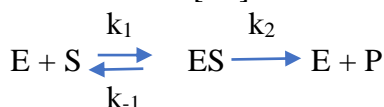


GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2024****Subject Code:3160512****Date:05-12-2024****Subject Name:Biochemical Engineering****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

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) Explain Polysaccharides with its examples. **03**
- (b) Discuss in detail about various unit operations involved in bioprocess. **04**
- (c) Give comparison of Chemical and Biochemical processes with advantages and limitations. **07**
- Q.2** (a) Explain Allosteric enzymes. **03**
- (b) The following data have been obtained for initial enzyme concentration $[E_0]$ for an enzyme-catalysed reaction. **04**



Rate of formation $r([E_0] = 0.015 \text{ g/l})$ (g/l-min)	Substrate Concentration [S] (g/l)
1.14	20.0
0.87	10.0
0.70	6.7
0.59	5.0
0.50	4.0
0.44	3.3
0.39	2.9
0.35	2.5

- a. Find K_m .
- b. Find maximum forward velocity of the reaction V_m for $[E_0] = 0.015 \text{ g/l}$.
- c. Find rate constant k_2 .
- (c) Give comparison of Eukaryotic and Prokaryotic cells using suitable labelled images. **07**
- OR**
- (c) Explain types of proteins in detail. **07**
- Q.3** (a) Explain: 1) Proximity effect of enzyme 2) Orientation effect of enzyme 3) specific activity **03**
- (b) Derive Michaelis and Menten rate equation assuming rapid equilibrium between Enzyme and substrate to form $[ES]$ complex. **04**
- (c) Discuss 'Entrapment' for immobilization of Enzymes with its types. **07**

OR

- Q.3** (a) What is Damkohler number? Give its significance. **03**
 (b) Explain the effect of pH and temperature on enzyme activity. **04**
 (c) Describe reactions for competitive inhibitors and derive rate equation for the same. **07**
- Q.4** (a) Explain Monod growth kinetics using equation. **03**
 (b) Draw schematic diagram for growth of microorganism in batch culture. **04**
 (c) Discuss types of sterilization of media in detail. **07**
- OR**
- Q.4** (a) Discuss 'Chemostat continuous culture' with dilution rate. **03**
 (b) Why aeration and agitation is required for fermentation process. **04**
 (c) Explain static method of gassing out for determination of mass transfer coefficient K_La value. **07**
- Q.5** (a) Explain Ultrasonication technique for cell disruption. **03**
 (b) Discuss the method of media preparation **04**
 (c) Discuss various parts and controls of fermenter using suitable diagram. **07**
- OR**
- Q.5** (a) Describe environmental factors affecting microbial growth of microorganisms. **03**
 (b) Name various industrial importance enzymes and mention their applications. **04**
 (c) Discuss adsorption chromatography for separation and purification of products. **07**
