



**B.TECH DEGREE EXAMINATIONS: APRIL/MAY 2024**

(Regulation 2018)

Fourth Semester

**BIOTECHNOLOGY**

U18BTI4202: Protein and Enzyme Technology

**COURSE OUTCOMES**

- CO1: Analyze and demonstrate the secondary, super-secondary, tertiary and quaternary structures of proteins and structure-function relationship.
- CO2: Apply the knowledge on protein structures in protein engineering and protein prediction.
- CO3: Compare the enzyme properties and kinetics.
- CO4: Evaluate the immobilization of enzymes and its effectiveness.
- CO5: Apply the knowledge on design of enzyme based biosensors and their applications.

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-  
PART A (10 x 2 = 20 Marks)  
(Answer not more than 40 words)**

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|---|-----|-------------------|
| 1. Define $\beta$ -pleated sheet with sketch.   | CO1 | [K <sub>2</sub> ] |
| 2. What is $\alpha/\beta$ horseshoe fold?   | CO1 | [K <sub>2</sub> ] |
| 3. Provide any two roles of helix-turn-helix motif in DNA binding?                          | CO2 | [K <sub>2</sub> ] |
| 4. Enlist the functions of hemoglobin.  | CO2 | [K <sub>2</sub> ] |
| 5. How does the specificity of an enzyme's active site contribute to substrate recognition? | CO3 | [K <sub>2</sub> ] |
| 6. Differentiate between reversible and irreversible enzyme inhibition                      | CO3 | [K <sub>2</sub> ] |
| 7. Sketch the process of enzyme production from microorganism                               | CO4 | [K <sub>2</sub> ] |
| 8. What are the key properties of a matrix that make it suitable for enzyme immobilization? | CO4 | [K <sub>2</sub> ] |
| 9. What is the principle of biosensor?  | CO5 | [K <sub>2</sub> ] |
| 10. List any two enzymes used in leather industry.  | CO5 | [K <sub>2</sub> ] |

**Answer any FIVE Questions:-  
PART B (5 x 16 = 80 Marks)  
(Answer not more than 400 words)**

11. Explain the secondary and tertiary structure of protein with suitable example. 16 CO1 [K<sub>2</sub>]
12. Discuss the how does the photosynthetic reaction center contribute to the generation of ATP and NADPH during photosynthesis with neat sketch? 16 CO2 [K<sub>3</sub>]
13. Derive the equation for single substrate enzyme catalyzed reaction and their parameters. 16 CO3 [K<sub>3</sub>]
14. a) The following data on the substrate removal rate and the substrate concentration is available for some waste treatment. 12 CO3 [K<sub>4</sub>]

[S] (mol)	0.002	0.005	0.02	0.04	0.06	0.08	0.10
V (mol/min)	0.045	0.115	0.285	0.38	0.46	0.475	0.505

Estimate the value of substrate removal rate constant  $K_m$  and the value of  $V_{max}$

- b) Discuss the importance of active site present in the enzyme with neat diagram. 4 CO3 [K<sub>3</sub>]
15. a) Write a detailed note on physical and chemical methods of immobilization (each one method). 8 CO4 [K<sub>2</sub>]
- b) Provide the advantages and disadvantages of immobilization. 8 CO4 [K<sub>2</sub>]
16. a) Enumerate the applications of enzymes in various industries. Write with an examples. 12 CO5 [K<sub>2</sub>]
- b) Sketch the components of a biosensor 4 CO5 [K<sub>1</sub>]

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