**QP Code: P25B004**

**Reg. No : .....**

**Name : .....**

# ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

## II SEMESTER (CBCSS-PG) DEGREE EXAMINATION, MARCH 2025

## M Sc Biotechnology

## GBT2C01 : METABOLISM AND BASIC ENZYMOLOGY

## 2024 Admission Onwards

**Time:3 Hours** **Maximum Weightage:30**

### Part A

*Short answer type questions: Answer **any four** questions. Weightage **2** for each question.*
***(4x2 = 8 Weightage)***

1. Comment on the biosynthesis of glutamate and its significance. [BTL1]
2. Define allosteric regulation and its significance in enzyme activity. [BTL1]
3. Explain how enzyme inhibitors affect the Lineweaver-Burk plot. [BTL2]
4. Use the knowledge of Citric acid cycle regulation to explain its response to high ATP levels. [BTL3]
5. Illustrate how targeted metabolomics aids in biomarker discovery for diabetes. [BTL3]
6. Compare and contrast the roles of gluconeogenesis and the Pentose Phosphate Pathway in maintaining glucose homeostasis. [BTL4]
7. Assess the physiological and industrial significance of zymogens and immobilized enzymes. How do they enhance the efficiency of biological and industrial processes? [BTL5]

### Part B

*Short essay-type questions: Answer **any four** questions. Weightage **3** for each question.*
***(4x3 = 12 Weightage)***

8. Define the enzyme-substrate complex and comment on its formation. [BTL1]
9. Compare the induced fit and lock-and-key models of enzyme action. [BTL2]
10. Apply enzyme kinetics principles to design an experiment to determine Km and Vmax. [BTL3]
11. Demonstrate how co-enzymes and co-factors contribute to the efficiency and regulation of enzymatic reactions in biological systems. [BTL3]

**Turn Over**

12. Analyze the Urea cycle and its importance in Nitrogen metabolism. [BTL4]
    (a) Explain the biochemical steps involved in the Urea cycle.
    (b) Analyze the role of key enzymes in the detoxification of ammonia.

13. Assess the impact of enzyme inhibition on metabolic pathways. [BTL4]
    (a) Compare competitive, non-competitive, and uncompetitive inhibition mechanisms.
    (b) Analyze the role of enzyme inhibitors in regulating key metabolic enzymes.

14. Evaluate the effectiveness of Mass Spectrometry (MS) techniques in metabolome analysis, focusing on their sensitivity, specificity, and limitations in untargeted metabolomics. [BTL5]

## Part C

*Essay-type questions: Answer **any two** questions. Weightage **5** for each question.*
***(2x5 = 10 Weightage)***

15. Give a detailed account of enzyme machinery and the process of Electron Transport Chain. Give a brief account of chemiosmosis. [BTL1]

16. Discuss the regulation of beta-oxidation and fatty acid biosynthesis under fasting and fed conditions, highlighting the hormonal control mechanisms. [BTL2]

17. Use the concepts of transamination and deamination to show how amino acids can be converted into metabolic intermediates. [BTL3]

18. Assess the interdependence of nucleotide metabolism with other metabolic pathways. [BTL4]
    (a) Analyze the role of folate and other co-factors in nucleotide biosynthesis.
    (b) Discuss the significance of ribonucleotide reductase in DNA synthesis.
    (c) Evaluate the impact of nucleotide imbalances on DNA replication and repair.

**********