Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD)
Re-accredited with 'A++' Grade by NAAC. Recognised by UGC Under Section 12B
Coimbatore - 641 043, Tamil Nadu, India

Bachelor's Degree Examination – November 2024
III Semester

Class : II UG | **Time: 3 Hours**
Major : Biochemistry and Biotechnology | **Max. Marks: 100**

23BBCC03 Proteins and Enzymes

Course Outcomes:

CO1: Describe the isolation and purification of protein by various methods and to estimate the amount of proteins
CO2: Classify the protein based on structure, solubility and function. Understand the methods of sequencing of aminoacids and proteins
CO3: Acquire theoretical knowledge on various methods of measurement of enzymatic reactions and understanding the enzyme kinetics and the mechanism of action of enzymes
CO4: Appreciate the role of enzyme in regulation of metabolism
CO5: Understanding the role of enzymes in clinical diagnosis and industries

Part A **10 x 1 = 10**

Choose the Correct Answer

1. Which of the following is NOT a common method for cell lysis? CO1 K1
   a. Sonication b. Freeze-thaw cycles
   c. Centrifugation d. Homogenization

2. Which chromatography technique separates proteins based on their size? CO1K2
   a. Ion exchange chromatography b. Affinity chromatography
   c. Size exclusion chromatography d. Reverse phase chromatography

3. Which of the following proteins is water-soluble? CO2 K3
   a. Collagen b. Haemoglobin
   c. Keratin d. Actin

4. Edman degradation is used for determining CO2 K2
   a. The complete 3D structure of proteins b.The N-terminal amino acid sequence
   c.The disulfide bond locations d. The C-terminal amino acid sequence

5. The term "enzyme" was first coined by: CO3 K1
   a. Emil Fischer b. Wilhelm Kühne
   c. James Sumner d. Eduard Buchner

6. In a Lineweaver-Burk plot, the x-intercept gives: CO3 K1
   a. Vmax b. Km
   c. 1/Vmax d.−1/Km

7. The unit of enzyme activity, defined as the amount of enzyme that converts 1 micromole of substrate perminute, is called: CO4 K2
   a. Turnover number b. Enzyme unit (U)
   c. Katal d. Michaelis constant

8. The cofactor required by many redox enzymes, such as those in the electron transport chain, is: CO4 K1
   a. Iron (Fe) b. Calcium (Ca)
   c. Zinc (Zn) d. Potassium (K)

9. Which enzyme is commonly used in the textile industry to remove starch from fabrics? CO5 K3
   a. Amylase b. Protease
   c. Lipase d. Cellulase

10. The principle behind enzyme biosensors is based on: CO5 K3
    a. The ability of enzymes to convert substrates into detectable products
    b. The use of enzymes to inhibit biosensor function
    c. Random enzyme binding to electrodes
    d. Synthesizing proteins

Part B — 5 x 6 = 30

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. Describe techniques such as salting out and solvent precipitation.	CO1 K1
(or)	
11.b. Explain affinity chromatography and its application in protein purification.	CO1 K1
12.a. Define primary structure and its significance in protein function.	CO2 K1
(or)	
12.b. Discuss the structural and functional importance of secondary structures in proteins.	CO2 K2
13.a. Explain how enzyme concentration influences reaction rate and the concept of saturation kinetics.	CO3 K2
(or)	
13.b. Discuss the role of lysozyme in bacterial cell wall degradation, including its substrate and mechanism.	CO3 K2
14.a. Define enzyme units (U), turnover number (kcat), and katal as enzyme activity measurements.	CO4 K1
(or)	
14.b. Define feedback inhibition and explain its significance in maintaining metabolic balance.	CO4 K1
15.a. Discuss how enzymes are used in diagnostic tools like ELISA (Enzyme-Linked Immunosorbent Assay) for disease detection.	CO5 K2
(or)	
15.b. Define enzyme electrodes and biosensors, and explain how they work.	CO5 K1

Part C — 5 x 12 = 60

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Describe the process of isolating and extracting proteins from a biological sample.	CO1 K1
(or)	
16.b. Describe the methods used for protein estimation in biological samples.	CO1 K1
17.a. Discuss protein denaturation and renaturation, citing Anfinsen's experiment as an example.	CO2 K2
(or)	
17.b. Outline the Edman degradation method for protein sequencing and its role in determining amino acid composition.	CO2 K4
18.a. Describe the Michaelis-Menten equation and its significance in enzyme kinetics.	CO3 K1
(or)	
18.b. Explain competitive, non-competitive, and uncompetitive inhibition of enzymes.	CO3 K2
19.a. Describe the different methods used to measure the rate of enzymatic reactions.	CO4 K1
(or)	
19.b. Explain the role of vitamins and trace elements in enzyme function, give some examples of coenzymes and cofactors.	CO4 K2
20.a. Describe the chemical synthesis of peptides in solution and solid phase.	CO5 K1
(or)	
20.b. Discuss the key biocatalyst properties that are altered through protein engineering.	CO5 K2