AV–1762

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

Time : Three Hours]   [Maximum Marks : 80

Note :— (1) **All** questions are compulsory.

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

  (3) Draw diagrams and write equations wherever necessary.

  (4) Use of Scientific calculator is allowed.

1. (A) Fill in the blanks :   ½×4=2

  (i) _____ is the process in which ore heated in absence of air.

  (ii) Malonic ester is also known as _____.

  (iii) The property which depends on the number of particle of a substance is known as _____ property.

  (iv) The NaCl crystal structure is a _____ cubic lattice.

 (B) Select the correct alternative :   ½×4=2

  (i) The most stable oxidation state of iron is :

   (a) +2   (b) +3

   (c) –2   (d) –3

  (ii) Galena is an ore of :

   (a) Pb   (b) Hg

   (c) Sn   (d) Zn

  (iii) In Naphthalene, all the carbon atoms are present in hybridization :

   (a) sp^3 (b) sp^2

   (c) d^2sp^3 (d) sp

  (iv) 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

 (C) Answer in **ONE** sentence :   1×4=4

  (i) What is an ore ?

  (ii) Define the term, Axis of symmetry.

  (iii) What is meant by smelting ?

  (iv) What is meant by reactive methylene group ?

UNIT—I

2. (A) Describe the variable oxidation state of 3d series elements. 4

   (B) Which of the following are paramagnetic and why ? 4

       (a) Ni^{2+} (b) Ti^{3+}

       (c) Sc^{3+} (d) Zn^{2+}

   (C) Calculate the magnetic moment for the Mn^{+2} and Cr^{+3} ions. 4

OR

3. (P) What are the factors influencing the choice of extraction process ? 4

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

   (R) Explain, why copper and chromium show irregular configuration ? 4

UNIT—II

4. (A) Explain ion exchange method for separation of Lanthanides. 4

   (B) Give the similarities between Lanthanides and Actinides Lutetium. 4

   (C) Give the electronic configuration of Thorium, Uranium and Plutonium. 4

OR

5. (P) Give the difference between Calcination and Roasting. 4

   (Q) Explain the oxidation state of Lanthanides. 4

   (R) Explain the colour properties of Lanthanides series. 4

UNIT—III

6. (A) How will you convert glucose into fructose ? 4

   (B) Give the preparation of Malonic Ester from Acetic acid. 4

   (C) Explain the electrophilic substitution reaction in Naphthalene. 4

OR

7. (P) Explain Epimerisation with example. 4

   (Q) How will you prepare following from Aceto-acetic ester ? 4

       (i) Acetyl Acetone

       (ii) 4-Methyl uracil.

   (R) How will you prepare α and β-Naphthylamines from naphthol ? 4

UNIT—IV

8. (A) How will you convert Benzene diazonium chloride into—

       (i) Chlorobenzene and

       (ii) Phenol ? 4

   (B) Discuss the relative basic character of ammonia and aliphatic amines. 4

   (C) Explain the terms : 4

       (i) Zwitter ion

       (ii) Isoelectric point.

OR

9. (P) Explain the various steps in Peptide synthesis. 4

   (Q) How will you convert : 4

      (i) Aniline to benzanilide

      (ii) Aniline to benzene diazonium chloride ?

   (R) Discuss the reduction of nitrobenzene in acidic and neutral medium. 4

UNIT—V

10. (A) Derive an expression for the relationship between depression of freezing point and molar mass of solute. 4

    (B) Describe Rast method to determine depression in freezing point and molecular weight of solute. 4

    (C) Find Molal Elevation constant of water which evaporates at 373 K with absorption of 40658 J.mol^{-1} heat energy. (R = 8.314 J/K/mol) 4

OR

11. (P) Define the following terms : 4

       (i) Molal Elevation constant

       (ii) Van't Hoff factor.

    (Q) Derive equation for the degree of dissociation, when the solute undergoes dissociation. 4

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

UNIT—VI

12. (A) Define the following terms : 4

       (i) Unit cell

       (ii) Plane of symmetry.

    (B) Derive Bragg's equation for diffraction of X-rays by crystals. 4

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

OR

13. (P) Explain how Bragg's method can be used to determine structure of NaCl. 4

    (Q) Define the following : 4

       (i) Law of Constancy of interfacial angles

       (ii) Weiss indices.

    (R) The interplanar distance for 301 planes was found to be 0.75 Å. Calculate length edge of its cubic lattice. 4