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

CLASS: B.TECH **SEMESTER: Vth**
BRANCH: CHEMICAL/CHEMICAL P&P **SESSION: MO/2022**

SUBJECT: CL319 MASS TRANSFER OPERATIONS -II

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 handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

				CO	BL
Q1	(a)	Define distribution coefficient and selectivity of a solvent for a liquid-liquid extraction operation.	[2]	CO1	BL1
Q1	(b)	It is desired to extract acetone (C) from an equimolar mixture containing acetone (C) and water (A), using chloroform (B) as solvent, in two cross current extraction stages. The amount of solvent in each stage is equal. In first stage 60 mole% acetone is extracted. If water (A) and chloroform (B) are completely immiscible, determine the mole fraction of acetone in final product (raffinate phase). Equilibrium condition is given by y' = 0.5x', where x' = moles of acetone (C)/moles of water (A), and y' = moles of acetone (C)/moles of chloroform (B).	[3]	CO1	BL3
Q2	(a)	Describe in brief the Ponchon-Savarit diagram for representing solid-liquid equilibrium data.	[2]	CO1	BL2
Q2	(b)	In a single stage leaching of soybean oil from flaked soybeans with hexane, 100 kg of soybeans containing 20 wt.% oil is leached with 100 kg of fresh hexane solvent. The value of N for the slurry underflow is essentially constant at 1.5 kg insoluble solid/kg solution retained. Calculate the amounts and compositions of the overflow and the underflow slurry leaving the stage.	[3]	CO1	BL3
Q3	(a)	Define the wet bulb temperature of a water vapor- air mixture.	[2]	CO2	BL1
Q3	(b)	Show the following relation for an adiabatic saturation of water vapor in a gas. $(t_{G1} - t_{as}) = (Y'_{as} - Y')\frac{\lambda_{as}}{C_{s1}}$ The notations have their usual meaning.	[3]	CO2	BL3
Q4	(a)	Describe the Lewis relation and its importance in humidification operation.	[2]	CO2	BL1
Q4	(b)	A mixture of nitrogen and acetone vapor at 760 mm Hg and 27°C has a percentage saturation of 75%. Calculate the relative saturation and dew point of the mixture. Vapor pressure of acetone at 27°C is 33.358 kPa.	[3]	CO2	BL3
Q5	(a)	Show the types of moisture on equilibrium drying curve.	[2]	CO2	BL1
Q5	(b)	A wet solid is to be dried from 80 to 5% moisture, wet basis. Compute the moisture to be evaporated, per 1000 kg of final product.	[3]	CO2	BL3

:::::: 27/09/2022 M ::::::