AW–1712

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

4S : CHEMISTRY

Time : Three Hours] [Maximum Marks : 80

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

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

(3) Draw diagrams, write equations wherever necessary.

(4) Use of scientific calculator is allowed.

1. (A) Fill in the blanks :

(i) In Lanthanides, differentiating electron is added to _____ subshell. ½

(ii) The organic compounds containing two or more benzene nuclei in their structure are called _____. ½

(iii) Disaccharides on hydrolysis gives _____ units of monosaccharides. ½

(iv) The temperature at which the liquid and the solid states of the substance have the same vapour pressure is called as _____. ½

(B) Choose the correct alternative :

(i) Which of the following elements have 5d electrons in its electronic configuration ? ½

(a) Pm (b) Sm

(c) Eu (d) Gd

(ii) Which of the following actinide does not occur in nature ? ½

(a) Th (b) U

(c) Am (d) Pa

(iii) Strecker synthesis is used for the synthesis of : ½

(a) Nitrobenzene (b) Diazonium Salt

(c) α-amino acid (d) Carbohydrates

(iv) NaCl is a example of : ½

(a) FCC (b) BCC

(c) SCC (d) None of the above

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

(i) Define Paramagnetism. 1

(ii) In metallurgy, what does the term gangue stand for ? 1

(iii) Draw the structure of Malonic Ester (Diethyl Malonate). 1

(iv) Define Catalyst. 1

UNIT—I

2. (A) (i) Explain with suitable reasons electronic configuration of chromium is $3d^5\ 4s^1$ instead of $3d^4\ 4s^2$. 2

(ii) Transition elements cannot form ionic compound in higher oxidation state. 2

(B) What are transition elements ? Why Zn is not considered as a true transition element ? 4

(C) What are the factors influencing the choice of extraction process ? 4

OR

3. (P) Give the electronic configuration of :

(i) Yttrium (atomic no. = 39) 2

(ii) Silver (atomic no. = 47). 2

(Q) What are complexes ? Why 3d elements generally form complex ? 4

(R) Which method would be applicable for separation of Na from NaCl and why ? 4

UNIT—II

4. (A) Discuss the magnetic properties of Lanthanides. 4

(B) Give the comparison of Lanthanides and Actinides. 4

(C) Describe the process of Smelting. 4

OR

5. (P) What is meant by Lanthanide contraction ? Explain in brief. 4

(Q) Discuss the electrolytic refining of metals. 4

(R) What are actinides ? Discuss the electronic configuration of actinides. 4

UNIT—III

6. (A) Discuss the structure of Naphthalene. 4

(B) How will you synthesize :

(i) 4–methyl uracil from AAE

(ii) Succinic acid from malonic ester ? 4

(C) What are epimers ? How will you convert D-Glucose into D-Mannose ? 4

OR

7. (P) How will you convert :

(i) AAE into propionic acid

(ii) Acetic acid into malonic ester ? 4

(Q) How will you bring out the following conversions :

(i) α-naphthol to α-naphthyl amine

(ii) β-naphthyl sulphonic acid to β-naphthol ? 4

(R) Draw the structure of following compounds :

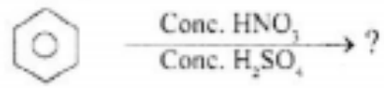
(i) Maltose

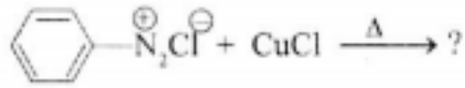
(ii) 2-Deoxy-D-Ribose. 4

UNIT—IV

8. (A) What are α-amino acids ? Discuss structure determination of polypeptide by Sanger's method. 4

(B) Complete the following reaction :

(i)  2

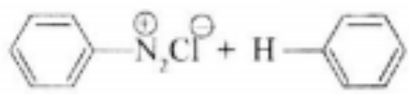
(ii)  2

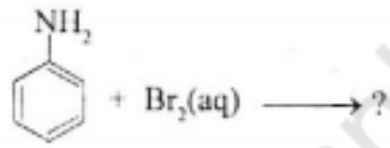
(C) Explain Hoffmann's exhaustive methylation reaction. 4

OR

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

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

(i)  2

(ii)  2

(R) How will you synthesize peptide from amino acid ? 4

UNIT—V

10. (A) How Vant Hoff's factor is used to determine the degree of dissociation of an electrolyte ? 4

(B) Describe Cottrells' method for determination of elevation of boiling point. 4

(C) Find molal elevation constant of water which evaporates at 373 K with absorption of 40658 J mol^{-1} heat energy ($R = 8.314\ Jk^{-1}\ mole^{-1}$) 4

OR

11. (P) What are colligative properties ? Give the reasons for abnormal colligative properties. 4

(Q) Derive the equation for Van't Hoff's factor when the solute undergoes association. 4

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

UNIT—VI

12. (A) Differentiate between crystalline solids and amorphous solid. 4

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

(C) The first order reflection maxima was noted at 5.90 for 100 planes of SCC. Calculate wavelength of X-rays, if interplanar spacing was 0.282 nm. 4

OR

13. (P) Explain with diagram :

(i) Plane of symmetry 2

(ii) Point of symmetry. 2

(Q) Determine the number of constituent particles in the Face Centered Cubic (FCC) Unit Cell, Simple Cubic Crystal (SCC) Unit Cell. 4

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

(i) 1 : 1 : 2

(ii) 2 : ∞ : 3 4