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

Question Paper Code:U7C02

B.E./B.Tech. DEGREE EXAMINATION, NOV 2025

Seventh Semester

21UBT702 - DOWNSTREAM PROCESSING

Biotechnology

(Regulations 2021)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Define cavitation and state its significance	CO1 – U
2.	What are inclusion bodies? Give flow chart to purify inclusion bodies	CO1 - U
3.	What is Grayo Tester?	CO1 – U
4.	How is the Compressibility of a cake determining influence the filtration of fermentation broth?	CO2- App
5.	What do you mean by Retention coefficient?	CO1 – U
6.	Define q factor	CO1 – U
7.	What is the importance of pI in separation technology?	CO1 – U
8.	Classify different chromatographic techniques	CO1 – U
9.	Define metastable zone	CO1 – U
10.	When will freeze dryer be selected over spray dryers? Give example	CO3- App

PART – B (5 x 16= 80 Marks)

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)	Derive the necessary design equation to determine the time of batch filtration process.	CO2 -App	(16)
		Or		
	(b)	In a R&D cell of an industry, one of the team is working on the purification of recombinant insulin from bacteria. You are expected to identify a better physical method to disrupt the large volume of bacterial cell suspension to isolate the target protein and also give a flow chart for the further purification stages. Outline the principle of the cell disruption method selected for the process. Also suggest the methods that can be added to enhance the efficiency of disruption.	CO2 – App	(16)
13.	(a)	Demonstrate the principle and procedure in microfiltration and ultrafiltration.	CO1 – U	(16)
		Or		
	(b)	Give an account on the theoretical principles and steps involved in the aqueous two- extraction of an enzyme.	CO1 -U	(16)
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.	CO4-Ana	(16)
		Or		
	(b)	It is decided to separate mixer of proteins containing Albumin (66 kDa), papin (12 kDa), Ovalbumin (46 kDa), Chymotrypsin (37 kDa), trypsin (22 kDa), plaminogen (95 kDa) using chromatography. Give the expected order of elution and analyze the chromatogram with principles behind in the chromatography?	CO4-Ana	(16)
15.	(a)	Discuss the theory of batch Crystallization process.	CO1 -U	(16)
		Or		
	(b)	Explain the process of drying with neat curve.	CO1 -U	(16)