

Exam. Code : 210402

Subject Code : 4246

M.Sc. Chemistry 2<sup>nd</sup> Semester

## ORGANOMETALLIC CHEMISTRY

## Course—VIII

Time Allowed—Three Hours] [Maximum Marks—50

**Note** :— Attempt any **FIVE** questions, selecting at least **ONE** question from each Section. The **fifth** question may be attempted from any Section. Each question carries **10** marks.

## SECTION—A

1. (a) Draw and discuss the structure of  $(\text{MeLi})_4$ . 2
- (b) Give two methods for preparation of organolithium compounds. Also discuss two applications of these compounds. 4
- (c) Briefly discuss chemical behaviour of organolithium compounds. 4
2. (a) What products would be formed when  $(\text{Me}_3\text{Al})_2$  react with (i)  $\text{Me}_3$ , (ii)  $\text{Me}_2\text{NH}$ , (iii)  $\text{MeNH}_2$  and (iv)  $t\text{-BuCN}$  ? 4
- (b) Write short notes on :
  - (i) Organoberyllium compounds
  - (ii) Application of Grignard reagents in organic synthesis. 6

## SECTION—B

3. (a) Describe various reactions of ferrocene which establish its aromatic character. 3
- (b) Give one method to prepare cyclobutadiene transition metal complexes. Also discuss nature of bonding in these complexes. 4
- (c) Write brief notes on Ziegler-Natta Polymerisation of ethylene. 3
4. (a) Give one method to prepare organocopper compounds. Also discuss their applications in organic synthesis. 3
- (b) Draw catalytic cycle for water gas shift reaction. 2
- (c) How will you prepare ferrocene using cyclopentadiene? Discuss the nature of metal-ligand bonding in ferrocene in terms of molecular orbital theory. 5

## SECTION—C

5. (a) Write a brief note on modified aldol condensation. 2
- (b) The coordinated amino acid ester hydrolysis is many times faster than the uncoordinated amino acid ester. Explain by giving suitable example. 3
- (c) Explain the reactions of coordinated ligands where template effect is operative. 5

6. (a) Discuss in detail the role of metal in hydrolysis of peptides. 5
- (b) What do you understand by template effect ? Describe coordinate and thermodynamic template effect with one example each. 5

### SECTION—D

7. (a) Suggest two methods to prepare dinitrogen-metal complexes. What is the nature of bonding in linear M-N-N group ? Also compare the bonding of M-N-N with M-C-O group. 5
- (b) Give three methods for the preparation of metal carbonyls. Also discuss the nature of bonding involved in linear M-CO group in metal carbonyls. 5
8. (a) Write a brief note on dioxygen containing complexes. 2
- (b) How will you prepare  $\text{Fe}(\text{CO})_5$  ? Write the possible products obtained when  $\text{Fe}(\text{CO})_5$  reacts with :
- (i)  $\text{OH}^-$ ,
  - (ii)  $\text{C}_5\text{H}_6$ , and
  - (iii)  $\text{PPh}_3$ . 4
- (c) What are  $\pi$ -acceptor ligands ? Discuss in detail the nature of bonding involved in metal carbonyls. 4