Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2022

Subject Code:3170411 Date:05-01-2023

Subject Name:Downstream Processes

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	How does cell wall composition affect the selection of cell disruption technique?	**03**
	(b)	Explain stages of downstream process.	**04**
	(c)	Explain High Speed Ball Mill Technique of cell disruption in detail.	**07**
Q.2	**(a)**	Explain Membrane fouling.	**03**
	(b)	Compare Stoke's law for sedimentation and centrifugation.	**04**
	(c)	A rotary vacuum filter is available with an area of 200 m^2 and vacuum pressure of 75 kPa. Filter leaf tests have been performed on a cell broth with a viscosity of 5cp. The leaf tests gave a specific cake resistance of 1×10^{11} cm/g and a medium resistance of 1×10^{8} cm^{-1}. The cake solids (dry basis) per volume of filtrate was 15 g/liter. It is desired to operate the large filter with a cycle time of 45s and a cake formation time of 10s. What is the filtration rate expected for the rotary vacuum filter?	**07**
		OR	
	(c)	A Buchner funnel 8 cm in diameter is available for testing the filtration of a cell culture suspension, which has a viscosity of 3.0 cp. A vacuum pressure of 600 mm Hg applied to the Buchner funnel. The cell solids on the filter at the end of filtration were dried and found to weigh 14.0 g. Determine the specific cake resistance and the medium resistance. Then estimate how long it would take to obtain 10,000 liters of filtrate from this cell broth on a filter with a surface area of 10 m^2 and vacuum pressure of 500 mm Hg. Take following values of slope and intercept for data obtained from t/(V/A) versus V/A graph. Slope = 4.81 s/cm^2 Intercept = 4.26 s/cm	**07**
Q.3	**(a)**	Enlist the parameters to be considered for solvent selection in liquid liquid extraction.	**03**
	(b)	Explain the phenomenon of precipitate formation.	**04**
	(c)	Explain batch adsorption process in detail with one of its application in bioprocess industry.	**07**
		OR	
Q.3	**(a)**	What is stationary phase and mobile phase?	**03**
	(b)	Write a note on spacer arm.	**04**
	(c)	Explain principle and application of Molecular Sieve Chromatography.	**07**
Q.4	**(a)**	Explain principle of ion exchange chromatography.	**03**
	(b)	What is gradient maker? How does it work?	**04**
	(c)	Explain components of HPLC.	**07**

OR

Q.4	**(a)**	What is filter aid?	**03**
	(b)	Explain structure of hydrophobic matrices.	**04**
	(c)	Explain various considerations to be made during scale up of crystallization process.	**07**

Q.5	**(a)**	Explain principle of crystallization.	**03**
	(b)	Explain the process of precipitation by temperature modification.	**04**
	(c)	Derive the design equation for tubular centrifuge.	**07**

OR

Q.5	**(a)**	Write a note on stationary phase used in molecular sieve chromatography.	**03**
	(b)	Explain product finishing step of bioprocess industry.	**04**
	(c)	Explain design of any one dryer used in bioprocess industries.	**07**

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