Exam. Code : 103202

Subject Code : 1298

B.A/B.Sc. Semester—II

CHEMISTRY

Paper—Physical Chemistry—I

Time Allowed—3 Hours] [Maximum Marks—35

Note :— Attempt ALL 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.

PART—A

1. Explain the effect of temperature on the mean free path.

2. Explain the correction due to the volume of the gas molecules.

3. What are the units of van der Wall's constants ?

4. What are lyophilic and lyophobic colloids ?

5. Explain intermolecular forces.

6. What are the colligative properties ?

7. What are the isotonic solutions ?

8. Explain why osmotic pressure of 0.1 M sugar solution is less than that of 0.1 M KC1 solution. $8 \times 1 = 8$

PART—B

SECTION—I

9. (a) What is continuity of state ? Explain it by taking a suitable example.

    (b) Derive reduced equation of state and hence define the law of corresponding states. What is its significance ?

10. (a) What are critical constants of a gas ? Derive the necessary relations between critical constants and van der Waal's constants.

    (b) Calculate the pressure exerted by one mole of a van der Waal's gas if its volume is 0.05 L at 100° C. The values of a and b are 3.6 atm L^2 mol^{-2} and 0.042 L mol^{-1} respectively.

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

    (b) Write a short note on liquefaction of gases.

SECTION—II

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

    (b) Differentiate between solids, liquids and liquid crystals.

13. (a) Explain the optical properties of the colloids.

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(b) Explain Hardy-Schulze rule. What is its importance ?

14. (a) Explain the following :

    (i) Stability of colloids

    (ii) Liquid crystal display.

  (b) Give the classification of colloids.

SECTION—III

15. (a) Give the thermodynamic derivation of the relation between molecular weight of a non volatile solute and elevation in boiling point of the solvent.

  (b) Vapour pressure of a 7.5 % aqueous solution of an organic substance is 750 mm at 100° C. Calculate the molecular mass of the substance.

16. (a) Describe briefly one method of determination of depression in freezing point.

  (b) Calculate the elevation in boiling point of an alcohol when 5 g of urea are dissolved in 100 g of it. The molal elevation constant may be taken as equal to 1.18.

17. (a) State and explain Raoult's law.

  (b) Explain why depression in freezing point occurs upon dissolution of a non volatile solute in a solvent.   6×4½