Exam. Code : 103202
Subject Code : 1293

B.A./B.Sc. Semester—II

CHEMISTRY

(Physical Chemistry–I)

Time Allowed—3 Hours] [Maximum Marks—35

PART—A

Note :— Attempt **ALL** the questions of Part–A and **SIX** questions from Part–B selecting **TWO** questions from each Section (Sections I, II and III). Log tables and scientific calculators are allowed.

1. What is the significance of van der Waal's constants ?
2. Why do gases fail to obey the ideal gas equation at high pressure ?
3. What is average velocity ?
4. What are the characteristic features of nematic liquid crystals ?
5. Define Hardy-Schulze rule.
6. What are isotonic solutions ?
7. Define activity and activity coefficient.
8. What is meant by abnormal molar mass ? 8×1=8

PART—B

SECTION—I

9. (a) What are the assumptions of kinetic theory of gases ? Which of them are not valid for real gases ?

(b) What are the limitations of the ideal gas equation ? What improvements have been suggested by van der Waal ?

(c) At what temperature the root mean square velocity of CO_2 gas will be equal to that of oxygen gas at S.T.P. ?

10. (a) Derive expressions for the critical constants in terms of van der Waal's constants.

(b) If the critical pressure, reduced volume and the reduced temperature of a gas are 45 atm, 10.5 and 0.9 respectively. Calculate the pressure exerted by the gas.

11. (a) Give a brief account of Maxwell distribution of molecular velocities.

(b) Define mean free path. Derive an expression for it in terms of molecular diameter of the gas molecules.

(c) Write short note on liquefaction of gases.

SECTION—II

12. (a) Discuss how solids are structurally different from gases.

    (b) Give a brief account of the classification of liquid crystals.

    (c) Write a short note on seven segment cell.

13. (a) Explain the structure of liquids.

    (b) Describe the kinetic properties of colloids.

    (c) What are the important applications of colloids ?

14. (a) What are emulsions ? How are these prepared ?

    (b) What are protective colloids ? How do they act ?

    (c) Differentiate between liquid and liquid crystal.

SECTION—III

15. (a) What are the different methods of expressing concentrations of solutions ?

    (b) Explain the method of relative lowering of vapour pressure for the determination of molecular mass of a solute.

16. (a) Describe Beckmann's method for the determination of depression in freezing point of a liquid when non volatile solute is dissolved in it.

(b) The boiling point of chloroform is raised by 0.325 K when 5.14×10^{-4} kg of a solute is dissolved in 3.5×10^{-2} kg of chloroform. Calculate the molar mass of the solute ($K_b = 3.9$).

17. (a) What is van't Hoff factor ? How is it used in the determination of degree of dissociation of a solute ?

(b) A 5.23% solution of cane sugar is isotonic with 0.9% solution of an unknown solute. Calculate the molar mass of the solute. $6 \times 4\frac{1}{2} = 27$