

**Exam. Code : 103202**

**Subject Code : 1257**

**B.A./B.Sc. 2<sup>nd</sup> Semester**

**CHEMISTRY**

**(Physical Chemistry-I)**

Time Allowed—2 Hours] [Maximum Marks—35

**Note** :—There are **EIGHT** questions of equal marks.  
Candidates are required to attempt any **FOUR** questions.

1. (a) Outline the fundamental features of van der Waal's equation of state. How far this equation is in keeping with experimental facts ? Explain.  
(b) Show that if two gases have the same reduced pressure and volume, they have the same reduced temperature.  
(c) State clearly the law of corresponding state.
2. (a) What are the important features of Maxwell distribution of molecular velocities ? Explain, how these can be demonstrated.  
(b) State clearly the principle underlying the method of liquefying a gas. Can a van der Waal's gas with 'a = 0' be liquefied ? Explain.

- (c) State and explain mean free path of the molecules of a gas ? Show that a gas sample in a container of constant is independent of temperature.
3. (a) How can structural differences between solid, liquid and gas phases can be accounted for in terms of intermolecular forces ? Explain.
- (b) What do you understand by liquid crystals ? Give a critical account of various molecular arrangements that exist in various states of Liquid Crystals.
4. Describe the following :—
- (i) Phase transformation in Liquid Crystals.
- (ii) Differences between thermotropic and lyotropic liquid crystals with examples.
5. (a) Bring out the essential differences between lyophobic and lyophilic sols.
- (b) What are protective colloids ? How a lyophilic colloid can stabilize a lyophobic colloid ? Explain.
- (c) State and explain the importance of Hardy Schulze rule with regards to colloidal.
6. (a) Give a brief account of optical and kinetic properties of colloids.
- (b) Explain the following :—
- (i) Emulsion and emulsifier
- (ii) Role of detergent as emulsifier.
7. (a) State and explain Henry's and Raoult's law of solution.
- (b) Show that if in any solution the solvent obeys Raoult's law, the solute obeys Henry's.
- (c) Derive an expression for relative lowering of vapour pressure of solvent in a solution. How is this fact used in determining the molecular mass of the solute ?
8. (a) Give an account of various thermodynamic properties of mixing of ideal solutions.
- (b) What would be the depression of freezing point if 7.8 g of hydrocarbon ( $C_{12}H_{12}$ ) is dissolved in 100 g of naphthalene ? (*Given molal freezing point depression constant of naphthalene 6.98 degree/molal*).
- (c) Account for the significance of van't Hoff factor in reference to dilute electrolytic solutions.