Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160512 Date:14-07-2023

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 Chemical and Biochemical process with a suitable example.	**03**
	(b)	Justify the statement "Biochemical engineering is an interdisciplinary course."	**04**
	(c)	List out the unit operations involved in biochemical processes. Elaborate the Integrated bioprocess system with suitable example.	**07**
Q.2	**(a)**	Define the following: (1) carbohydrates, (2) Protein, and (3) Lipid	**03**
	(b)	For the fermentation, write the importance of (1) Nutriant, (2) Agitator, (3) Areation , and (4) Steam.	**04**
	(c)	Differentiate between primay, secondary and tertiary protein ? List out the characteristics of protein.	**07**
		OR	
	(c)	Classify Lipid based on its structure. Discuss the important functions of lipid.	**07**
Q.3	**(a)**	List out the techniques used for sterilization. Explain the need of sterilization ?	**03**
	(b)	Justify the statement, "Media preparation is essential part of biochemical process."	**04**
	(c)	Draw the various phases for microbial growth. Explain the need of deriving methametical model for enzyme kinetics? List out the various enzyme kinetics approachs.	**07**
		OR	
Q.3	**(a)**	How the enzymes are classified? Discuss the importance of Industrial enzymes.	**03**
	(b)	Discuss the merit and demerit of Enzyme immobilization in biochemical process.	**04**
	(c)	List out the factor affecting enzymatic activity. Derive an expression for non-competitive inhibition with a suitable diagram.	**07**
Q.4	**(a)**	Explain the importance of centrifugation operation role in product recovery.	**03**
	(b)	Define the following: (1) Monod growth rate, (2) Yield coefficient, (3) Respiratory Quotients, and (4) Fluid rheology	**04**
	(c)	Compare between batch and continuous biomass culture with suitable example.	**07**
		OR	
Q.4	**(a)**	Discuss the briefly factor affecting K_La value in design of fermentor.	**03**

	(b)	List out the various confurigations for fermentation process. Draw the Fed batch reactor showing important components.	**04**
	(c)	Explain the role of maintaining the aseptic conditions and control of parameters in ferementation process.	**07**
Q.5	**(a)**	What is the importance of product recovery in biochemical unit ?	**03**
	(b)	Differentiate between microfiltration and ultra filtration method.	**04**
	(c)	State the imporatant characteristics of Stirred tank reactor in series and stirred tank reactor with recycle of biomass.	**07**

OR

Q.5	**(a)**	Define the following in context to continuous reactor: (1) critical dilution rate, (2) wash out and , (3) Residence time.	**03**
	(b)	List the product recovery method? Discuss in brief single stage and multistage extraction for biochemical process.	**04**
	(c)	Explain the variant of cell disruption method with merit and demirt of each.	**07**

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