

B.Sc. (CBCS Pattern) Sem-III  
**USCCHT05 - Chemistry Paper-I : Inorganic Chemistry**

P. Pages : 2

Time : Three Hours



**GUG/W/22/11600**

Max. Marks : 50

- Notes : 1. All the five questions are compulsory and carry equal marks.  
2. Write chemical equation and draw diagram wherever necessary.

1. a) Discuss the structure and bonding in diborane. 5  
b) Discuss the preparation and structure of the following compounds. 5  
i) CIF            ii) Marshal Acid.
- OR**
- c) What are carbides? Explain the ionic carbides in detail. 2½  
d) What is polyhalides? Discuss the structure of I<sub>3</sub><sup>-</sup> ion. 2½  
e) Discuss the preparation and structure of silicon carbide. 2½  
f) Write a note on 2½  
Pyrosilicates
2. a) Explain the term polarization. Give fajan's rule for extent of polarization. 5  
b) Explain band theory for metals. How it explain the difference in conductor, insulator and semiconductor? 5
- OR**
- c) Explain the Lux-flood solvent system of acid and base. 2½  
d) What is lattice energy? Calculate the lattice energy of NaCl crystal from the following data by use of Born – Haber cycle. 2½  
 $\Delta H_{\text{sub.}}$  for sodium = 108.7 kJ mole<sup>-1</sup>  
 $\Delta H_{\text{diss.}}$  for Cl<sub>2</sub> = 225.9 kJ mole<sup>-1</sup>  
IE for Na<sub>(g)</sub> = 489.5 kJ mole<sup>-1</sup>  
EA for Cl<sub>(g)</sub> = -351.4 kJ mole<sup>-1</sup>  
Heat of formation ( $\Delta H_f$ ) of NaCl = -414.2 kJ mole<sup>-1</sup>.
- e) Explain p-type extrinsic semiconductor. 2½  
f) Explain the solvation and solvation energy with suitable example. 2½
3. a) Discuss the 3d-block element with respect to 5  
i) Atomic and ionic radii  
ii) Electronic configuration.  
b) Discuss the comparative study of Cr, Mo and W with respect to 5  
i) Oxidation state  
ii) Magnetic properties.
- OR**
- c) Discuss the complex formation tendency of 3d-block elements. 2½  
d) Discuss the electronic configuration of 4d-transition series elements. 2½  
e) Discuss the magnetic properties of Ni, Pd and Pt. 2½  
f) Discuss the variable oxidation state shown by first transition series elements. 2½

4. a) What is Lanthanide contraction? Describe the ion exchange method for the separation of Lanthanides. 5
- b) Discuss the actinide series with respect to 5
- i) Electronic configuration ii) Oxidation state.

**OR**

- c) Discuss the electronic configuration of lanthanide series elements. 2½
- d) Describe the solvent extraction method for the separation of lanthanides. 2½
- e) Discuss the atomic and ionic radii of actinide series elements. 2½
- f) Discuss the complex formation tendency of lanthanides. 2½
5. Attempt any ten. 10

- i) Draw a structure of borazine.
- ii) Give the chemical name and structure of Caro's acid.
- iii) Write any one method for the preparation of  $S_4N_4$ .
- iv) Define radius ratio rule.
- v) Define metallic bond.
- vi) Classify the following as Lewis acid or base
- a)  $H^+$       b)  $BF_3$       c)  $CH_3 - NH_2$       d)  $CH_3 - O - CH_3$
- vii) What is spin only formula?
- viii) Give the electronic configuration of  $Au(z = 79)$  and  $Hg(z = 80)$
- ix)  $Cu^{2+}$  is coloured and paramagnetic. Why?
- x)  $La(OH)_3$  is the most basic while  $Lu(OH)_3$  is the least basic. Why?
- xi) give any two minerals of Lanthanides.
- xii) What are transuranic elements?

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