Exam. Code   : 103202
Subject Code :   1255

B.A./B.Sc. 2nd Semester
CHEMISTRY
(Physical Chemistry-B)

Time Allowed—3 Hours]   [Maximum Marks—35

Note :—Attempt five questions in total, selecting one question from each section. Fifth question can be attempted from any section. **(Scientific calculator and Log table are allowed).**

SECTION—A

1. (a) Outline the essential features of the kinetic theory of gases. What is the interpretation of temperature on this theory ?   3

    (b) Define critical temperature, pressure and volume of a vapour, and give an account of the behaviour of a substance near the critical point.   2

    (c) Give an account of a method of liquefying gases, and discuss the principle on which it depends.   2

2. (a) Write an expression for the pressure of a gas obtained from the kinetic theory of gases, and deduce expressions for root mean square velocity.   2

    (b) At what temperature will the root mean square velocity of hydrogen be double of its value at NTP, pressure remaining constant ?   4

(c) Can a van der Waals gas with a = 0 be liquefied ? 1

SECTION—B

3. (a) State and explain what effect, if any, variation in the surface area of the liquid, hydrogen bonding and intermolecular forces have on the boiling point of liquid. 3

   (b) Define liquid crystals, give examples. What are liquid crystals used for ? 4

4. (a) Describe the nature of liquid in terms of the kinetic theory model. 3

   (b) Draw a parallelism between volatility and surface tension. 2

   (c) Bring out the difference between semectic and nematic liquid crystals. 2

SECTION—C

5. (a) Describe the following w.r.t. colloids :

   (i) Formation of river deltas

   (ii) Cottrell precipitator

   (iii) Gold number. 2×3=6

   (b) What are emulsions ? What are their different types? 1

6. (a) Outline important applications of colloids and emulsifier.

                                                                    4

    (b) Describe the following briefly :

        (i) Hardy-Schulze rule

        (ii) Tyndall effect. $1\frac{1}{2} \times 2 = 3$

SECTION—D

7. (a) Explain molarity, molality, mole fraction and normality with suitable example.   2

    (b) What do you understand by relative lowering of vapour pressure ? Show that it is a colligative property.

                                                        3

    (c) State Raoult's law for solution containing volatile and non-volatile solutes.   2

8. (a) What are ideal and non-ideal solutions ? What type of non-idealities are exhibited by cyclohexane-ethanol and acetone-chloroform mixtures ? Explain.   4

    (b) Why do we get sometimes abnormal molar masses of the substance by using colligative properties of the solutions ? State the factors with suitable example.

                                                        2

    (c) What is osmotic pressure ? Give its biological significance.   1