

## V SEMESTER B.TECH (BIOTECHNOLOGY) END SEMESTER EXAMINATION (MAKEUP), FEB-MAR 2022 SUBJECT: Separation Processes (BIO 3154) REVISED CREDIT SYSTEM PART-B

<b>O.</b>	QUESTION	Mark	СО	Bloom
NO		S	mapped	Taxonomy level
1A	A binary liquid mixture, $\alpha$ as constant ( $\alpha = 1.5$ ), of A-B (50 mole % A) is flashed at 1 atm such that the composition of vapour in equilibrium with liquid is found to be 60 mole% A. Estimate the corresponding liquid composition, the fraction of feed vapourized. <b>DO NOT USE GRAPH.</b>	3	CO1	3
1B	Henry's law for Gas-Liquid system at 760 mmHg/25 <sup>o</sup> C is given by, $\overline{P}_{A}^{*}=32x_{A}$ where $\overline{P}_{A}^{*}$ is the partial pressure of A in mm Hg, $x_{A}$ is the mole fraction of A in the liquid. Compute the values of Y for X=0.2, 0.4, 0.7	3	CO2	4
1C	A hygroscopic material is subjected to drying-wetting (humidification) experiment by changing RH of air and observing equilibrium moisture content of the particles to <b>generate equilibrium diagram</b> . It is observed that during drying, air in pores did not interfere with drying while during wetting, entrapped air created increased pressure with rising moisture content. Draw the equilibrium diagram for both the operations on the same plot. (RH on y axis, equilibrium solid moisture content $\bar{X}$ on x-axis). Give your explanation. [2] Dried fish in the form of a block was dried and it was found that initially the material lost equal moisture in equal time, followed by rate of drying being proportional free moisture. The fish was pulverized to fine particles and subjected to drying again. Predict the drying behaviour. Plot both the behaviours on the same plot. Give your explanation. [2]	4	CO5	2
2A	Literature describes an HPLC separation in which $k_A = 1.0$ , $k_B = 1.54$ , $k_C = 2.38$ , $k_D = 3.00$ . Can this separation be carried out in a low-pressure column having only 300 plates, with the same phase system and a minimum resolution of 1?and $k_1$ is the distribution coefficient of the last peak in a pair of peaks, $k_{avg}$ is the average distribution coefficient in a pair.	4	CO4	3

	$\sqrt{N_{min}} = \left(\frac{4R_s}{(\infty - 1)}\right)\left(\frac{1 + k_{avg}}{k_1}\right)$			
28	10 kg of adipic acid is slurried in 13.1 kg water and heated to $90^{0}$ C to solubilize the acid. The solution is then filtered to remove insoluble impurities. During the process, 10% of the water is evaporated. The clarified solution is cooled to $35^{0}$ C and filtered. The solubility at $35^{0}$ C is 0.05 kg acid/kg water. Determine the weight of crystal (kg) removed in this operation.	3	CO5	4
2C	80 cc of modified detxran will adsorb upto $7.8 \times 10^{-6}$ mol of immunoglobulin G per cm <sup>3</sup> of adsorbent. This adsorption follows Langmuir isotherm with a constant K of $1.9 \times 10^{-5}$ mol/lit. What concentration in 1.2 lit of feed solution will exhaust 90% of the dextran's capacity?	3	CO3	4