

B.Sc. Semester - 6 (NEP-2020) Examination**March/April-2026****MIC: Prokaryotic Metabolism (Major-14)****Time: 2:00 Hours****Marks:50****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate marks.

- Que.1 (1) Explain the concept of free energy (ΔG) and its significance in bioenergetics. (05)
(2) Describe energy-rich compounds and their role in cellular metabolism. (05)
- OR
- (1) Explain the role of ATP, reducing power, and precursor metabolites in energy metabolism. (05)
(2) Define non-regulatory enzymes and derive the Michaelis–Menten equation. (05)
- Que.2 (1) Explain glycolysis and its regulation in carbohydrate catabolism. (05)
(2) Describe the Pentose Phosphate Pathway and its significance in metabolism. (05)
- OR
- (1) Describe the Citric Acid Cycle (TCA cycle) and its regulation. (05)
(2) Describe lipid catabolism, including oxidation of fatty acids and β -oxidation. (05)
- Que.3 (1) Explain the different modes of ATP generation in cells. (05)
(2) Describe the electron transport chain (ETC), its components, and the energy yield. (05)
- OR
- (1) Explain the concept and significance of anaerobic respiration in microorganisms. (05)
(2) Describe the strategy of studying biosynthesis in bacteria. (05)
- Que.4 (1) Explain the patterns of carbohydrate fermentation in lactic acid bacteria. (05)
(2) Describe the fermentative patterns of Gram-negative enteric bacteria and related eubacteria. (05)
- OR
- (1) Explain the energy metabolism of methanogens among archaeobacteria. (05)
(2) Explain photophosphorylation in Halobacterium and its significance in energy generation. (05)
- Que.5 (1) Discuss the differences between regulatory and non-regulatory enzymes in metabolism. (05)
(2) Explain the Entner–Doudoroff pathway. (05)
- OR
- (1) Write a short note on bacterial photosynthesis and its role in energy metabolism. (05)
(2) Describe the carbon assimilation pathways in methanogens. (05)
