

## MSc Sem.-2 Examination

409

## Biochemistry

May-2025

Time : 2-30 Hours]

[Max. Marks : 70

**Instructions:** Illustrate your answers with neat diagrams wherever necessary.

**Que 1 Write the following**

- (i) Write difference between compulsory ordered sequential and random order sequential bisubstrate reactions. (7 Marks)
- (ii) Discuss (a) the unique properties of the enzyme and (b) environmental factors that affect enzyme activity. (7 Marks)

**OR**

- (i) Discuss the relationship between substrate concentration and rate of enzyme activity. Write the significance of the  $K_m$  value. (7 Marks)
- (ii) What is Enzyme kinetics? Discuss the pre-steady state and steady-state conditions in enzyme kinetics with a proper graph. (7 Marks)

**Que 2 Write the following**

- (i) Discuss the lysosomal-protein degradation with proper diagram. (7 Marks)
- (ii) Discuss spectrophotometric methods to determine rate of enzyme activity with example. Write its advantage. (7 Marks)

**OR**

- (i) What is ubiquitination? How does the ubiquitin-proteasome system target the protein for degradation? (7 Marks)
- (ii) What is coupled reaction? How is it significant to identify the rate of enzyme activity? Explain with an example. (7 Marks)

**Que 3 Write the following**

- (i) Discuss the various allosteric regulators of haemoglobin and their physiological significance. Explain the molecular basis of the Bohr effect and its importance in oxygen transport. (7 Marks)
- (ii) Describe in detail the various techniques used for enzyme immobilization. Compare their advantages and disadvantages with suitable examples. (7 Marks)

**OR**

- (i) Compare and contrast the Monod-Wyman-Changeux (MWC) model and the Koshland-Némethy-Filmer (KNF) model of allosteric regulation. Include their assumptions, functional implications, strengths, and limitations. (7 Marks)

- (ii) Discuss the environmental and industrial applications of immobilized enzymes. (7 Marks)  
How do these applications contribute to sustainable development and green chemistry?

**Que 4 Write the following**

- (i) Discuss the various methods of regulation of the PDH complex. Explain the roles of phosphorylation/dephosphorylation and allosteric regulation in detail. (7 Marks)
- (ii) Why is enzyme regulation necessary? Describe the various mechanisms of enzyme regulation. (7 Marks)

**OR**

- (i) Explain the role of vitamins as coenzymes in enzymatic reactions. Discuss in detail how at least four B vitamins function as cofactors in metabolic pathways. (7 Marks)
- (ii) Explain the concept of substrate channelling in multienzyme complexes. Discuss its advantages and provide examples from metabolic pathways where this phenomenon occurs. (7 Marks)

**Que 5 Attempt any seven out of twelve** (14 Marks)

- (i) What is the significance of the Hill coefficient (h) in understanding allosteric regulation?
- (ii) Write the difference between continuous and discontinuous enzyme assay.
- (iii) Enlist the methods for measurement of the rate of enzyme turnover.
- (iv) What is the significance of the Hill coefficient (h) in understanding allosteric regulation?
- (v) Define feedback inhibition and provide one example.
- (vi) What is compartmentalisation in enzyme regulation?
- (vii) Why do cells need to degrade the proteins/enzymes?
- (viii) Which are the factors affecting the value of  $K_m$  and  $V_{max}$ ?
- (ix) What is Pupylation in prokaryotic cell?
- (x) Write the differentiate between apoenzyme and holoenzyme.
- (xi) Enlist the discontinuous methods to determine enzyme activity.
- (xii) How many types of bonds and interactions happen with the Enzyme substrate complex?