26.11.25

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 (now MoE)
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC
Coimbatore - 641043, Tamil Nadu, India

Bachelor's Degree Examination - November 2025
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 aminoacid 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 enzyme in clinical diagnosis and industries

Part A **10 x 1 = 10**
Choose the Correct Answer

1. The process used to separate proteins based on molecular size is: CO1K1
   a. adsorption chromatography
   b. Gel filtration chromatography
   c. ammonium sulphate precipitation
   d. ion exchange chromatography

2. The technique that removes small molecules while retaining proteins using a semipermeable membrane is: CO1K1
   a. Dialysis
   b. Salting out
   c. Electrophoresis
   d. Chromatography

3. The primary structure of a protein is determined by: CO2K1
   a. Hydrogen bonds
   b. Peptide bond sequence of amino acids
   c. Hydrophobic interactions
   d. Disulfide bridges

4. The quaternary structure of hemoglobin consists of: CO2K1
   a. One polypeptide chain
   b. Two α and two β chains
   c. Four identical chains
   d. Three peptide chains

5. The point at which the enzyme is saturated with substrate and reaction rate is maximal is: CO3K1
   a. Km
   b. Vmax
   c. kcat
   d. Turnover number

6. Which enzyme is an example of an isoenzyme? CO3K1
   a. Amylase
   b. Pyruvate decarboxylase
   c. Catalase
   d. DNA polymerase

7. The instrument used to measure enzyme activity based on absorbance of light is: CO4K1
   a. Manometer
   b. Spectrophotometer
   c. Colorimeter
   d. Electrophoresis

8. The reversible regulation of enzymes by phosphorylation is an example of: CO4K1
   a. Feedback inhibition
   b. Covalent modification
   c. Isoenzyme activity
   d. Ligand binding

9. The technique used to modify specific amino acids in proteins is: CO5K1
   a. Frame shift mutagenesis
   b. Site-directed mutagenesis
   c. Gel electrophoresis
   d. ELISA

10. An enzyme used as a thrombolytic agent in therapy is: CO5K1
   a. Streptokinase
   b. Amylase

Part B — 5 x 6 = 30

Answer ALL questions

Each answer should not exceed 400 words or two pages

11.a. List the techniques used for isolation and purification of proteins, and explain any one technique in detail.	CO1K2
(or)	
11.b. Differentiate Qualitative and quantitative detection of proteins.Explain in detail any one method for quantitative estimation of portion.	CO1K2
12.a. Classify proteins based on solubility, structure and functions with examples.	CO2K2
(or)	
12.b. Give a short note on the forces involved in protein conformation.	CO2K2
13.a. Derive and interpret the Michaelis-Menten equation.	CO3K2
(or)	
13.b. Infer the theories proposed for active site — lock and key hypothesis and induced fit hypothesis.	CO3K2
14.a. Give a note on the significance of enzyme units, turnover number, katal.	CO4K3
(or)	
14.b. What is the role of vitamins and trace elements for the functioning of enzymes.	CO4K3
15.a. Describe briefly the chemical synthesis of peptides.	CO4K3
(or)	
15.b. How can an enzyme be used as a biosensor. Explain in detail the principles behind it.	CO4K3

Part C — 5 x 12 = 60

Answer ALL questions

Each answer should not exceed 800 words or four pages

16.a. Explain the separation and purification of proteins based on molecular size, electric charge, and ligand specificity.	CO1K2
(or)	
16.b. Discuss on the methods of protein purification using dialysis salting out, pH precipitation and solvent precipitation	CO1K2
17.a. Compare the primary, secondary, tertiary structure and quaternary structure of proteins.	CO2K3
(or)	
17.b. Compare the methods of protein sequencing with appropriate illustration. Describe in detail sequencing by Edman's degradation method for determination of N and C terminal end and amino acid composition.	CO2K3
18.a. Show the classification of enzymes based on IUB system with examples and explain the nomenclature of enzymes.	CO3K3
(or)	
18.b. Summarize the mechanism of action of lysozyme and chymotrypsin.	CO3K3
19.a. Compare various methods followed for determining enzymatic reactions.	CO4K4
(or)	
19.b. Discuss the feedback inhibition and multiple cascade system of enzymes with an example.	CO4K4
20.a. What in meant by immobilization of enzymes? Summarize the various methods and give a note of the significance of each method.	CO5K4
(or)	
20.b. Discuss in detail the applications of enzymes in industry.	CO5K4

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