2 0 2 4

(CBCS)

(3rd Semester)

BIOCHEMISTRY

THIRD PAPER

(Enzymology and Bioenergetics)

(Revised)

Full Marks : 75

Time : 3 hours

The figures in the margin indicate full marks for the questions

(SECTION : A—OBJECTIVE)

(*Marks* : 10)

Tick (✓) the correct answer in the brackets provided : 1×10=10

1. Enzymes are polymers of

(a) hexose sugar ( )

(b) amino acids ( )

(c) fatty acids ( )

(d) inorganic phosphate ( )

2. Enzyme specificity can be described by different specificities of the following, ***except***

(a) substrate specificity ( )

(b) reaction specificity ( )

(c) Koshland specificity ( )

(d) stereospecificity ( )

3. Enzyme inhibition by blocking its active site is called as

(a) allosteric inhibition ( )

(b) feedback inhibition ( )

(c) competitive inhibition ( )

(d) non-competitive inhibition ( )

4. Which of the following enzyme inhibitions shows increased K_m value?

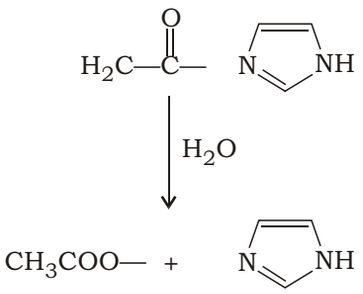
(a) Competitive inhibition ( )

(b) Un-competitive inhibition ( )

(c) Non-competitive inhibition ( )

(d) Feedback inhibition ( )

5. The reaction in the diagram belongs to which type of catalysis?



(a) Strain distortion and conformational change ( )

(b) Approximation catalysis ( )

(c) Acid-base catalysis ( )

(d) Covalent catalysis ( )

6. Coenzyme involved in carbohydrate metabolism includes

(a) thiamine pyrophosphate ( )

(b) cobamide ( )

(c) pyridoxal phosphate ( )

(d) tetrahydrofolate ( )

7. The P : O ratio for the mitochondrial oxidation of NADH is

(a) 2 ( )

(b) 3 ( )

(c) 4 ( )

(d) 0 ( )

8. Which of the following is a membrane-bound enzyme of Krebs cycle that forms an enzyme complex in ETC?

(a) NADH dehydrogenase ( )

(b) Succinate dehydrogenase ( )

(c) Cytochrome oxidase ( )

(d) Cytochrome reductase ( )

9. Hill reagent, a dye which is used as an artificial electron acceptor, is

(a) DCPIP ( )

(b) PFC ( )

(c) DNPH ( )

(d) PRPP ( )

10. In photosynthesis, 8 moles of photons are required to produce ____ in the absence of photorespiration.

(a) 1 mole of CO_2 ( )

(b) 1 mole of O_2 ( )

(c) 2 moles of CO_2 ( )

(d) 2 moles of O_2 ( )

(SECTION : B—SHORT ANSWERS)

(*Marks* : 15)

Write short notes on the following : 3×5=15

UNIT—I

1. Enzyme activators

OR

2. Transition state theory

UNIT—II

3. Effect of pH on enzyme activity

OR

4. Non-competitive inhibition

UNIT—III

5. Covalent catalysis

OR

6. Pyridoxal phosphate

UNIT—IV

7. ATP synthase

OR

8. Inhibitors of electron transport chain

UNIT—V

9. Carotenoids

OR

10. First law of thermodynamics

(SECTION : C—DESCRIPTIVE)

(*Marks* : 50)

Answer the following questions: 10×5=50

UNIT—I

1. Define active site. Discuss the characteristic features of active site of an enzyme. 2+8=10

OR

2. What is enzyme specificity? Elaborate on different categories explaining specificity of an enzyme action. 2+8=10

UNIT—II

3. What is Michaelis-Menten equation? Show its derivation in relation to enzyme kinetics. 2+8=10

OR

4. Write in detail the various reversible inhibition of enzyme activity. 10

UNIT—III

5. Discuss the mechanism of enzyme catalysis mediated by covalent catalysis and strain distortion. 5+5=10

OR

6. What are cofactors? Discuss the role of cofactors in enzyme catalysis. 2+8=10

UNIT—IV

7. Explain in detail the components and reactions of mitochondrial electron transport chain. 10

OR

8. Write notes on the following : 5+5=10

(a) High energy compounds

(b) Chemiosmotic hypothesis of oxidative phosphorylation

UNIT—V

9. Describe in detail the *Z*-scheme of photosynthetic electron flow with suitable diagram. 10

OR

10. Write notes on the following : 5+5=10

(a) Application of 2nd law of thermodynamic to biological system

(b) Photophosphorylation

★ ★ ★