

M.Sc. (Chemistry) (CBCS Pattern) Semester-I
PSCCHT01 - Major DSC Paper-I : Inorganic Chemistry

P. Pages : 2

Time : Three Hours



GUG/S/25/11183

Max. Marks : 80

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1. a) Explain structure and bonding in SF_4 & 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 planer complex. 4
2. a) Explain $\text{SN}'\text{CB}$ 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-Rossotti method. 4
- e) Give Energy changes in ligand substitution reaction in octahedral complex. 4
- f) Explain the stereochemistry of intermediates in SN' reaction mechanism. 4
3. a) Explain structure and bonding in B_2H_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 B_5H_9 . 4
- e) What do you mean by cluster, Give classification of Boron hydrides. 4

- f) Give preparation of metallocarborane $[\text{C}_2\text{B}_9\text{H}_{11}]^{2-}$.
4. a) Give the preparation and properties of Binuclear halide $[\text{Re}_2\text{X}_8]$. 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 $\text{AsI}_3 > \text{AsBr}_3$.
- c) Why $[\text{Ni}(\text{cn})_3]^{2+}$ is more stable than $[\text{Ni}(\text{NH})_6]^{2+}$
- d) Draw Diagram of splitting of d-orbital in octahedral complex.
- e) Classify the following Borane as closo, Nido or Arachno.
- i) B_4H_{10}
- ii) B_5H_9
- f) Draw the structure of $\text{C}_2\text{B}_4\text{H}_6$.
- 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.
