

**Exam. Code : 210402**

**Subject Code : 4947**

**M.Sc. Chemistry 2<sup>nd</sup> Semester**  
**ORGANOMETALLIC CHEMISTRY**  
**Course—VIII**

Time Allowed—2 Hours] [Maximum Marks—50

**Note** :— There are *eight* questions of equal marks.  
Candidates are required to attempt any  
*four* questions.

1. (a) Write a short note on carbolithiation reactions.  
(b) Draw and briefly discuss the structures of  $(\text{LiCH}_3)_4$   
and  $(\text{C}_5\text{H}_5)_2\text{Be}$ .  
(c) Give one method to prepare triethylaluminium.  
What products do you expect when  
triethylaluminium react with
  - (i)  $\text{C}_2\text{Ph}_2$
  - (ii)  $\text{C}_2\text{H}_5\text{OH}$  ?
2. (a) State EAN rule. Calculate the EAN value for  
each of the following :
  - (i)  $[\text{H}_2\text{Cr}(\text{CO})_5]$
  - (ii)  $[\text{Fe}(\pi\text{-C}_5\text{H}_5)_2]$
  - (iii)  $[(\pi\text{-C}_5\text{H}_5)\text{Fe}(\text{CO})_3]$
  - (iv)  $[(\text{CH}_3)\text{Mn}(\text{CO})_5]$ .  
(b) Give two methods to prepare metal olefin  
complexes. Explain the metal-olefin bonding in  
terms of molecular orbital theory.

3. (a) How will you prepare cyclobutadiene transition metal complexes ? Also discuss nature of metal-ligand bonding in these complexes.
- (b) Suggest one method to prepare bis(benzene) chromium complexes. Also discuss the nature of bonding between benzene and chromium.
4. (a) Discuss the hydrolysis of coordinated :  
 (i) Amino acid ester and  
 (ii) Amide using suitable examples.
- (b) Write short notes on :  
 (i) Macrocyclic ligands  
 (ii) Modified aldol condensation.
5. (a) Draw the catalytic cycle involved in hydrosilation of ethylene. Also give description of what is happening at each step.
- (b) Describe in detail the olefin oxidation catalyzed by ethylene chloro complexes of palladium.
6. Draw and discuss catalytic loops for the following reactions :  
 (i) Monsanto acetic acid process  
 (ii) Oxo reaction.
7. (a)  $N_2$  and CO are isoelectronic but M- $N_2$  complexes are much weaker than M-CO complexes. Offer a reasonable justification.
- (b) Give two methods to prepare metal carbonyls. Also discuss the nature of bonding involved in linear M-CO group in metal carbonyls. How does infrared spectroscopy help in characterization of metal carbonyls ?
8. (a) Write brief notes on :  
 (i) Dioxygen containing complexes  
 (ii) Dinitrogen containing complexes.
- (b) How will you prepare  $Fe(CO)_5$  ? Write the possible products obtained when  $Fe(CO)_5$  reacts with :  
 (i)  $OH^-$   
 (ii)  $C_5H_6$   
 (iii)  $PPh_3$