(i) Printed Pages: 4 Roll No. .....

(ii) Questions : 9 Sub. Code : 3 4 7 4

Exam. Code : 0 4 3 6

M.Sc. Bio-Technology 2nd Semester

(2054)

Enzymology and Enzyme Technology

Paper : MBIO-203

Time Allowed : Three Hours] [Maximum Marks : 80

Note :—(1) Attempt **FIVE** questions in all.

(2) Question No. **1** is compulsory.

(3) Attempt **ONE** question from each Section.

1. (i) Define endpoint kinetic assay.

(ii) Explain the effect of pH on enzyme activity.

(iii) What is competitive inhibition ?

(iv) What is meant by enzyme turnover number ?

(v) Define acid-base catalysis.

(vi) What are ribozymes and what is their significance ?

(vii) What is the function of lipid-protein interaction ?

(viii) Define membrane-bound enzyme. 8×2=16

SECTION—A

2. (A) Explain the influence of substrate concentration on enzyme reaction rate. Discuss the significance of the Michaelis constant (Km) in enzyme kinetics. 8

   (B) Discuss the role of binding sites in enzyme-substrate interaction. How does enzyme specificity arise from the structural features of binding sites ? 8

3. (A) Describe the international units (IU) used to measure enzyme activity. How is specific activity calculated and what does it indicated about enzyme purity ? 8

   (B) Discuss the effect of temperature on enzyme activity. Describe the factors that determine the temperature sensitivity of enzymes. 8

SECTION—B

4. (A) Explain the principles of pre-steady-state kinetics. How do these kinetics differ from steady-state kinetics and what information do they provide about enzyme mechanisms ? 8

   (B) Discuss the characteristics and mechanisms of uncompetitive inhibition. Provide examples of enzymes inhibited by uncompetitive inhibitors. 8

5. (A) Describe the Lineweaver-Burk plot and its utility in enzyme kinetics analysis. How can this plot be used to determine kinetic parameters such as Vmax and Km ? 8

(B) Discuss the structural basis of enzyme inhibition by allosteric modulators. How do allosteric inhibitors and activators regulate enzyme activity ? 8

SECTION—C

6. (A) Describe the role of metal ions in enzyme catalysis. Give examples of metal ion cofactors and discuss their functions in enzyme reactions. 8

(B) Discuss the mechanism of enzyme action for a specific enzyme of your choice, highlighting the key steps involved in catalysis. 8

7. (A) What are isoenzymes ? Discuss their significance in cellular function and disease diagnosis. Give examples of diseases where changes in isoenzyme levels are clinically relevant. 8

(B) Explain the concept of catalytic antibodies. How are these antibodies generated ? Enlist their applications in biotechnology and medicine. 8

SECTION—D

8. (A) Describe the methods used for the extraction and assay of membrane-bound enzymes. How do membrane properties such as fluidity and composition affect enzyme activity ? 8

(B) Explain the structure and function of glycoproteins. How are glycoproteins involved in cellular recognition and signalling processes ? 8

9. (A) What are biosensors ? Explain their principles of operation. How are enzymes used in biosensor technology and what advantages do enzyme-based biosensors offer ? 8

(B) Describe the methods used for enzyme immobilization, including physical and chemical immobilization techniques. What are the applications of immobilized enzymes in industry and medicine ? 8