Q. Code: 613350

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

M.E./ M.TECH. DEGREE EXAMINATION, MAY 2023

Second Semester

BY18201 – Bioseparation Technology

(Biotechnology)

(Regulation 2018A)

TIME: 3 HOURS **MAX. MARKS: 100**

CO 1 Understand the importance of bioseparation and nature of the fermentation broth and biomolecules to select an appropriate purification process

CO 2 Select the appropriate cell disruption method used for the recovery of intracellular products

CO 3 Choose the appropriate extraction and precipitation methods used for the separation of biomolecules

CO 4 Select an appropriate chromatographic separation method to achieve maximum purity of target product

CO 5 Apply the principles of drying and crystallization to obtain the final polished desired biomolecule

PART- A (10 x 2 = 20 Marks)

(Answer all Questions)

		CO	RBT LEVEL
1	Name any two cationic and anionic detergents used for cell disruption.	**2**	**2**
2	List out the industrial applications of tangential-flow microfiltration.	**2**	**2**
3	Brief about the role of electrophoresis in bioseparations.	**3**	**2**
4	How will you use reverse micelles for the separation of proteins?	**3**	**2**
5	Give the applications of ion-exchange chromatography in bioseparations.	**4**	**2**
6	How will you calculate number of theortical plates in chromatography?	**4**	**2**
7	Differentiate adsorption and partition column chromatography.	**4**	**2**
8	List out the considerations in scaling up an HPLC method.	**4**	**2**
9	Compare batch and continuous crystallization process.	**5**	**2**
10	What does the term polishing chromatography refers to?	**5**	**2**

PART- B (5 x 13 = 65 Marks)

		Marks	CO	RBT LEVEL
11(a)	Categorize bioproducts based on their volume in fermentation broth and market volume with examples. Suggest and brief about the suitable biosperation techniques for each of the above category.	**(13)**	**1**	**3**
	(OR)			
11(b)	Comment on the challenges in the purification of recombinant proteins. Also elaborate on the guidelines to reach high-quality purified recombinant expressed proteins.	**(13)**	**1**	**3**
12(a)	Enumerate various methods of cell disruption for release of intracellular products from fermentation broth. Give a detailed note on cell disruption by mechanical methods.	**(13)**	**2**	**3**
	(OR)			
12(b)	Brief about the principle and theory of different types of centrifugation techniques. Also given an overview of commercial applications of centrifugation that are commonly used in biotechnology.	**(13)**	**2**	**3**
13(a)	Explain the theoretical principles and steps involved in the aqueous two-phase extraction of an enzyme.	**(13)**	**3**	**3**
	(OR)			
13(b)	Discuss about the principles and strategies of salting-out method in large scale precipitation of proteins.	**(13)**	**3**	**3**
14(a)	Describe the working principle and applications of size exclusion chromatography with a neat diagram.	**(13)**	**4**	**3**
	(OR)			
14(b)	Describe the various affinity chromatography techniques used in separation of biomolecules.	**(13)**	**4**	**3**
15(a)	Elaborate on the stability and process considerations involved in spray-drying of biopharmaceutical products.	**(13)**	**5**	**4**
	(OR)			

15(b)	Present an overview of recent techniques used in the purification of cephalosporin antibiotics.	**(13)**	**5**	**4**

PART- C (1 x 15 = 15 Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16	Monoclonal antibodies (mAbs) have realized their potential over the last 20 years, with successful applications in a range of major therapeutic areas, including the treatment of breast cancer. In fact, they are the largest and fastest growing class of biological drugs today. As a result, there is high demand for solutions that will deliver efficient, flexible, and cost-effective mAb purification. Increases in upstream titers mean that downstream processes must gear up too. Higher titers mean a higher number of impurities is likely, and these need to be separated from the target molecule. So what is the most effective way to optimize purification? Justify your answer.	**(15)**	**5**	**5**

Q. Code: 613350