

Exam. Code : 103202

Subject Code : 1325

B.A./B.Sc. 2nd Semester

CHEMISTRY (Physical Chemistry-I)

Time Allowed—3 Hours]

[Maximum Marks—35

Note :- Attempt ALL the questions of Part-A and SIX questions from Part-B, selecting TWO questions from each Section (Section I, II and III). Log tables and Scientific Calculator are allowed.

PART-A

1. What are elastic and inelastic collisions ?
2. Outline the reason which led to Van der Waals equation.
3. Give an account of the behaviour of a substance near the critical temperature.
4. Place most probable velocity, mean velocity and root mean square velocity in increasing order of their magnitude.
5. Why temperature of the liquid does not rise at its boiling point although heat is being continuously supplied ? Explain.
6. What is the size range of colloidal particles ?
7. Distinguish between ideal and non-ideal solutions.
8. What is the common feature of colligative properties ?

1×8=8

PART-B**SECTION-I**

9. How Van der Waals constants can be determined in terms of critical constants ? Explain. 4½
10. Derive an expression for the corresponding state of a gas. Explain why it is called so. 4½
11. Find the molecular kinetic energy of 1g of helium at N.T.P. What will be the energy at 100°C ? (Given $R = 8.3 \times 10^7$ ergs.) 4½

SECTION-II

12. (a) What are various types of intermolecular forces in liquids ? Explain their origin. 2½
- (b) What are liquid crystals ? List their characteristics. 2
13. Give an account of electrical properties of colloidal solution. Explain the action of electrolyte on colloidal solution. 4½
14. What are emulsions ? How are they prepared ? Give a critical account of methods used in finding the type of an emulsion. 4½

SECTION-III

15. State and derive an expression for Raoult's law for vapour pressure of binary solution of volatile liquids. How is it used for determining the molar mass of a non-volatile compound ? 4½

16. Explain the terms osmosis and osmotic pressure. Derive an expression for van't Hoff equation for the osmotic pressure of dilute solution. How is it used for the determination of molar mass of a solute ? $4\frac{1}{2}$
17. (a) Outline the essential features for the elevation in boiling point, and apply it to determine the molar mass of a compound. $2\frac{1}{2}$
- (b) 10g of paraffin wax when dissolved in 100g of benzene raises its b. pt. by 1°C . What is the molar mass of the wax ? (Given $K_b = 2.53 \text{ degree molal}^{-1}$) 2