

**A-057**

Total Pages : 4

Roll No. ....

**MSCCH-501**

**M.Sc. CHEMISTRY (MSCCH)**

**(Inorganic Chemistry-I)**

1st Semester Examination, 2024 (June)

Time : 2:00 Hrs.

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. *Candidates should limit their answers to the questions on the given answer sheet. No additional (B) answer sheet will be issued.*

**Section-A**

**(Long Answer Type Questions)    2×19=38**

*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.

**A-057/MSCCH-501 ( 1 )**

P.T.O.

1. Give the any three method of preparation for the Iron(0) pentacarbonyl ( $\text{Fe}(\text{CO})_5$ ). Also discuss the structure and bonding in ( $\text{Fe}(\text{CO})_5$ ).
2. What is the main postulate of the VSEPR theory ?  
What is the limitation of the VSEPR theory ? Explain the structure of the  $\text{I}_3^-$ ,  $\text{XeO}_4$  and  $\text{SF}_6$  molecules.
3. Give the any three method for Determining the Binary formation/stability constants.
4. Attempt any *two* of the following :
  - (a) What is the Nitrogen compounds ?
  - (b) What is the transition metal carbene complexes ?
  - (c) Phosphorus-Sulfur compounds.
5. Explain the wades rule. Discuss the structure of the Closo, Nido, hypo, arachno and borane.

### Section-B

(Short Answer Type Questions)  $4 \times 8 = 32$

**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.

**A-057/MSCCH-501 ( 2 )**

1. What are phosphonitrilic compounds ? Discuss the synthesis of cyclophosphazenes.
2. What is the Effective atomic number (EAN) rule ? Calculate the EAN of the :  
 $\text{Cr}(\text{CO})_6$ ,  $\text{Fe}(\text{CO})_5$ ,  $\text{W}(\text{CO})_6$ ,  $\text{Ru}(\text{CO})_5$ ,  $\text{Mn}_2(\text{CO})_{10}$
3. What is the Bent Rule ? Give the limitation of the bent rule.
4. What factors are necessary for  $\beta$ -elimination and what factors can reduce the possibility of  $\beta$ -elimination in metal alkyls ?
5. What is the  $d_{\pi}-p_{\pi}$  bond ? explain the  $d_{\pi}-p_{\pi}$  with the suitable example.
6. What are polyoxometallates ? Write short note on isopoly and heteropolyoxometallates.
7. Identify the shapes of the molecules  $\text{ClF}_3$ ,  $\text{PCl}_3$ ,  $\text{XeF}_2$  and  $\text{SF}_4$  by using the concepts of the VSEPR theory.

8. Attempt any *two* of the following :
- (a) What is the nitrosyl compounds ?
  - (b) Insertion reactions
  - (c) Stepwise formation constant

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