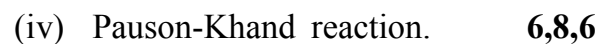
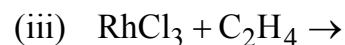
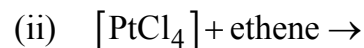
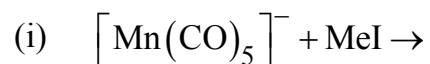


- (c) Complete the following reactions by giving proper structure of the products formed :



4. (a) Compare the properties of Cp and Cp* ligands in metallocenes.
- (b) Explain the bonding and structure features of metal alkene complexes.
- (c) Explain any *two* important reactions each related to nucleophilic and electrophilic attack on ligands. **5,10,5**

Unit III

5. (a) What are Metal-carbenes ? Write any *two* types of reactions that are catalyzed by Fischer and Schrock Carbenes.

No. of Printed Pages : 06

Roll No.

DD-291

M. Sc. EXAMINATION, May 2018

(Fourth Semester)

(Main & Re-appear)

(CHEMISTRY)

CH602B

INORGANIC SPECIAL-IV

(Organometallic Chemistry)

Time : 3 Hours]

[Maximum Marks : 100

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Explain the following in brief :
 - (i) Eighteen electron rule
 - (ii) EAN
 - (iii) 16 electron rule
 - (iv) synergistic effect. **10**
- (b) Compute the oxidation number of metal, VEC and also the species that obey 18 electron rule among the following :
 - (i) $\text{MN}(\text{NO})_3(\text{CO})$
 - (ii) $\left[\text{Fe}(\eta^6\text{-C}_6\text{H}_6)(\eta^5\text{-C}_5\text{H}_5)\right]^+$
 - (iii) Cp_2ZrCl_2
 - (iv) $\text{Ti}(\eta^5\text{-Cp})_2\text{Cl}_2$. **10**
2. (a) What is meant by term “hapticity”. Explain with suitable examples.
- (b) First row transition metal M forms a homoleptic complex “A” with the empirical formula $\text{M}(\text{CO})_5$. A reacts with Na/Hg in THF solvent to give

compound B whose empirical formula is $\text{C}_5\text{O}_5\text{MNa}$. Treatment of B with MeI followed by excess of CO at high pressure resulted in a compound C with the empirical formula $\text{C}_7\text{H}_3\text{O}_6\text{M}$. Unlike A and B, compound C had in its IR spectra an extra band in the range of $1600\text{-}1700\text{ cm}^{-1}$. Define the metal M and write the structures of A, B and C. Compound A on reaction with I_2 followed by reaction with NaCp loses a colourless gas and gives a stable OM compound D with the empirical formula $\text{C}_8\text{H}_5\text{O}_3\text{M}$. Suggest the structure of A, B, C and D with their proper bonding. **8,12**

Unit II

3. (a) Give any *three* examples of preparation and electrophilic aromatic substitution reaction of ferrocene.
- (b) Draw the molecular orbital level diagram of metallocene.

8. (a) Explain the following :

- (i) Agostic interactions
- (ii) Anagostic interactions
- (iii) Oxidative addition
- (iv) Reductive elimination.

(b) Give the catalytic cycle of alkene hydrogenation using Wilkinsons catalyst.

10,10

(b) Explain the following :

- (i) Why α -hydrogen is acidic in Fischer carbene ?
- (ii) Bond order of Fischer and Schrock carbene.

12,8

6. (a) What are fluxional compounds ? Discuss the fluxional behavior of $\text{Fe}(\text{CO})_5$ at room temperature and below room temperature.

(b) Write down the preparation and various reactions shown by metal carbynes.

10,10

Unit IV

7. (a) What is Ziegler-Natta Catalyst ? Explain its mechanism of polymerization and various steps involved inside it.

(b) Why intramolecular reactions are often referred to as migratory insertion. Also explain what is the role of Lewis acid in alkyl carbonyl migratory insertion reaction.

10,10