

**VIT[®]****Vellore Institute of Technology**
(Deemed to be University under section 3 of UGC Act, 1956)**School of Bio Sciences and Technology****Winter Semester 2023- 2024****Continuous Assessment Test – II****Programme Name & Branch - B.Tech Biotechnology****Course Name & code: Downstream Processing & BBIT309L****Class Number (s): 2401, 2403, 2405****Slot: B1 Slot****Faculty Name:** Prof.Sangeetha Subramanian, Prof.Aanchal Mittal & Prof. Kamalanathan A.S**Exam Duration: 90 Min.****Maximum Marks: 50****Answer all the Questions**

Q.No.	Question	Max Marks
1.	(A). How would you separate Fibrinogen (340 kDa) and Myoglobin (16.8 kDa) using the salt precipitation technique? Explain the principle and practice in detail. (B). a. Complete the following statements :(i) Protein usually exhibit----- ----charge on their surface (ii) The stern – layer comprises-----ions. (iii)The -----layer is a diffuse layer of mobile counter ions b. The Hofmeister series is given: Citrate >phosphate >sulphate >chloride >nitrate >thiocyanate. Now select the correct response to the following statements.(i)Nitrate salts are more effective than phosphate salts for salting out – True/ false (ii)Nitrate salts tend to cause more structural damage to proteins than phosphate salts – True /false [6+4]	10
2.	You are asked to separate human serum albumin, sucrose, and sodium chloride from each other in a feed solution using membrane separation processes. Sequence the method you will use and explain each method you propose.	10

3.	(i).Protein A will be extracted from a plant source using reverse micelle extraction. The protein's isoelectric point (pI) has been identified as pH 7. As a bio separation engineer, you will design the process and provide justification for the chosen approach. (ii) From the phase diagram infer (a) If E is initial concentration of the 3 components present, estimate concentrations after equilibrium is established.(b)FG is designated as _____ line (c) Estimate the ratio of volumes for the top and bottom phases for initial component mixture E. [7+3]	10
4.	The objective is to recover 94% of Protein A in a 100-liter solution containing 8g/L of Protein A and 3g/L of Protein B. The treatment involves using $(\text{NH}_4)_2\text{SO}_4$, and the proteins' properties are Protein A : β -22 & k-8 and Protein B: β- 20 & k-7.5. What is the purity of the precipitant (Protein A) if the properties of each protein are independent of each other?	10
5.	Using a continuous extractor, a solute will be extracted from an aqueous phase to an organic phase. The aqueous feed enters the extractor at a flow rate of 400 L/hr and has a solute concentration of 0.5 g/L. The equilibrium relationship is given by $x = 2y^2$, where x and y are the concentrations in the extract and raffinate, respectively. The extraction unit consists of 2 theoretical counter-current stages. What organic solvent flow rate will be required for 60% solute recovery?	10

