# WEST BENGAL STATE UNIVERSITY

B.Sc. Honours/Programme 2nd Semester Examination, 2022

## MLBHGEC02T/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) Amino acids with non-polar aliphatic side chain (R-group) are
(A) Glycine, Alanine, Leucine
(B) Serine, Threonine, Cysteine
(C) Lysine, Arginine, Histidine
(D) Phenylalanine, Tyrosine, Tryptophan

(ii) The enzyme which is responsible for the conversion of pyruvate to phosphoenolpyruvate is:
(A) Pyruvate carboxylase (B) Pyruvate carboxykinase
(C) Glucose 6-phosphatase (D) Phosphofructokinase

(iii) Which of the following amino acid is essential in infants and non-essential in adults?
(A) Lysine (B) Arginine (C) Leucine (D) Tryptophan

(iv) Derivatives of water-soluble vitamins function as:
(A) Holoenzyme (B) Isozymes (C) Co-enzymes (D) Hormones

(v) Most of the digestive enzymes belong to the class of
(A) Lyases (B) Hydrolases
(C) Oxidoreductases (D) Transferases

(vi) How is the rate of enzyme catalyzed reactions changed by every $10^{o}$ C rise in temperature?
(A) Halves (B) Four times
(C) Doubles (D) Remains unchanged

(vii) The optically inactive amino acid is
(A) Glycine (B) Serine (C) Threonine (D) Valine

(viii) In $\alpha$-helical structure of proteins distance between adjacent amino acid residues in nm is:
(A) 0.15 (B) 0.10 (C) 0.12 (D) 0.20

(ix) Sulphur containing amino acid is
(A) Methionine (B) Leucine (C) Valine (D) Asparagine

(x) An amino acid that does not form $\alpha$-helix is

(A) Valine (B) Proline (C) Tyrosine (D) Tryptophan

(xi) Tertiary structure of a protein describes

(A) The order of amino acids

(B) Location of disulphide bonds

(C) Loop regions of proteins

(D) The ways of protein folding in 3D

(xii) Net generation of energy on complete oxidation of palmitic acid by $\beta$-oxidation and TCA cycle is

(A) 129 ATP equivalents (B) 131 ATP equivalents

(C) 146 ATP equivalents (D) 148 ATP equivalents

(xiii) In enzyme kinetics $K_M$ implies

(A) The substrate concentration that gives one half $V_{max}$

(B) The dissociation constant for the enzyme substrate complex

(C) Concentration of enzyme

(D) Half of the substrate concentration required to achieve $V_{max}$

(xiv) In competitive enzyme inhibition

(A) Apparent $K_M$ is decreased (B) Apparent $K_M$ is increased

(C) $V_{max}$ is increased (D) $V_{max}$ is decreased

(xv) Co-enzymes are

(A) Heat stable, dialyzable, non-protein organic molecules

(B) Soluble, colloidal, protein molecules

(C) Structural analogue of enzymes

(D) Different forms of enzymes

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

(a) Give example of one glucogenic and one ketogenic amino acid.

(b) Write down the zwitterionic structure of lysine.

(c) What do you mean by an ‘isoenzyme’?

(d) What are ‘ketone bodies’?

(e) What is a conjugated protein? Give one example.

(f) What is a non-competitive inhibitor?

(g) Define ‘Turnover number’ of an enzyme.

(h) Mention the important features of $\alpha$-helical structures of proteins.

(i) What is $\beta$-oxidation?

(j) Define Transamination.

(k) Write down the reaction catalyzed by Glyceraldehyde 3-phosphate dehydrogenase mentioning the co-enzyme.

(l) Name one inhibitor each of Glycolysis and TCA cycle.

(m) What is Feedback inhibition? Give an example.

(n) Write down the name of a $Mg^{2+}$ requiring enzyme. Mention the reaction catalyzed by it.

(o) Define prosthetic group of an enzyme. Give example.

3. Write any ***two*** questions from the following: $5\times2 = 10$

(a) Mention the role of carnitine for transport of fatty acid in mitochondria with a schematic diagram. 5

(b) State the reactions of urea cycle taking place in mitochondria, mentioning the enzymes and co-enzymes. 5

(c) (i) Draw the Lineweaver Burk plot of an enzyme catalyzed reaction in absence of inhibitor. 2

(ii) How is an enzyme catalyzed reaction affected by temperature and pH? $1\frac{1}{2}+1\frac{1}{2}$

(d) Write short notes on any ***two*** of the following: $2\frac{1}{2}\times2 = 5$

(i) Oxidative phosphorylation

(ii) Gluconeogenesis

(iii) Tertiary structure of proteins

(iv) Edman Degradation.

**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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