AS–1428

B.Sc. Part—II (Semester—IV) Examination

CHEMISTRY

Time : Three Hours] [Maximum Marks : 80

N.B. :— (1) Question No. **1** is compulsory.
(2) Solve **ONE** question from each unit.
(3) Draw diagrams and give equations wherever necessary.
(4) Use of calculator is allowed.

1. (A) Fill in the blanks :
   (i) Common oxidation state of Lanthanide element is _____.
   (ii) Carbohydrates are poly _____ aldehydes or ketones.
   (iii) Unit cell of NaCl contains _____ molecules of NaCl.
   (iv) Amino derivative of Naphthalene are called _____. 2

   (B) Choose the correct option from the given alternative :
   (i) Which of the following Actinide does not occur in nature ?
   (a) Th (b) U
   (c) Am (d) Pa
   (ii) Malonic ester on condensation with urea gives :
   (a) 4-methyl uracil (b) Thiourea
   (c) Methyl urea (d) Malonyl urea
   (iii) Which of the following is not a colligative property :
   (a) Elevation of Boiling point (b) Boiling point
   (c) Depression of Freezing point (d) Osmotic pressure
   (iv) The number of atoms per unit cell in Body Centred Cubic Crystal (BCC) Lattice :
   (a) 1 (b) 2
   (c) 3 (d) 4 2

(C) Answer in **one** sentence :

(i) Define Van't Hoff Factor.

(ii) What is slag ?

(iii) What is isoelectric point ?

(iv) Define plane of symmetry. 4

UNIT—I

2. (A) Explain oxidation states of 3d series elements. 4

(B) Explain with suitable reason-why :

(i) Cu^{2+} ion is paramagnetic and Zn^{2+} ion is dimagnetic.

(ii) Transition elements cannot form ionic compound in higher oxidation state. 4

(C) Discuss thermal decomposition and displacement of one metal by another for the extraction of elements. 4

OR

3. (P) Give electronic configuration of :

(i) Zirconium (At No = 40)

(ii) Cadmium (At No = 48). 4

(Q) Which of the following ions of transition series are expected to be coloured ? Why ?

(i) Sc^{3+} (ii) Co^{2+}

(iii) Cr^{3+} (iv) Mn^{2+} 4

(R) Explain high temperature chemical reduction method and electrolytic reduction method for the extraction of elements. 4

UNIT—II

4. (A) What is lanthanide contraction ? Explain the effect of lanthanide contraction on Lanthanides and on Post Lanthanide elements. 4

(B) Give electronic configuration of Actinides. 4

(C) Write short account on smelting. 4

OR

5. (P) Discuss oxidation states in Lanthanide series. 4

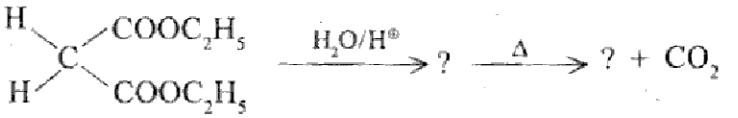
(Q) What is concentration of ore ? Explain gravity separation method for the concentration of ore. 4

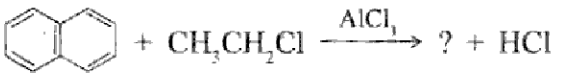
(R) Give electronic configuration of Lanthanide series elements. 4

UNIT—III

6. (A) What are polynuclear hydrocarbons ? Explain molecular orbital structure of Naphthalene. 4

(B) Complete the following reaction :

(i) 

(ii)  4

(C) What are epimers ? Explain the formation of D-Mannose from D-Glucose. 4

OR

7. (P) Discuss drawbacks of open chain structure of glucose and draw structures of α– and β – D – glucopyranose. 4

(Q) How will you convert :

(i) α – Naphthol to α – Naphthyl amine

(ii) Naphthalene to naphthalene sulphonic acid ? 4

(R) (i) How will you prepare succinic acid from malonic ester ? 2

(ii) What happens when naphthalene is heated with chlorine in presence of CCl_4 ? 2

UNIT—IV

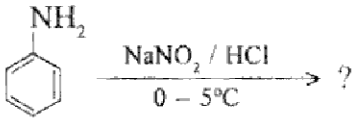
8. (A) What happens when aniline is treated with :

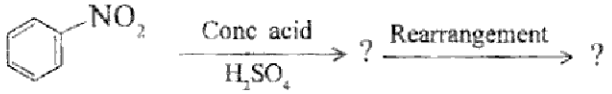
(i) aqueous Br_2

(ii) Br_2 in CS_2 ? 4

(B) Write short account on diazocoupling reaction of benzene diazonium chloride. 4

(C) Complete the following reactions :

(i) 

(ii)  4

OR

9. (P) Write short account on :
   (i) Peptides
   (ii) Zwitter ion. 4

   (Q) How will you prepare following from aniline :
   (i) Acetanilide
   (ii) Benzanilide ? 4

   (R) How will you obtain :
   (i) Benzene N-methyl aniline from Aniline
   (ii) Nitrobenzene from benzene ? 4

UNIT—V

10. (A) Derive an expression for the relationship between elevation of boiling point and molar mass of a non-volatile solute. 6

    (B) A solution containing 2.44×10^{-3} kg of solute dissolved in 75×10^{-3} kg of water boiled at 373.413 K. Calculate the molar mass of solute (Kb = 0.512 kg mol^{-1}). 4

    (C) Define depression in freezing point. 2

OR

11. (P) Describe Cottrell's method for the determination of elevation of boiling point. 4

    (Q) Define Van't Hoff factor i ? Derive relationship between Van't Hoff factor i and degree of association. 4

    (R) A solution of sucrose (molar mass = 342 gm mol^{-1}) is prepared by dissolving 68.4×10^{-3} kg in 1 kg of water. K_f for water is 1.86 K kg mol^{-1}. Find freezing point of the solution. 4

UNIT—VI

12. (A) Define :

    (i) Unit Cell

    (ii) Centre of symmetry. 4

    (B) Describe the Bragg's spectrophotometer method for the determination of crystal structure. 4

    (C) Calculate the glancing angle for first order reflection from 100 planes of FCC when X-rays of the wavelength of 0.154 nm are used. Given spacing of 100 planes is 0.315 nm. 4

OR

13. (P) Explain the structure of KCl on the basis of x-ray diffraction. 4

    (Q) Define :

    (i) Lattice point

    (ii) Axis of symmetry. 4

    (R) Find out Miller indices of Weiss indices of :

    (i) 2 : 1 : 3

    (ii) 1 : ∞ : 1/4. 4