

B.Sc. Semester - 5 (Remedial) (CBCS) Examination**March/April-2024 (Old Course)****PROCARYOTIC METABOLISM (CORE)****Time: 2:30 Hours****Marks: 70****Instructions:**

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

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- Que-1 (A) Answer the following. (Any One) (07)
1. Elaborate on the derivation of the Michaelis-Menten equation.
 2. Describe the role of precursor metabolites in cellular metabolism.
- Que-1 (B) Answer the following. (Any One) (04)
1. Discuss the Role of ATP in metabolism.
 2. Explain how the ΔG is determined in a biochemical reaction.
- Que-1 (C) Answer the following (Any Three) (03)
1. Define free energy.
 2. Name one energy-rich compound.
 3. Give an example of a non-regulatory enzyme.
 4. What does ΔG represent in bioenergetics?
 5. What is the primary role of ATP in metabolism?
- Que-2 (A) Answer the following. (Any One) (07)
1. Explain how the Citric Acid Cycle is regulated to coordinate with cellular energy demands.
 2. Discuss the process of beta-oxidation of fatty acids in detail.
- Que-2 (B) Answer the following. (Any One) (04)
1. Explain the Steps involved in glycolysis.
 2. What are the primary products generated by the PPP and their biological significance?
- Que-2 (C) Answer the following (Any Three) (03)
1. True or False: Glycolysis is the primary pathway for the catabolism of carbohydrates, and its regulation primarily occurs through feedback inhibition.
 2. True or False: The PPP operates exclusively in the cytoplasm and is primarily involved in the generation of NADPH and pentose sugars.
 3. True or False: The ED pathway is an alternative pathway for glucose catabolism found in some bacteria, and it does not involve the production of ATP directly.
 4. True or False: The TCA Cycle is the final common pathway for the oxidation of carbohydrates, proteins, and lipids, and its regulation primarily occurs through allosteric inhibition.
 5. True or False: The Glyoxylate Cycle is a variation of the Citric Acid Cycle found in plants and some microorganisms, and it is characterized by the bypass of the steps involving the production of CO_2 .
- Que-3 (A) Answer the following. (Any One) (07)
1. Describe the process of anaerobic respiration, focusing on the mechanisms of ATP generation.
 2. Discuss the methods used to study biosynthesis, including the use of biochemical mutants and isotopic labeling.

- Que-3 (B) Answer the following. (Any One) (04)
1. Discuss the different modes of ATP generation in cells.
 2. Explain the components of the electron transport chain (ETC).
- Que-3 (C) Answer the following (Any Three) (03)
1. True/False: In substrate-level phosphorylation, ATP is generated directly from ADP and inorganic phosphate using energy from a proton gradient.
 2. True/False: The electron transport chain consists of a single protein complex responsible for transferring electrons from NADH to oxygen.
 3. _____ is a process of ATP generation that involves the direct transfer of a phosphate group to ADP from a phosphorylated substrate.
 4. In the electron transport chain, electrons are passed through a series of _____, which are protein complexes embedded in the inner mitochondrial membrane.
 5. During anaerobic respiration, pyruvate is converted into _____ in the absence of oxygen.
- Que-4 (A) Answer the following. (Any One) (07)
1. Explore the metabolic characteristics and ecological significance of nitrifying bacteria.
 2. Describe the fermentative patterns exhibited by lactic acid bacteria in carbohydrate fermentation.
- Que-4 (B) Answer the following. (Any One) (04)
1. Explain the process of photophosphorylation in Halobacterium.
 2. Discuss the energy metabolism and carbon assimilation by Methanogens.
- Que-4 (C) Answer the following (Any Three) (03)
1. What type of bacteria are commonly involved in nitrification?
 2. Name a group of bacteria that oxidize sulfur compounds for energy.
 3. Describe the fermentative patterns observed in Gram-negative Eubacteria.
 4. Which type of bacteria utilize hydrogen as their primary energy source?
 5. What is the primary metabolic pathway utilized by lactic acid bacteria for carbohydrate fermentation?
- Que-5 (A) Answer the following. (Any One) (07)
1. Give a brief explanation of quorum sensing with example.
 2. Explain the mechanisms involved in establishing signal transduction across cellular membranes
- Que-5 (B) Answer the following. (Any One) (04)
1. Explain the mechanisms of active transport.
 2. Discuss the structure and function of membrane carbohydrates.
- Que-5 (C) Answer the following (Any Three) (03)
1. What is the function of membrane proteins?
 2. What are the primary components of membrane lipids?
 3. Name the carbohydrate molecules found on cell membranes.
 4. Describe the process of passive transport across cell membranes.
 5. Explain the role of specific transport systems in maintaining cellular homeostasis.
