

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

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|------------|--|-----------|
| 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) State 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**

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

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|------------|---|-----------|
| 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**
