

M.Sc. (Part-I) (Chemistry) (NEP Pattern) Semester-I
NEP-11 / 01MSCCH01 - Inorganic Chemistry-I

P. Pages : 2

Time : Three Hours



GUG/W/24/15070

Max. Marks : 80

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1. a) Describe the effect of lone pair electrons on bond angles in molecules, using VSEPR theory. 8
- b) Discuss the Jahn-Teller distortion on following molecules $[\text{Mn}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{CuCl}_4]^{2-}$ 8

OR

- a) Explain how MOT describe the bonding in tetrahedral complex such as $[\text{NiCl}_4]^{2-}$. 4
- b) Explain the geometries of the following molecules I_7^- . 4
- c) Describe the role of CFSE in the H.S. and L.S. configuration of transition metal complexes. 4
- d) Explain the variation in bond angles in the molecules NH_3 and PH_3 . 4
2. a) Discuss the principle of Job's method and explain its limitations in determination of the stoichiometry of complexes. 8
- b) Explain conjugate base mechanism occurs in octahedral complexes and its different intermediate pathway. 8

OR

- a) What is anion reaction? Discuss the mechanism with suitable examples? 4
- b) Explain the potentiometric method for the determination of formation constant of complex. 4
- c) How does the chelate effect enhance the thermodynamic stability of complexes. 4
- d) Explain the concept of substitution reactions in coordination compounds without breaking of metal ligand bond. 4
3. a) What do you mean by Boron Hydride. Explain structure and bonding in B_2H_6 ? 8
- b) What are Carboranes? Write the classification of carboranes with suitable examples? 8

OR

- a) Describe a general methods for the synthesis of metalloboranes? 4
- b) Discuss the structure and bonding of following boranes (i) B_5H_9 , (ii) B_6H_{10} . 4
- c) What is STYX number, and how it is used to describe the bonding in boranes B_5H_9 . 4
- d) How do the position of metal atom influence the overall structure of metalloboranes? 4
- 4. a) Describe the structure of $Re_2Cl_8^{2-}$ and explain the bonding between the rhenium atoms in the complex? 8
- b) Define isopoly and heteropoly acids? Explain the main structural difference them. 8

OR

- a) Explain the structure and bonding in trinuclear metal cluster? 4
- b) Discuss the role of heteropoly acid anions in catalytic process? 4
- c) What is metal oxide cluster? Explain with suitable examples? 4
- d) Explain the geometry of
 - i) Mo_6Cl_{12} 4
- 5. a) Explain why d^6 (L.S.) octahedral complex has greater CFSE than d^6 (H.S.) octahedral complex. 2
- b) What are the geometry of BF_3 SF_6 molecules. 2
- c) Identify weather the $[Fe(CN)_6]^{4-}$ is inert or labile complex and give reason. 2
- d) Write any two factor's affecting stability of complex. 2
- e) Give the preparation of Carboranes. 2
- f) What is the general formula for closo and nido boranes. 2
- g) Define holide type of cluster. 2
- h) What are the binuclear cluster of metal acids? 2
