AU–107

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) The energy required to remove loosely bound electron from neutral gaseous atom to form cation is called _____.

(ii) Glucose on acetylation with acetic anhydride and sodium acetate gives glucose penta acetate. This indicates the presence of _____ in it.

(iii) In bcc, corner particle contributes _____ to the unit cell.

(iv) The $-CH_2-$ group when attached to two strongly electron withdrawing groups is called _____. 2

(B) Choose the correct option from the given alternative :

(i) Outer electronic configuration for copper is :

(a) [Ar] $3d^{10}$, $4s^2$ (b) [Ar] $3d^{10}$, $4s^1$

(c) [Ar] $3d^8$, $4s^2$ (d) [Ar] $3d^5$, $4s^2$

(ii) Molal depression constant of camphor is :

(a) K_f = 37.7 K kg. mol^{-1} (b) K_f = 14.40 K kg. mol^{-1}

(c) K_f = 6.90 K kg. mol^{-1} (d) K_f = 20.00 K kg. mol^{-1}

(iii) The polynuclear hydrocarbons in which two or more benzene rings are fused together are called as :

(a) Condensed system (b) Isolated system

(c) Isomeric system (d) None of the above

(iv) Strecker synthesis is used for the synthesis of :

(a) Nitrobenzene (b) Diazonium salt

(c) α-amino acid (d) Carbohydrate 2

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

(i) Why Inner transition elements are called 'f' block elements ?

(ii) What is calcination ?

(iii) What are monosaccharides ?

(iv) Define catalyst. 4

UNIT—I

2. (A) Give reasons :

(i) Transition elements show variable oxidation states.

(ii) Chromium and Copper have abnormal electronic configuration. 4

(B) Giving electronic configuration, explain why Sc^{3+} and Zn^{2+} are colourless while Fe^{2+} and Co^{3+} ions are coloured. 4

(C) What are transition elements ? Discuss their general characteristics. Why Zn is not considered as a true transition element ? 4

OR

3. (P) Give electronic configurations of :

(i) Zirconium (At. No. – 40)

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

(Q) Why second ionization energy of chromium is higher as compared to other transition elements ? 4

(R) Calculate the magnetic moment of Fe^{2+} ion and Cu^{2+} ion. 4

UNIT—II

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

(B) Give the electronic configuration of Lanthanide Series Elements. 4

(C) Explain Smelting. 4

OR

5. (P) Discuss the differences between Lanthanides and Actinides. 4

(Q) Explain Magnetic Separation Method for separation of ores. 4

(R) Discuss isolation of lanthanides by ion exchange method. 4

UNIT—III

6. (A) Explain molecular orbital structure of Naphthalene. 4

(B) How will you convert :

(i) α-Naphthol to α-Naphthylamine

(ii) Naphthalene to 1-Naphthalene sulphonic acid ? 4

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

OR

7. (P) Describe the important stages in the preparation of Malonic ester from acetic acid. 4

(Q) How will you bring about following conversions :

(i) Naphthalene into 2-Ethylnaphthalene 2

(ii) Naphthalene into 1-Acetylnaphthalene ? 2

(R) How Fructose is converted into Glucose ? 4

UNIT—IV

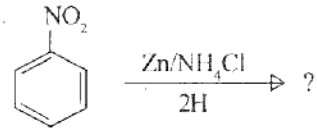
8. (A) What happens when aniline is treated with :

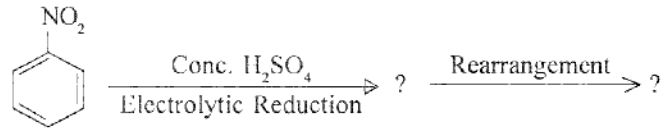
(i) Aqueous Br_2

(ii) Br_2 is carbon disulphide ? 4

(B) How benzene diazonium chloride is prepared in laboratory ? 4

(C) Complete the following reactions :

(i) 

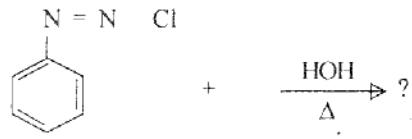
(ii) 

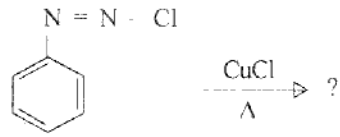
4

OR

9. (P) Discuss Synthesis of Glycine by Gabriel Phthalamide synthesis. 4

(Q) Complete the following reaction and predict the product :

(i) 

(ii) 

4

(R) What is nitrating mixture ? How benzene is nitrated with nitrating mixture ? 4

UNIT—V

10. (A) State and explain Vant Hoff factor. 4

(B) On the basis of thermodynamic consideration derive an expression for molal elevation constant. 4

(C) Melting point of camphor is 449.5 K. The melting point of a solution containing 5.22×10^{-4} kg camphor and 3.86×10^{-5} kg of an unknown substance is 431.5 K. Find the molar mass of the unknown substance. (Kf of camphor = 37.7 K kg. mol^{-1}). 4

OR

11. (P) What are colligative properties ? Give importance of colligative properties. 4

(Q) How degree of dissociation for an electrolyte A_XB_Y type is determined by using Vant Hoff factor ? 4

(R) Calculate the molal depression constant of water. The heat of fusion of ice at 273 K is 6024.6 $J.mol^{-1}$. ($R = 8.314\ J\ K^{-1}$, $M = 18 \times 10^{-3}$ kg mol^{-1}) 4

UNIT—VI

12. (A) Explain the structure of KCl on the basis of X-ray diffraction. 4

(B) Define :

(i) Point of symmetry

(ii) Lattice point. 4

(C) Find out Miller indices if the Weiss indices are as follows :

(i) 1 : 1 : 2

(ii) 2 : ∞ : 3. 4

OR

13. (P) Differentiate between Crystalline solids and Amorphous solids. 4

(Q) Calculate the glancing angle for first order reflection from 100 planes of fcc x-rays of wavelength of 0.154 nm are used. Given spacing of 100 planes is 0.315 nm. 4

(R) Define :

(i) Body centred crystal

(ii) Axis of symmetry. 4