Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U7C02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Seventh Semester

Biotechnology

21UBT702 - DOWNSTREAM PROCESSING

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

PART A - (10 x 2 = 20 Marks)

1.	What is cell permeabilization and give example?	CO1-U	
2.	Outline the DSP steps in citric acid manufacture.	CO2-App	
3.	Define Darcy's Law.	CO1-U	
4.	What is relative centrifugal force (RCF)? Find G- factor of the centrifuge with an effective diameter of 30 cm and rotating at a speed of 50 rotation per sec.	CO2-App	
5.	What do you meant by Binodal curve? State its significance.	CO1-U	
6.	What is "salting out" and "Chatropic agent"?	CO1-U	
7.	Classify different chromatographic techniques.	CO1-U	
8.	Comment on the significance of resolution in chromatogram.	CO2-App	
9.	Give the expression for crystal growth.	CO1-U	
10.	What is meant by primary and secondary nucleation?	CO1-U	

PART – B (5 x 16= 80Marks)

11.	(a)	Explain the characteristics and features of fermentation broth in bioseparation process.	CO1-U	(16)
		Or		
	(b)	Describe the cell disruption for product release by chemical methods with suitable examples.	CO1-U	(16)
12.	(a)	Determine the position of particular particles as a function of time and volumetric flow rate of feed in a disc type centrifuge with the diagram and explain the different types of centrifuge.	CO2-App	(16)
		Or		

(b) The specific resistance of the cake of biomass was found to vary with pressure drop as follows. Find the compressibility of the cake. CO2-App (16)

Pressure drop (kN/m^2)	330	134.3	46.1	21.1
Cake resistance (m/kg) x 10^{11}	3.56	2.16	1.45	1.07

13. (a) Demonstrate the principle and procedure in microfiltration and ultrafiltration. CO2-App (16)

Or

(b) The fermentation broth of 1000 litres containing 0.25 g/l of the antibiotic was mixed with 1.5 kg of an adsorbent in a batch reactor and allowed to equilibrate. The values of K and n are 0.188 and 0.2 respectively. The isotherm is given as, CO2-App (16)

y (mg / cm^{-3})	0.3	0.12	0.04	0.018	0.006	0.001
q (mg/g)	0.15	0.12	0.095	0.08	0.06	0.045

Calculate the percent solute adsorbed.

14. (a) If the protein of interest is stable at pH 5.5 and the isoelectric point of the protein is 7.1, then which type of ion exchange chromatography can be adopted to purify the protein. Justify with reason. Also explain in detail about the principle, matrix used, application of the same type of chromatography. CO3-Ana (16)

Or

(b) It is decided to separate mixer of proteins containing Albumin (66 kDa), papin (12 kDa), Ovalbumin (46 kDa), Chtmotrypsin (37 kDa), trypsin (22 kDa), plaminogen (95 kDa) using chromatography. Give the expected order of elution and explain the basic principles behind in the chromatography? CO3-Ana (16)

15. (a) Explain with neat block diagram about freeze drying process. CO1 -U (16)

Or

(b) Discuss the theory of batch Crystallization process. CO1 -U (16)