

**S-459**

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Roll No. ....

# **MSCCH-501**

## **Inorganic Chemistry-I**

M.Sc. Chemistry (MSCCH)

1st Semester Examination, 2022 (Dec.)

**Time : 2 Hours]**

**Max. Marks : 70**

**Note :** This paper is of Seventy (70) marks divided into two (02) Sections A and B. Attempt the questions contained in these sections according to the detailed instructions given therein.

### **SECTION-A**

#### **(Long Answer Type Questions)**

**Note :** Section 'A' contains Five (05) long answer type questions of Nineteen (19) marks each. Learners are required to answer any Two (02) questions only.

(2×19=38)

1. What are the metal carbonyl ? Classify the metal carbonyl. Discuss the bonding and structure of the  $\text{Fe}(\text{CO})_5$  metal carbonyl.

2. Give the any three method for Determining the Binary formation/stability constants.
3. What is the valence Shell Electron Pair Repulsion (VSEPR) theory? Predict the structure of the Geometry and shape of the  $\text{NH}_3$ ,  $\text{H}_2\text{O}$  and  $\text{I}_3^-$  molecules.
4. Attempt any *two* :
  - (a) What is the Bent Rule? Give the limitation of the bent rule.
  - (b) What are the matellocarborane? Explain the matellocarborane with help of the example.
  - (c) Phosphorus-Sulfur compounds.
5. What is the chelate effect? Explain why chelate complexes is more stable than the normal coordination complexes. Discuss the various factors which affect the stability of the complexes.

**SECTION-B**  
**(Short Answer Type Questions)**

**Note :** Section 'B' contains Eight (08) short answer type questions of Eight (08) marks each. Learners are required to answer any Four (04) questions only. (4×8=32)

1. What factors are necessary for  $\beta$ -elimination and what factors can reduce the possibility of  $\beta$ -elimination in metal alkyls?

2. Explain the vibration spectra of the metal carbonyl.
  3. What is the  $d\pi-p\pi$  bond ? Explain the  $d\pi-p\pi$  with the suitable example.
  4. Attempt any *two* :
    - (a) Tertiary phosphine ligand.
    - (b) Give the Name of the  $B_4H_8$ ,  $B_2H_4$ ,  $B_6H_{12}$  and  $B_{10}H_{12}$  borane.
    - (c) Cyclophosphazene.
  5. What are mononuclear, Dinuclear and Polynuclear metal carbonyls?
  6. Give the relationship between stepwise and overall formation constant.
  7. Identify the shapes of the molecules  $ClF_3$ ,  $PCl_3$ ,  $XeF_2$  and  $SF_4$  by using the concepts of the VSEPR theory.
  8. Discuss the general methods of preparation of transition metal alkyls.
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