**A–0404**

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# MSCCH-501

## M.SC. (CHEMISTRY) (MSCCH)

**(Inorganic Chemistry-I)**

Examination, June 2025

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.

1. What is the Valence Shell Electron Pair Repulsion (VSEPR) theory ? Write about the shape of $NH_3$, $H_2O$ and $SF_4$ molecules with the help of VSEPR theory.

2. Give any three methods for Determining the Binary formation/stability constants.

3. Give any three methods of preparation for the Iron(0) pentaearbonyl ($Fe(CO)_5$). Also, discuss the structure and bonding in $(Fe)CO)_5$).

4. What are metal clusters ? Explain the structure of $[Re_2X_8]^{2-}$ ion- .

5. Attempts the following :

   (a) Discuss the synthesis, structure, and reactions of Grignard reagents

   (b) What are the STYX number

## Section–B

**Short Answer Type Questions** 4×8=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.

1. What is organocopper compounds ? Give any two uses of organocopper compounds in organic synthesis.

2. Explain stepwise and overall formation in complex formation with examples.

3. What is the atomic inversion ? Discuss the atomic inversion by taking nitrogen and phosphorus as examples.

4. Explain the organolithium compound. Draw MO diagram of the $CH_3Li$.

5. Discuss the oxidative addition reaction. Explain the oxidative addition reaction in an appropriate example.

6. What is the Bent Rule ? Give the limitation of the bent rule.

7. Attempt any two of the following :

   (a) Ziese salt

   (b) Reductive elimination

   (c) Ferrocene

8. Explain vibrational spectra of the metal carbonyls.

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