th	mponent A the distillate ne relative vol	from the fee is 93 mole 9 latility is 2.5.	ed is in the %. The feed	5
3B.	Determine the minimum reflux ratio for the conditions given in question 3A.						
	What are the assumptions involved in Mc Cabe Thiele (MT) method? Discuss about the graphical and physical considerations in MT method which proves that its assumptions are justified.						
3C.	Discuss about which proves t	the graphic that its assu	al and phys mptions ar	sical consider e justified.	ations in MT	method	3
3C.	Discuss about which proves the A feed of 1000 to be extracted raffinate to 29 solvent rate in system)	the graphic that its assu 0 kg aqueou d with pur %. Determine is 1.3 time	al and phys mptions are as solution the benzene ine the nu the mir	sical consider e justified. of pyridine pe to reduce th mber of idea nimum. (Use	ations in MT er hour (50% ne solute con il stages req rectangular	' method by mass) is ntent in the uired if the coordinate	3
3C.	Discuss about which proves to A feed of 1000 to be extracte raffinate to 29 solvent rate is system)	the graphic that its assu 0 kg aqueou d with pur %. Determinis 1.3 time ater Layer	al and physomptions around the solution of the	sical consider e justified. of pyridine per to reduce the mber of idea nimum. (Use	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye	' method by mass) is ntent in the uired if the coordinate	3
3C.	Discuss about which proves to A feed of 1000 to be extracte raffinate to 29 solvent rate is system) Wa Pyridine, ma	the graphic that its assu 0 kg aqueou d with pur %. Determinis 1.3 time ater Layer	al and phys mptions ar is solution re benzene ine the nu es the mir ene, mass	sical consider e justified. of pyridine per to reduce the mber of idea nimum. (Use Be Pyridine, r	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye	' method by mass) is ntent in the uired if the coordinate r zene, mass	3
	Discuss about which proves to A feed of 1000 to be extracte raffinate to 29 solvent rate is system) Wa Pyridine, ma %	the graphic that its assu 0 kg aqueou d with pur %. Determinis 1.3 time ater Layer	al and physomptions around the solution of the	sical consider e justified. of pyridine per to reduce the mber of idea nimum. (Use Be Pyridine, r %	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye nass Benz	by mass) is ntent in the uired if the coordinate r zene, mass %	
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	Discuss about which proves to A feed of 1000 to be extracter raffinate to 29 solvent rate in system) War Pyridine, ma % 1.17	the graphic that its assu 0 kg aqueou d with pur %. Determinis 1.3 time ater Layer	al and physimptions are us solution re benzene ine the nu es the min	sical consider e justified. of pyridine per to reduce the mber of idea nimum. (Use Bellet Pyridine, r <u>%</u> 3.28	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye mass Benz	r method by mass) is ntent in the uired if the coordinate r rene, mass % 94.54 87.46	
	Discuss about which proves to A feed of 1000 to be extracte raffinate to 29 solvent rate is system) Wa Pyridine, ma % 1.17 3.55	the graphic that its assu 0 kg aqueou d with pur %. Determine is 1.3 time ater Layer ass Benz	al and phys mptions are us solution re benzene ine the nu es the min	sical consider e justified. of pyridine per to reduce the mber of idea nimum. (Use Pyridine, r % 3.28 9.75 18.35	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye mass Benz	y method by mass) is ntent in the uired if the coordinate r zene, mass <u>%</u> 94.54	
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3C. 4A. 5A. 5B.	Discuss about which proves to A feed of 1000 to be extracted raffinate to 29 solvent rate if system) Wate Pyridine, mate % 1.17 3.55 7.39 13.46 22.78 32.15 42.47 48.87 49.82 56.05 Discuss about schematic repr	the graphic that its assu 0 kg aqueou d with pur %. Determine is 1.3 time ater Layer ass Benz Benz bis spiral wour resentation.	cal and physimptions are ins solution rebenzene ine the nuises the mire free, mass $\frac{96}{0}$ 0 0 0 0 0 0 0 0 0 0	sical consider e justified. of pyridine per to reduce the mber of idea imum. (Use Pyridine, r % 3.28 9.75 18.35 26.99 31.42 34.32 36.85 39.45 39.27 48.39 nes and bundloong these is g	ations in MT er hour (50% ne solute con il stages req rectangular enzene Laye mass Benz he of hollow f generally used	r method by mass) is ntent in the uired if the coordinate r rene, mass % 94.54 87.46 79.49 71.31 66.46 64.48 59.35 56.43 55.72 40.05 Fibers with d in RO	10
