Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (NEW) EXAMINATION – WINTER 2021

Subject Code:3160512 Date:04/12/2021

Subject Name:Biochemical Engineering

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)**	Discuss the limitation of bio-catalyzed reaction.	**03**
	(b)	How biochemical engineering process differs from conventional chemical process?	**04**
	(c)	Explain with suitable example the integrated bioprocess system.	**07**
Q.2	**(a)**	State different unit operation involved in bioprocessing operation.	**03**
	(b)	Sate the function of lipid? How it differ from carbohydrates?	**04**
	(c)	Explain and classify the protein according to its structure.	**07**
		OR	
	(c)	What is carbohydrate? Explain the types and function of carbohydrates.	**07**
Q.3	**(a)**	Differentiate between batch and continuous sterilization?	**03**
	(b)	Explain the factors affecting enzyme activity?	**04**
	(c)	Explain growth of a typical microbial culture in a batch conditions	**07**
		OR	
Q.3	**(a)**	Define and explain types of sterilization?	**03**
	(b)	List out the properties of enzymatic reaction?	**04**
	(c)	Write down Monod equation of microbial growth kinetics. Explain various terms in the same equation. How do you determine the kinetic parameters of the above equation graphically?	**07**
Q.4	**(a)**	Classify the enzyme based on its application? List the name of industrial enzymes.	**03**
	(b)	What is enzyme immobilization? What is the merit of immobilization method?	**04**
	(c)	What is enzyme inhibition? Explain competitive enzyme inhibition and derive expression for it.	**07**
		OR	
Q.4	**(a)**	Explain the need of oxygen supply in fermentation process.	**03**
	(b)	Discuss briefly the cell disruption techniques.	**04**
	(c)	Develop the Michaelis-Menten equation for enzyme substrate reaction.	**07**
Q.5	**(a)**	How the product inhibition can be eliminated in fermentation process?	**03**
	(b)	List the importance of Valves and steam traps in fermenter.	**04**
	(c)	State various methods of determination of volumetric mass transfer coefficient KLa in a fermenter and explain any one.	**07**

OR

Q.5	**(a)**	Explain different types of membrane process and their specification.	**03**
	(b)	Explain the electrophoresis method for product recovery.	**04**
	(c)	What Fed batch reactor? Explain with neat sketch and derive the expression of Fed batch reactor.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160512 Date:10/06/2022

Subject Name:Biochemical Engineering

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)**	Differentiate between Prokaryotic and Eukaryotic cells with a suitable example.	**03**
	(b)	Suggest the role of Aeration and Agitation in the fermentation unit. List out the various agitation units used in a typical fermenter.	**04**
	(c)	Compare the chemical processes with the biochemical process. Specify the characteristic of biochemical processes.	**07**
Q.2	**(a)**	What are carbohydrates? List out the functions of carbohydrates.	**03**
	(b)	Specify the application of the following in fermentation: (1) Sterile air, (2) Stem trap, (3) Controller, and (4) valve.	**04**
	(c)	Explain the types of protein with a suitable example? Discuss the factor affecting protein denaturation.	**07**
		OR	
	(c)	Define polysaccharides. Differentiate between amylose and amylopectin in terms of their structure, composition, and function.	**07**
Q.3	**(a)**	List out the unit operations involved in bioprocesses. Explain the need for unit operations with appropriate examples.	**03**
	(b)	Explain the effect of pH and temperature on enzyme activity.	**04**
	(c)	Derive an expression for enzyme kinetics using the Michaelis-Menten approach. State the assumption made in this approach.	**07**
		OR	
Q.3	**(a)**	Control of process parameters is essential in the fermentation unit. Please explain how the controlled conditions are kept fermentation.	**03**
	(b)	Define the term ‘Enzyme immobilization’. How the function of an enzyme is altered due to immobilization.	**04**
	(c)	What is enzyme inhibition? List out the various type of enzyme inhabitation. Derive an expression for competitive inhibition with a suitable diagram.	**07**
Q.4	**(a)**	List the types of chromatography methods. Explain its role in product recovery.	**03**
	(b)	Define the following: (1) Sterilization (2) Yield coefficient, (3) oxygen uptake rate (4) Substrate	**04**
	(c)	Discuss the following (1) cell death kinetics (2) Microbial growth phases	**07**

OR

Q.4	**(a)**	Discuss the electrophoresis process in biochemical processing.	**03**
	(b)	State the Monod Equation and suggests the techniques to determine its parameters.	**04**
	(c)	List out various methods for the determination of KLa value. Explain any one in detail.	**07**
Q.5	**(a)**	List the methods available for product recovery. What is the difference between micro and ultrafiltration?	**03**
	(b)	State the similarity and difference between batch and continuous biomass culture.	**04**
	(c)	What is a fed-batch reactor? Explain with diagram various configurations of fed-batch bioreactor.	**07**

OR

Q.5	**(a)**	What is cell disruption? Explain its importance in biochemical processes.	**03**
	(b)	Explain the term 'critical dilution rate' and 'wash out' in context with a continuous culture.	**04**
	(c)	Discuss the stirred tank reactor in series and stirred tank reactor with recycling of biomass using a suitable diagram.	**07**

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