BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: B. TECH **SEMESTER: 5th**
BRANCH: BIOTECH **SESSION: MO/2022**

SUBJECT: BE303 MASS TRANSFER OPERATIONS

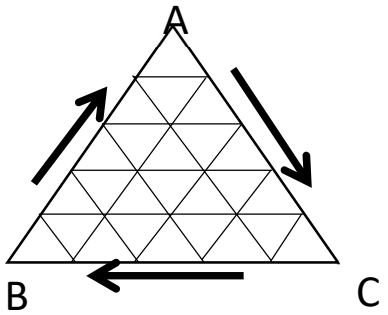
TIME: 2 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Define Raoult's Law	[2]	CO1	BL1
Q1	(b)	In an oxygen-nitrogen mixture at 25 °C and 1 atm, the concentration of oxygen at two planes 0.2 cm apart are 20% and 30% v/v respectively. Calculate the rate of diffusion if nitrogen is not diffusing. Diffusivity is 0.215 cm^2/s.	[3]	CO1	BL3
Q2	(a)	Write the equation to calculate minimum number of plates in a distillation column.	[2]	CO2	BL1
Q2	(b)	Draw a labeled diagram of a distillation column with reflux.	[3]	CO2	BL2
Q3		A plant must distill a mixture containing 70 mole % methanol and 30 mole % water. The overhead product is 98 mole % methanol and bottom product is 98 mole % water. If q = 1, α = 3.32 and R_D is 2.4, Graphically calculate, the number of theoretical plates if	[5]	CO2	BL5

X	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
Y	0.42	0.58	0.67	0.73	0.78	0.82	0.87	0.91	0.96	1

Q4 (a) [2] CO3 BL3



Identify the point that indicates the concentration of 40% A; 40% B and 20% C.

Q4 (b) Draw and describe the temperature concentration phase diagram. [3] CO2 BL3

Q5 (a) Define Plait Point in a Binodal curve of LLE. [2] CO3 BL1

Q5 (b) A clarified fermentation beer (H) containing 250 mg/L of antibiotic is to be extracted using butyl acetate (L). K = 50. We plan to use H = 450 L/h and L = 36 L/h to recover 95% antibiotics. How many stages are required for this separation? [3] CO3 BL5

:::::: 01/10/2022 ::::::M