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Question Paper Code: R4C04

B.E./B.Tech. DEGREE EXAMINATION, APRIL / MAY 2025

Fourth Semester

Biotechnology

R21UBT404 - ENZYME ENGINEERING AND TECHNOLOGY

(Common to BME Engineering)

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

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|--|--------|
| 1. What is an enzyme and classify based on enzyme commission nomenclature | CO1- U |
| 2. Define stereochemical specificity of an enzyme with an example. | CO1- U |
| 3. List out the methods for the evaluation of parameters in M-M equation. | CO1- U |
| 4. What do you mean by substrate and product inhibition? | CO1- U |
| 5. List-out the sources of plant for extraction of enzymes | CO1- U |
| 6. How do you purify enzymes by precipitation? | CO1- U |
| 7. What is Damkohler numbers? | CO1- U |
| 8. What is the relationship between Thiele modulus and effectiveness factor? | CO1- U |
| 9. Illustrate an electrochemical cell and mention its parts. | CO1- U |
| 10. Classify the enzymes based on its function and give some examples for each | CO1- U |

PART – B (5 x 16= 80 Marks)

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|---|--------|------|
| 11. (a) Describe in depth the many forms of specificity and the idea of an active site using a schematic diagram. | CO1- U | (16) |
| Or | | |
| (b) Explain in detail about the two models that are used to describe the way enzymes interact with substrates? | CO1- U | (16) |

12. (a) The reaction between nicotinamide mononucleotide and ATP to form nicotinamide–adenine dinucleotide and pyrophosphate is catalyzed by the enzyme nicotinamide mononucleotide adenylyltransferase. The following table provides typical data obtained at a pH of 4.95. The substrate, S, is nicotinamide mononucleotide and the initial rate, v , is the μmol of nicotinamide–adenine dinucleotide formed in a 3-min reaction period. CO2- App (16)

[S] (mM)	v (μmol)
0.138	0.148
0.220	0.171
0.291	0.234
0.560	0.324
0.766	0.390
01.460	0.493

Determine values for V_{max} and K_m

Or

- (b) Illustrate various inhibition ways in which the enzymatic reaction is stopped. Derive the kinetic equation for each inhibition way and draw the plots for each CO2- App (16)
13. (a) Explain how enzymes can be studied by Zymography. List its advantages and applications CO1-U (16)
- Or
- (b) Explain in detail about the X-ray spectroscopy technique and its application in enzyme analysis with neat sketch CO1– U (16)
14. (a) Explain the physical methods of immobilization of enzymes and its advantages, disadvantages and applications. CO1– U (16)
- Or
- (b) Explain the methods of enzyme immobilization and its effect on mass transfer. CO1–U (16)
15. (a) How environment could be monitored or analyzed using biosensor. Explain in detail with an example. CO1- U (16)
- Or
- (b) How biosensors are used in healthcare industries. Explain it in detail with examples. CO1- U (16)