



**WEST BENGAL STATE UNIVERSITY**  
B.Sc. Honours/Programme 2nd Semester Examination, 2020

**MLBHGE02T/MLBGCOR02T-MOLECULAR BIOLOGY (GE2/DSC2)**

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.  
Candidates should answer in their own words and adhere to the word limit as practicable.*

1. Answer any **ten** questions from the following: 1×10 = 10
- (I) Choose the correct option:**
- (i) Proteins contain  
(A) Only L-amino acids (B) Only D-amino acids  
(C) DL-amino acids (D) Both (A) and (B)
- (ii) The optically inactive amino acid is  
(A) Glycine (B) Serine  
(C) Threonine (D) Valine
- (iii) At neutral pH, a mixture of amino acids in solution would be predominantly  
(A) Dipolar ions (B) Nonpolar molecules  
(C) Positive and monovalent (D) Hydrophobic
- (iv) Fischer's 'lock and key' model of enzyme action implies that  
(A) The active site is complementary in shape to that of substrate only after interaction.  
(B) The active site is complementary in shape to that of substrate.  
(C) Substrates change conformation prior to active site interaction.  
(D) The active site is flexible and adjusts to Substrate.
- (v) An amphibolic pathway among the following is  
(A) HMP shunt (B) Glycolysis  
(C) Citric acid cycle (D) Gluconeogenesis
- (vi) Synthesis of the following enzymes is increased during starvation.  
(A) Digestive enzymes (B) Gluconeogenic enzymes  
(C) Urea cycle enzymes (D) Glucokinase
- (vii) Long chain fatty acids penetrate the inner mitochondrial membrane  
(A) Freely  
(B) As acyl-CoA derivative  
(C) As carnitine derivative  
(D) Requiring sodium dependent carrier
- (II) State whether the following statements are "True" or "False":**
- (i) Hydroxyproline is present in Collagen.  
(ii) Malonate is a non-competitive inhibitor of Succinate dehydrogenase.  
(iii) Dinitrophenol is an uncoupler of electron transport and oxidative phosphorylation.

- (iv) Katal is the International Unit (IU) of Enzyme activity.
- (v) Allosteric enzymes follow sigmoidal kinetics.
- (vi) Beta-oxidation of fatty acids occur in the mitochondria.
- (vii) Leucine is a purely ketogenic amino acid.
- (viii) All cofactors are co-enzymes.

2. Answer any **ten** questions from the following: 2×10 = 20

- (i) What are the differences between secondary structure and tertiary structure of a protein?
- (ii) Write down the structure of an amino acid having two asymmetric centers.
- (iii) Write down the Michaelis Menten equation of enzyme kinetics.
- (iv) Give the structures of two high energy phosphate compounds indicating the high energy-bonds.
- (v) How can you determine  $K_M$  and  $V_{max}$  of an enzyme?
- (vi) What is Feedback Inhibition? Give an example.
- (vii) What is Formol titration of an amino acid?
- (viii) Mention two main significances of the Pentose Phosphate Pathway.
- (ix) Which step in TCA cycle is inhibited by Fluoroacetate? Indicate the name of the enzyme, co-enzyme and cofactor involved in the reaction.
- (x) Write down the reaction catalyzed by Pyruvate dehydrogenase complex. Mention the reaction of each step indicating the enzymes, co-enzymes or prosthetic groups involved.
- (xi) Differentiate between transamination and oxidative deamination.
- (xii) What is substrate level phosphorylation? Explain with an example.
- (xiii) How many moles of ATP are produced when 1 mol of Palmitic acid is completely oxidized to Carbon di-oxide and water by  $\beta$ -oxidation and TCA cycle?
- (xiv) What do you mean by ureotelic and uricotelic organisms?
- (xv) What are ketone bodies?

3. Answer any **two** questions from the following: 5×2 = 10

- (i) Write short notes on the following: 2  $\frac{1}{2}$  × 2 = 5
  - (a) Zymogens
  - (b) Edman's degradation method
- (ii) What is Gluconeogenesis? Can it be called the reversal of glycolysis? 2+3
- (iii) What are the components of the mitochondrial electron-transport chain? Describe the process of electron-transport by the mitochondrial respiratory chain. 2+3
- (iv) What are the different factors that influence the rate of an enzymatic reaction? Discuss their effects in detail. 1+4

**N.B. :** Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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