

**Note:** Attempt any five questions. All questions carry equal marks;

1. Discuss different physical properties of drug molecules. How dielectric constant is determined? What is its significance?

14

2. What is Chemical equilibrium? Explain factors affecting the equilibrium constant and discuss its importance. 14

3. a) Explain the first law of thermodynamics. Calculate the work done in an isothermal reversible and irreversible expansion process of an ideal gas. / 10

b) The heat of combustion of carbon monoxide at const. vol. at 17°C is -283.3 KJ. Calculate its heat of combustion at , constant pressure ( $R=8.3145 \text{ J deg}^{-1} \text{ mol}^{-1}$ ). 4

4. Explain phase rule. Discuss phase diagram of phenol water system with special emphasis on CST 14

5. Define colligative properties. Derive the formula for determination of molecular weight by depression of freezing point. 14

6 Comment on the following:- 14

- a) Surface tension
- b) Methods of viscosity determination .
- c) Quantum numbers with example

7. Write notes on any two 14

- a) Nerst's distribution law
- b) Schrodinger wave equation
- c) Relation between relative lowering of vapour pressure and osmotic pressure.