647510 **BSc3BiTC0301** **Seat No :_____**

B.Sc. Semester - 3 (*CBCS*) Examination
July-2025 (OLD COURSE)
BIO-TECHNOLOGY(CORE)

Time: 2:30 Hours **Marks: 70**

Instructions:

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

Que-1(A) **Answer the following. (Any one Out of Two)** **(07)**

1) Derive the Michaelis-Menten equation and discuss the significance of the Michaelis constant (Km) in enzyme kinetics.
2) Discuss the various mechanisms of enzyme regulation.

Que-1(B) **Attempt any one. (Out of Two)** **(04)**

1) Explain the difference between a cofactor and a coenzyme, providing examples of each.
2) Describe the basic concept of enzyme inhibition.

Que-1(C) **Attempt any three. (Out of Five)** **(03)**

1) Allosteric enzymes have multiple binding sites that can be regulated by effectors. (True/False)
2) Coenzymes are organic molecules that assist enzymes in their catalytic activity. (True/False)
3) The Michaelis-Menten equation describes the rate of reaction for allosteric enzymes. (True/False)
4) Irreversible enzyme inhibitors form a permanent covalent bond with the enzyme. (True/False)
5) Chemical catalysts are as specific as biocatalysts in their action. (True/False)

Que-2(A) **Answer the following. (Any one Out of Two)** **(07)**

1) Discuss the steps of the TCA cycle.
2) Describe the process of β-oxidation of fatty acids.

Que-2(B) **Attempt any one. (Out of Two)** **(04)**

1) Briefly describe the fate of pyruvate after glycolysis under aerobic conditions.
2) Explain the significance of the pentose phosphate pathway (HMP) in cellular metabolism.

Que-2(C) **Attempt any three. (Out of Five)** **(03)**

1) The end product of glycolysis is _____.
2) The TCA cycle occurs in the _____ of the cell.
3) Gluconeogenesis primarily occurs in the _____ and _____.
4) The breakdown of fatty acids through β-oxidation produces _____ as the main energy currency.
5) In oxidative phosphorylation, ATP is synthesized as a result of the flow of electrons through the _____.

Que-3(A) **Answer the following. (Any one Out of Two)** **(07)**

1) Describe the urea cycle.
2) Discuss the process of photosynthesis.

Que-3(B) **Attempt any one. (Out of Two)** **(04)**

1) Briefly explain the significance of decarboxylation in amino acid metabolism.
2) Outline the basic steps involved in the biosynthesis of nucleic acids.

Que-3(C) Attempt any three. (Out of Five) (03)

1) What is the primary function of the urea cycle in protein metabolism?
2) Name one enzyme involved in the process of transamination.
3) Which organelle is the site of photosynthesis in plant cells?
4) Define deamination in the context of protein metabolism.
5) What is an inborn error of metabolism?

Que-4(A) Answer the following. (Any one Out of Two) (07)

1) Discuss the various types of plant hormones.
2) Explain the consequences of hormonal imbalances in humans.

Que-4(B) Attempt any one. (Out of Two) (04)

1) Briefly describe the difference between endocrine and exocrine glands.
2) List two major functions of animal hormones in the body.

Que-4(C) Attempt any three. (Out of Five) (03)

1) What type of gland secretes hormones directly into the bloodstream?
2) Name the plant hormone responsible for cell elongation.
3) Which hormone regulates blood sugar levels in humans?
4) Identify one hormone produced by the adrenal glands.
5) What is the condition caused by an underactive thyroid gland?

Que-5(A) Answer the following. (Any one Out of Two) (07)

1) Discuss the steps involved in a signal transduction cascade and its importance in cellular communication.
2) Explain how protein kinases regulate the cell cycle.

Que-5(B) Attempt any one. (Out of Two) (04)

1) Describe the basic structure of a phospholipid bilayer and its role in membrane architecture.
2) Briefly explain the difference between passive and active transport across cell membranes.

Que-5(C) Attempt any three. (Out of Five) (03)

1) What is the primary lipid component of cell membranes?
2) Which type of transport requires energy to move solutes across a membrane?
3) Name the molecule that often acts as a second messenger in signal transduction.
4) Which enzyme regulates the cell cycle by phosphorylating target proteins?
5) What type of signaling molecule binds to a receptor to initiate a signal transduction cascade?

****