AW–1685

B.Sc. (Part–II) Semester–III Examination
CHEMISTRY

Time : Three Hours]   [Maximum Marks : 80

Note :— (1) Question No. **1** is compulsory.

(2) Solve **ONE** question from each unit.

(3) Draw diagrams and give equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :— $4 \times \frac{1}{2} = 2$

(i) The property of metals to form thin sheets on hammering is known as _____ .

(ii) $LiAlH_4$ reduces the carbonyl group into _____ group.

(iii) The surface tension of liquid _____ with increase of the temperature.

(iv) The titration between an acid and the base is also called as _____ .

(B) Choose the correct alternative :— $4 \times \frac{1}{2} = 2$

(i) In conformational analysis of n-butane the highly stable conformation is :

(a) Gauche   (b) Anti or Skew

(c) Partially Eclipsed   (d) Fully Eclipsed

(ii) The hybridisation of carbon and oxygen atoms in carbonyl group is :

(a) sp^3 (b) sp

(c) sp^2 (d) dsp^2

(iii) The upper critical solution temperature of Phenol-water system is :

(a) 68.1   (b) 67.8

(c) 68.7   (d) 67.9

(iv) In gravimetric estimation the unknown compound is analysed by measuring its :

(a) Pressure   (b) Volume

(c) Density   (d) Mass

(C) Answer the following in **ONE** sentence :—   4

(i) What is meant by resolution ?

(ii) What is phase transition ?

(iii) What are optically active compounds ?

(iv) What is molality ?

UNIT—I

2. (A) Explain VSEPR theory with suitable example.   4

(B) How will you compare atomic orbitals with molecular orbitals ?   4

(C) Draw molecular orbital energy level diagram of O_2 molecule. Calculate its bond order.

4

OR

YBC—15256   1   (Contd.)

3. (P) How will you differentiate bonding and antibonding molecular orbitals ?   4

   (Q) Discuss (i) metalic luster (ii) Electrical conductivity of metal on the basis of free electron theory.   4

   (R) Discuss the structure of BF_3 molecule on the basis of VSEPR theory.   4

UNIT—II

4. (A) Calculate the mole fraction of ethanol and water, if solution contains 6 moles of ethanol and 3 moles of water.   4

   (B) Explain the terms :—

      (i) Normality

      (ii) Molality.   4

   (C) Discuss the choice of suitable indicator in strong acid with weak base.   4

OR

5. (P) Discuss the following steps involved in gravimetric estimation of Barium as barium Sulphate :

      (i) Precipitation

      (ii) Digestion.   4

   (Q) Write a note on Iodimetry and Iodometry.   4

   (R) Explain :—

      (i) End Point

      (ii) Molarity.   4

UNIT—III

6. (A) Complete the following reactions :

      (i) $CH_3-CH_2-OH + [O] \xrightarrow[H^+]{K_2Cr_2O_7}$? + ?

      (ii) $\overset{O}{\overset{||}{H-C-H}} + \overset{O}{\overset{||}{H-C-H}} \xrightarrow[\Delta]{50\% NaOH}$? + ?   4

   (B) How will you prepare acetone from :

      (i) Isopropyl alcohol

      (ii) 2, 2-Dichloro propane ?   4

   (C) What happens when Benzoic acid is treated with :

      (i) Ethyl alcohol in presence of conc. H_2SO_4

   (ii) PCl_5 in presence of conc. H_2SO_4 ?   4

OR

7. (P) How will you prepare Benzoic acid from

    (i)   Benzyl alcohol

    (ii) Phenyl cyanide. 4

    (Q) What happens when

    (i)   Ethylene glycol on oxidation with chromic acid

    (ii) Lactic acid reacts with ethanol in conc. H_2SO_4 ? 4

    (R) Explain Aldol condensation in Aldehydes and Ketones with example. 4

UNIT—IV

8. (A) Explain the following :

    (i)   Plane of symmetry

    (ii) Centre of symmetry. 4

    (B) Assign the following groups in proper priority order according to 'R' and 'S' nomenclature system :

    (i)   —COOH, —NH_2, —H, —CH_3

    (ii) —C_2H_5, —OH, —H, —CH_3 4

    (C) What is geometrical isomerism ? Explain with suitable example. 4

OR

9. (P) Explain the conformational analysis of n-butane with energy level diagram. 4

    (Q) Explain the terms :

    (i)   Chirality

    (ii) Racemisation. 4

    (R) Classify the following compounds into E-2 type :

4
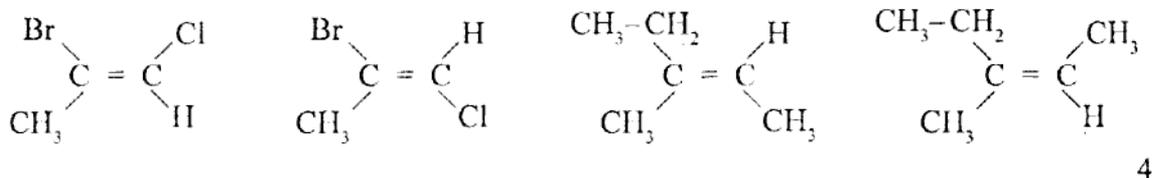
UNIT—V

10. (A) Explain the variation of Gibbs free energy with temperature and pressure. 4

    (B) State and explain Nerst Distribution Law. State the conditions of its validity. 4

    (C) What is extraction ? Explain its types. 4

OR

11. (P) Derive Gibb's–Duhem equation. 4

    (Q) Explain the Phenol-Water system. 4

(R) The Value of Kp for Water gas reaction

$$CO(g) + H_2O(g) \rightleftharpoons CO_2(g) + H_2(g)$$

is 1.6×10^{-5} at 25°C. Calculate the standard free energy change ($\Delta G°$) of the reaction at 25°C.

$(R = 8.314 \text{ JK}^{-1} \text{ mole}^{-1})$ 4

UNIT—VI

12. (A) How relative viscosity of liquid is determined by Ostwald's Viscometer ?   4

    (B) Define :—

        (i) Cell constant

        (ii) Molar conductance.   4

    (C) 0.5 N solution of salt occupying volume between two platinum electrodes 0.0172 m apart and 0.04499 sq m. area has resistance 25 ohm. Calculate equivalent conductance of solution.   4

OR

13. (P) What are the advantages of conductometric titrations over ordinary titrations ?   4

    (Q) Explain the variation of specific and equivalent conductance with dilution.   4

    (R) Describe moving boundary method for determination of transport number.   4