

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - III EXAMINATION - WINTER 2025

Subject Code: 3130403

Date: 31-12-2025

Subject Name: Basic Biochemistry and Calculations

Time: 10:30 AM TO 01:00 PM

Total Marks: 70

Instructions

- 1. Attempt all questions.**
- 2. Make suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Simple and non-programmable scientific calculators are allowed.**

	Marks
Q.1 (a) Define buffer and explain its role in living systems.	03
(b) Differentiate between nucleosides and nucleotides.	04
(c) Draw the structure of D-Glucose (open chain and Haworth projection) and classify it.	07
Q.2 (a) Write down the full name and one example of a Glycoconjugate.	03
(b) Explain the concept of hydrophobicity in the context of biomolecules in water.	04
(c) Discuss the biosynthesis of membrane lipids and its physiological significance.	07
OR	
(c) Calculate the concentration of a protein sample (in mg/mL) if its absorbance at 280 nm is 0.52, and the extinction coefficient is $E_{1\%}^{1\text{cm}} = 5.2$.	07
Q.3 (a) What is the metabolic fate of the amino groups removed from amino acids?	03
(b) Classify lipoproteins based on their density and state the function of one class.	04
(c) Illustrate and explain the Ramachandran Plot and its significance in protein structure elucidation.	07
OR	
(a) List the four major nitrogenous bases found in DNA and RNA.	03
(b) What are ketone bodies? State the conditions under which they are formed.	04
(c) Analyze the steps and key regulatory enzymes of Glycolysis and explain its regulation.	07
Q.4 (a) Briefly explain the Miller-Urey experiment.	03
(b) Distinguish between the A, B, and Z forms of DNA based on two structural features each.	04
(c) Evaluate the importance of the Citric Acid Cycle (TCA cycle) in the overall energy metabolism of the cell, linking it to the fate of carbohydrates, proteins, and lipids.	07
OR	
(a) Name the three components that form a nucleotide.	03

- (b) Differentiate between storage lipids and membrane lipids with one example of each. 04
- (c) Describe the Urea Cycle with a schematic diagram. Analyze the consequences of a defect in this cycle. 07
- Q.5** (a) Give the reaction catalyzed by the enzyme Hexokinase in Glycolysis. 03
- (b) How does the process of Nitrogen Excretion differ in mammals compared to birds? 04
- (c) Explain the Oxidation of Fatty Acids (β -oxidation). Evaluate the total ATP yield from the complete oxidation of one molecule of Palmitoyl-CoA (16-carbon saturated fatty acid). 07

OR

- (a) What is the significance of the biosynthesis of amino acids? 03
- (b) Discuss the role of different types of RNA in the cell. 04
- (c) Evaluate the significance of water's properties (e.g., polarity, high specific heat) in sustaining life on Earth and in maintaining the higher-order structure of biomolecules. 07
