(2 Hours) | Total Marks : 40

N.B. (1) Question No. **1** is **compulsory**.

   (2) Attempt any **three** questions from the **remaining** questions.

   (3) Draw neat and labelled **diagrams** wherever **necessary**.

   (4) **Figures** to the **right** indicate **full** marks.

1. (a) Define the terms :—   3
        (i) Order of reaction
        (ii) Negative Catalysis
        (iii) Shelf life.

   (b) A drug product is known to be ineffective after it has decomposed 30%. The original   3
       concentration of one sample was 5·0 mg/ml, when assayed 20 months later, the
       concentration was found to be 4·2 mg/ml. Assuming the decomposition is first order.
       What is the shelf life of the product ?

   (c) Explain the term 'molecularity of a reaction' and derive an equation for specific   4
       reaction rate constant for a second order reaction or which a = b ('a' and 'b' are
       initial concentrations).

2. (a) Explain in details Concentration cells.   3
   (b) Write a note on Zeta potential.   3
   (c) Define 'surface tension' and explain in detail any one method to determine surface   4
       tension.

3. (a) Give a brief account of enzyme catalysis.   3
   (b) Explain the terms acidic and basic buffers and derive Henderson-Hasselbalch equation   3
       for a basic buffer. ·
   (c) Derive an expression for spreading coefficient.   4

4. (a) Discuss Henry's law of solubility of gases in liquids.   3
   (b) What is Tonicity ? Explain any one method to determine tonicity.   3
   (c) Give the classification of different types of electrodes. Explain the calomel electrode   4
       with a neat labelled diagram.

5. (a) Write short notes on (any **two**) :—   6
        (i) Effect of molecular association on distribution.
        (ii) Optical properties of colloids.
        (iii) Langmuir Adsorption Isotherm.

   (b) Calculate the pH of 0·01 N NaOH and 0·1 M H_2SO_4. (Given : pKw for water = 14)   2
   (c) Explain any one method to prepare Lyophobic colloids.   2