

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 226

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Unique Paper Code : 2233012005

Name of the Paper : Bioenergetics and Enzymology

Name of the Course : **B.Sc. (Hons.) Zoology, NEP**

Semester : IV DSE

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Draw neat, well labelled diagrams and structures, wherever required.
3. Attempt **five** questions in all. Question No. **1** is compulsory.

1. (a) Define the following (6)
 - (i) Electrostatic bond
 - (ii) Cofactor
 - (iii) Binding energy
 - (iv) Redox potential
 - (v) Equilibrium constant
 - (vi) Proteases
- (b) Differentiate between the following (10)
 - (i) Reversible and Irreversible Inhibition
 - (ii) Coenzyme and holoenzyme
 - (iii) Positive Cooperativity and negative cooperativity
 - (iv) Inhibitors and Uncouplers
 - (v) NAD and FAD
- (c) Write the contribution of the following scientists (4)
 - (i) E. Racker
 - (ii) P. Boyer
 - (iii) Josiah Willard Gibbs
 - (iv) Frederick Kuhne

P.T.O.

- (d) Give reasoning (6)
- (i) K_m is a measure of enzyme affinity.
 - (ii) Dinitrophenol acts as an uncoupler of oxidative phosphorylation.
 - (iii) V_{max} is unchanged by the presence of a competitive inhibitor.
- (e) Give an example of each (3)
- (i) An enzyme regulated by reversible covalent modification
 - (ii) A phosphorylase
 - (iii) first enzyme to be crystallized
2. (a) Explain the mechanism through which ATP transfers its energy. (8)
- (b) Discuss hydrophilic and hydrophobic electron carriers. (7)
3. (a) Describe the pathway of transfer of electrons from Complex I to Complex IV in the ETC of mitochondria. (8)
- (b) Draw a neat, well-labelled diagram of ATP synthase. Add a note on rotational catalysis exhibited by this enzyme. (7)
4. (a) Derive the Michaelis-Menten equation and show under what conditions $K_m = [S]$. (8)
- (b) Discuss the factors that influence the activity of enzymes. (7)
5. (a) Describe any three different types of enzyme regulation, giving one example of each. (9)
- (b) Explain the mechanism of positive and negative cooperativity. (6)
6. Write a short note on the following (**any three**). (3×5=15)
- (i) Shuttle system
 - (ii) Multi-enzyme complexes
 - (iii) Classification of enzymes
 - (iv) Competitive inhibition