AQ—697

B.Sc. (Part—II) Semester-IV Examination
4S : CHEMISTRY

Time—Three Hours] [Maximum Marks—80

N.B. :— (1) **All** questions are compulsory.

(2) Question No. 1 carries 8 marks while each of the remaining questions carry 12 marks.

(3) Draw diagram and write equation wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

(i) The substance which possesses a high value of magnetic permeability is called _____.

(ii) The General electronic configuration of 4f series elements is _____.

(iii) C–C–C bond angle in Naphthalene is ____.

(iv) The total number of symmetry elements for cubic crystal are _____. 2

(B) Select the correct alternative :

(i) In the first transition series, highest oxidation state is exhibited by :

(a) Mn (b) Ni

(c) Fe (d) Cr

(ii) Important ore of aluminium is :

(a) Malachite (b) Cinnabar

(c) Bauxite (d) Magnetite

(iii) How many number of primary alcoholic groups are there in Glucose ?

(a) One (b) Three

(c) Five (d) Four

(iv) The Miller indices for Weiss indices 1 : 2 : 3 are :

(a) 3, 1, 2 (b) 3, 2, 1

(c) 6, 3, 2 (d) 1, 2, 3 2

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

(i) Define Catalyst.

(ii) Draw the structure of Fischer projection of Glucose.

(iii) Name the functional groups present in Amino Acid.

(iv) What is Molal elevation constant ? 4

(C) The first order reflection maxima was noted at 5.9°, for 100 planes of SCC. Calculate wavelength of X-rays, if interplaner spacing was 0.282 nm. 4

OR

13. (P) Describe the Bragg's spectrometer method for determination of crystal structure. 4

(Q) Define :

(i) Plane of symmetry

(ii) Weiss indices. 4

(R) The length of edge of a cubic lattice is 2.5 Å. Calculate interplaner distance for its 231 planes. 4

(C) Calculate the Molal depression constant of water. The heat of fusion of ice at 273 K is 6024.6 J/mole. ($R = 8.314$ J/K/mole, $M = 18\times10^{-3}$ kg/mole) 3

OR

11. (P) What is Van't Hoff factor 'i' ? Derive the relationship between Van't Hoff factor 'i' and degree of association of a solute. 4

(Q) Describe Cottrell's method for determination of elevation of boiling point. 4

(R) 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. (k_f of camphor = 37.7 k.kg.mol^{-1}). 4

UNIT—VI

12. (A) Show that, unit cell of NaCl contains four molecules of NaCl. 4

(B) Define different elements of symmetry in a cubic crystal. 4

UNIT—I

2. (A) Explain the following terms :

(i) Mineral

(ii) Metallic Nature. 4

(B) Give electronic configuration of 3d series Elements. 4

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

OR

3. (P) Explain the catalytic properties of 3d series elements. 4

(Q) Why is Manganese more stable in the +2 state than the +3 state ? 4

(R) Explain why the compounds of Copper (II) are 'coloured' but those of Zinc are colourless ? 4

UNIT—II

4. (A) Give any four differences between Lanthanides and Actinides. 4

(B) Explain the electromagnetic separation process of concentration of Ore. 4

(C) Give electronic configuration of Actinium, Thorium, Nobelium and Curium. 4

OR

5. (P) What is Lanthanide contraction ? Explain the causes of Lanthanide contraction. 4

(Q) What are Actinides ? Discuss the electronic configuration of Actinides. 6

(R) Define the term Calcination. 2

UNIT—III

6. (A) Discuss the constitution of Glucose. 4

(B) Explain the molecular orbital structure of Naphthalene. 4

(C) How will you convert acetoacetic ester into :

(i) Crotonic Acid

(ii) Acetyl Acetone ? 4

OR

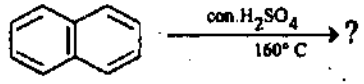
7. (P) How will you convert :

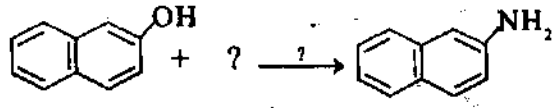
(i) Acetic Acid to Malonic ester and

(ii) Malonic ester to Acetic Acid ? 4

(Q) Draw the structure of ribose and deoxyribose. 4

(R) Complete the following reactions :

(i) 

(ii) 

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UNIT—IV

8. (A) Explain basic nature of amines. 4

(B) Give Strecker's synthesis of Amino Acid. 4

(C) How will you convert Benzene diazonium chloride into :

(i) Benzene

(ii) Phenol. 4

OR

9. (P) Explain Hoffman's exhaustive methylation with mechanism. 4

(Q) How Benzene diazonium chloride reacts with :

(i) Phenol

(ii) CuCl/HCl ? 4

(R) Explain Gabriel phthalimide synthesis. 4

UNIT—V

10. (A) Derive an expression for the relationship between elevation of boiling point and Molar mass of Non-Volatile Solute. 5

(B) Define the following terms :

(i) Boiling point

(ii) Depression in freezing point. 4