GUJARAT TECHNOLOGICAL UNIVERSITY
BACHELOR OF SCIENCE - HONOURS/ HONOURS WITH RESEARCH - SEMESTER - I
EXAMINATION - WINTER 2025

Subject Code: BS01001051   **Date: 29-12-2025**

Subject Name: Chemistry

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. **Draw neat and clean diagrams as required.**

Q.1   **Write a note on following**   **(Marks-10X2=20)**

1. Conjugate acid-base concept
2. Rate constant (k)
3. pH
4. Molarity and Normality
5. Define a Bronsted-Lowry acid and a Bronsted-Lowry base
6. First Law of Thermodynamics
7. R and S configuration
8. Chiral carbon
9. Buffer solutions
10. Activation energy

Q.2   **Answer the following (Any 2 out of 3)**   **(Marks-2X10=20)**

1. Derive the relationship between the degree of dissociation (α) and the dissociation constant (K α) for a weak electrolyte using Ostwald's Dilution Law.
2. Describe the stages of a typical analytical chemical analysis, from sample collection to obtaining results. How is a representative sample obtained from a larger population?
3. Convert Sawhorse formula to Fischer formula.
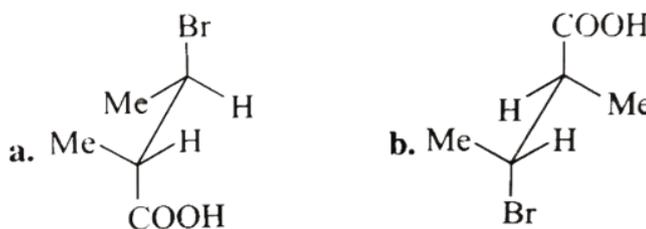
Q.3   **Answer the following (Any 6 out of 8)**   **(Marks-6X5=30)**

1. What is the difference between enantiomers and diastereomers, and how are they classified?
2. What is a spontaneous process in thermodynamics, and how does it relate to entropy
3. A 250 mL solution contains 5.85 gm of NaCl Calculate its molarity.
4. What is the Lewis concept of acids and bases, and how does it differ from the Arrhenius and Bronsted-Lowry theories?
5. Discuss the significance of the Third Law of Thermodynamics and its applications in entropy.

6. What is the order of a reaction, and how is it determined from the rate law

7 Explain the factors affecting the rate of a chemical reaction.

8 Explain the Gibbs free energy equation and its role in determining the spontaneity of chemical reactions.

****