

- N.B.** (1) Question No. 1 is **compulsory**. Attempt any **three** from the remaining questions.  
 (2) Draw **neat** and **labelled** diagrams wherever **necessary**.  
 (3) **Figures** to the **right** indicate **full** marks.

1. (a) Explain the terms : 3
  - (i) Rate of reaction
  - (ii) Surface tension
  - (iii) Partition coefficient
- (b) Discuss the transition state theory in details. 3
- (c) If the half life of a first order reaction of drug A is 15 min, how long will it take for drug A to reach 10 percent of the initial concentration ? 4
  
2. (a) Explain the factors affecting solubility of gases in liquids. 3
- (b) Derive an expression for spreading coefficient. 4
- (c) Derive the buffer equation for weak acid and its salt. 3
  
3. (a) Calculate the pH of the following solutions : 3
  - (i) 0.01 N NaOH
  - (ii) 0.001 M HCl
  - (iii) 0.02 M H<sub>2</sub>SO<sub>4</sub>

pK<sub>w</sub> for water = 14
- (b) Explain tonicity of solutions. Explain sodium chloride equivalent method for adjustment of tonicity. 3
- (c) Explain in details 'Enzyme catalysis'. 4
  
4. (a) Give the classification of electrodes. Explain in details 'Ion Sensitive Electrode'. 4
- (b) What are the differences between absorption and adsorption ? Give applications of adsorption. 3
- (c) Explain in details, the protective action of colloids. 3
  
5. (a) Write short notes on (any **two**) :- 8
  - (i) Electrical properties of colloids.
  - (ii) Concentration cells
  - (iii) Freundlich Adsorption Isotherm.
- (b) What is the effect of addition of a salt on the upper consolute temperature of a partially miscible binary system ? 2

-----