

**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.  $\frac{1}{2}$
- (ii) The organic compounds containing two or more benzene nuclei in their structure are called \_\_\_\_\_.  $\frac{1}{2}$
- (iii) Disaccharides on hydrolysis gives \_\_\_\_\_ units of monosaccharides.  $\frac{1}{2}$
- (iv) The temperature at which the liquid and the solid states of the substance have the same vapour pressure is called as \_\_\_\_\_.  $\frac{1}{2}$

(B) Choose the correct alternative :

- (i) Which of the following elements have 5d electrons in its electronic configuration ?  $\frac{1}{2}$ 
  - (a) Pm
  - (b) Sm
  - (c) Eu
  - (d) Gd
- (ii) Which of the following actinide does not occur in nature ?  $\frac{1}{2}$ 
  - (a) Th
  - (b) U
  - (c) Am
  - (d) Pa
- (iii) Strecker synthesis is used for the synthesis of :  $\frac{1}{2}$ 
  - (a) Nitrobenzene
  - (b) Diazonium Salt
  - (c)  $\alpha$ -amino acid
  - (d) Carbohydrates
- (iv) NaCl is an example of :  $\frac{1}{2}$ 
  - (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 4
- (ii) Succinic acid from malonic ester ? 4
- (C) What are epimers ? How will you convert D-Glucose into D-Mannose ? 4

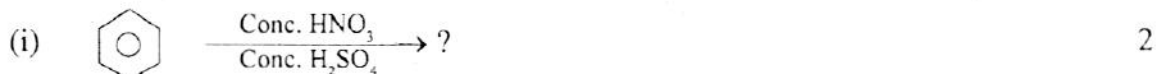
### OR

7. (P) How will you convert :
- (i) AAE into propionic acid 4
- (ii) Acetic acid into malonic ester ? 4
- (Q) How will you bring out the following conversions :
- (i)  $\alpha$ -naphthol to  $\alpha$ -naphthyl amine 4
- (ii)  $\beta$ -naphthyl sulphonic acid to  $\beta$ -naphthol ? 4
- (R) Draw the structure of following compounds :
- (i) Maltose 4
- (ii) 2-Deoxy-D-Ribose. 4

UNIT—IV

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

(B) Complete the following reaction :

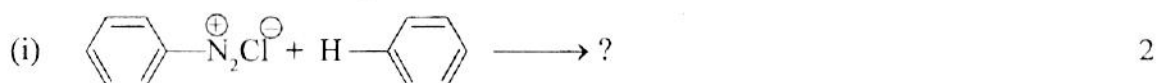


- (C) Explain Hoffmann's exhaustive methylation reaction. 4

OR

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

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



- (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<sup>-1</sup> heat energy (R = 8.314 Jk<sup>-1</sup> mole<sup>-1</sup>) 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<sup>-1</sup>. (R = 8.314 Jk<sup>-1</sup>, M = 18 × 10<sup>-3</sup> kg mol<sup>-1</sup>) 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  $5.90^\circ$  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)  $2 : \infty : 3$  4