BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: M. SC. & PRE-PHD **SEMESTER : III**
BRANCH: BIOENGINEERING & BIOTECHNOLOGY **SESSION : MO/2022**

SUBJECT: BT509 DOWNSTREAM PROCESSING

TIME: 3:00 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Sketch the overview (outline) of any Bioseparation process.	[2]	1	2
(b)	Describe any one gradient centrifugation method.	[3]	1	2
(c)	Explain various mechanical cell disruption methods.	[5]	1	2
Q.2(a)	Write adsorption isotherm equations.	[2]	2	2
(b)	Justify the use of ammonium sulphate for precipitation of protein in salting out method.	[3]	2	3
(c)	Calculate specific activity, purification fold and percentage recovery from the given data:	[5]	2	5

Steps	Total protein (mg)	Total activity (unit)	Specific activity	Purification fold	% recovery
Homogenate	2936	27028			
Sediments	1041	22846			
Salt precipitation	32	18314			
Ion exchange	4.3	4185			
Affinity	1.3	2137			

Q.3(a)	What is reverse phase chromatography? How it is advantageous over normal phase chromatographic techniques.	[2]	3	1
(b)	Describe briefly the principle of anion exchange chromatography.	[3]	3	2
(c)	Two proteins of MW 2.5×10^5 and 1×10^4 were eluted out of a gel in gel filtration column at 220 mL and 300 mL respectively. Determine the molecular weight of a protein that elutes out at 270 mL under the same condition?	[5]	3	5
Q.4(a)	In a cross flow filtration, if inlet pressure is 8 atm., outlet pressure is 2 atm., calculate transmembrane pressure drop.	[2]	4	4
(b)	Describe any one membrane module with its advantages and disadvantages.	[3]	4	2
(c)	Explain the mechanism of transport of particles in a MF system.	[5]	4	3
Q.5(a)	Write in detail about the following (i) Tray dryer; (ii) Fluidized bed dryer	[5]	5	3
(b)	(i) Write about crystallization theory and explain in detail about the nucleation and crystal growth. (ii) Write the working principle and operating procedure about oslo type crystallizer.	[5]	5	3

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