

M.Sc. (Chemistry) (NEP Pattern) Semester-I  
**NEP-11 / 01MSCCH01 - Major DSC Paper-I : Inorganic Chemistry-I**

P. Pages : 2

Time : Three Hours



**GUG/S/25/15070**

Max. Marks : 80

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1. a) Explain structure and bonding in  $\text{SF}_4$  &  $\text{XeF}_2$ . 8
- b) Draw M.O. Diagram of  $[\text{CoF}_6]^{-3}$  and Explain it's magnetic properties. 8

**OR**

- c) Write short note on spectrochemical series. 4
- d) Explain decrease of bond angle  $\text{CH}_4 > \text{NH}_3$ . 4
- e) Explain bonding in  $[\text{CO}(\text{NH}_3)_6]^{3+}$  using MOT. 4
- f) Explain splitting of d-orbital in square planar complex. 4
2. a) Explain  $\text{SN}^1$  CB mechanism and it's Evidences. 8
- b) What do you mean by thermodynamic stability and kinetic stability. Derive the relation between stepwise formation constant and overall formation constant. 8

**OR**

- c) Explain the term labile and inert complex. 4
- d) Explain Irving-Rossetti method. 4
- e) Give energy changes in ligand substitution reaction in octahedral complex. 4
- f) Explain the stereochemistry of intermediates in  $\text{SN}^1$  reaction mechanism. 4
3. a) Explain structure and bonding in  $\text{B}_2\text{H}_6$  and  $\text{B}_{10}\text{H}_{14}$ . 8
- b) What do you mean by Metallocarboranes Explain briefly. 8

**OR**

- c) Write short note on closo-carboranes. 4
- d) Discuss the topological Approach to Boron Hydride Give styx number for  $\text{B}_5\text{H}_9$ . 4
- e) What do you mean by cluster, give classification of Boron hydrides. 4

- f) Give preparation of metallocarborane  $[C_2B_9H_{11}]^{2-}$  4
4. a) Give the preparation and properties of Binuclear halide  $[Re_2 \times 8]^{--}$  8
- b) Explain Heteropolyacids and their anion. 8
- OR**
- c) Explain pentanuclear acetate clusters. 4
- d) Discuss the term Isopolyacids. 4
- e) Give classification of metal clusters. 4
- f) Write short note on metal metal bond with suitable example. 4
5. All questions are compulsory. 16
- a) Explain structure and bonding in  $PCl_5$ .
- b) Explain decrease of bond angle  $AsI_3 > AsBr_3$ .
- c) Why  $[Ni(en)_3]^{2+}$  is more stable than  $[Ni(NH_3)_6]^{2+}$ .
- d) Draw diagram of splitting of d-orbital in octahedral complex.
- e) Classify the following Borane as dodecahedral, Nido or Adorned.
- i)  $B_4H_{10}$  ii)  $B_5H_9$
- f) Draw the structure of  $C_2B_4H_6$ .
- g) Explain the structure and bonding in carbonyl clusters, what is oxidation state of metal.
- h) Write down two factors affecting stability of metal complexes.

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