

U.G. 1st Semester Examination - 2021
Molecular Biology & Biotechnology
[HONOURS]

Course Code : MBBT-H-101-T-CCR-1

(Biochemistry and Metabolism)

Full Marks : 40

Time : $2\frac{1}{2}$ Hours

*The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their
own words as far as practicable.*

1. Answer any **five** of the following: $2 \times 5 = 10$

- a) Write some special features of enzymes of archaebacteria living in extreme conditions.
- b) State the significance of 'Transition state' in enzyme kinetics.
- c) Differentiate between 'Fibrous' and 'Globular' proteins.
- d) Give an example where glucose is produced from non-carbohydrate source.
- e) How do ATP/ADP and NADH/NAD⁺ ratio influence glycolysis?

- f) Differentiate between 'homopolysaccharide' and 'heteropolysaccharide' with an example.
- g) Draw the structure of GTP.
- h) What are prostaglandins?

2. Answer any **two** of the following: $5 \times 2 = 10$

- a) Mention different classes of enzymes with examples according to the recent classification. Explain the role of vitamins in any two reactions of the cellular energy production.

$2\frac{1}{2} + 2\frac{1}{2}$

- b) How bacterial cell wall can be degraded enzymatically? Why sucrose is a non-reducing sugar, when its components glucose and fructose are reducing in nature? What are mucopolysaccharides? $2 + 2 + 1$
- c) Schematically explain the process of β -oxidation of fatty acids. Why does this process produce large amount of water? $4 + 1$
- d) Compare between phospholipid, sphingolipid and glycolipid with examples. 5

3. Answer any **two** of the following: $10 \times 2 = 20$

- a) Explain the effect of competitive and non-competitive inhibition on K_m and V_{max} of an enzyme using Lineweaver-Burk Plot. Describe 'Lock and Key' hypothesis of enzyme activity and its demerits. What is a prosthetic group?

4+4+2

- b) If you want to denature a protein with rigid tertiary structure and having disulphide bonds into a linear chain of amino acids, what kind of physical and chemical processes will you carry out? Explain. Discuss the properties based on which amino acids could be separated and detected? State the role of glycolipids in cell signaling.

4+4+2

- c) Schematically represent the steps of Krebs cycle. How is it regulated? How is proton motive force generated across the mitochondrial inner membrane?

5+2+3

- d) Describe the double helical model of DNA with suitable diagram. Why DNA assumes a double helical structure? Compare the structural details of A-, B- and Z-form of DNA.

5+2+3