

**G-3/359/22**

Roll No. ....

**III Semester Examination, January 2022**

**M.Sc.**

**CHEMISTRY**

Paper I

(Organo-transition Metal Chemistry)

Time : 3 Hours ]

[ Max. Marks : 80

**Note :** *All questions are compulsory. Question Paper comprises of 3 Sections. Section A is objective type/multiple choice questions with no internal choice. Section B is short answer type with internal choice. Section C is long answer type with internal choice.*

**SECTION A**

**1×8=8**

**(Objective Type/Multiple Choice Questions)**

*Choose the correct answer :*

1. Which of the following compound is not consider as organometallic compound ?  
(a) Ferrocene                      (b) Cisplatin  
(c) Zeise's salt                    (d) Grignard reagent
2. If the complex  $[W(C_p)_2(CO)_2]$  follows 18 electron rule, what is hapticity of  $C_p$  ?  
(a) 5 and 5                          (b) 3 and 5  
(c) 3 and 3                          (d) 1 and 5

P.T.O.

3. For Metal Olefin complex (i)  $[\text{PtCl}_3(\text{C}_2\text{F}_4)]^-$  and  $[\text{PtCl}_3(\text{C}_2\text{H}_4)]^-$ , which of the following is the correct statement ?

- (a) Carbon-carbon bond length is same in (i) and (ii)
- (b) Bond length is smaller in (i) than (ii)
- (c) Bond length (ii) is smaller
- (d) A metallocycle is formed in each complex

4. How many M-M bonds are present in  $[\text{CpMo}(\text{CO})_3]_2$  ?

- (a) 1
- (b) 2
- (c) 0
- (d) 4

5. Is ferrocene paramagnetic or diamagnetic ?  
IUPAC name of ferrocene.

6. Structure of allyl group.

7. Ziegler Natta chemical name.

8. Is  $\text{SiF}_4$  fluxional ? One line answer.

#### SECTION B

4×6=24

(Short Answer Type Questions)

Note : Answer the following questions in 250 words.

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#### Unit-I

1. Why transition metal alkyls are unstable than aryls ? How can you increase the stability of metal alkyl compounds ?

Or

What does CuLi do in organic chemistry ? How many types of reactions are given by organocopper reagents ?

#### Unit-II

2. What is the difference between denticity and hapticity ? What is the most common hapticity of allyl group in metal allyl complex ? Explain with example.

Or

How is ferrocene prepared ? How many Pi bonds are there in ferrocene ?

#### Unit-III

3. Discuss the role of triethylealuminium in polymerisation of ethene. How it leads to stereospecific polymers ?

Or

What is the catalytic species used in wacker process ? How is it generated ?

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**Unit-IV**

4. What is ring Whizzing ? Explain with example.

*Or*

Fluxionality in dienyl complexes.

**SECTION C**

4×12=48

**(Long Answer Type Questions)**

**Note :** Answer the following questions in **500** words.

**Unit-I**

1. What are singlet and triplet carbenes ? Discuss their stability and geometry.

*Or*

Write down the preparative methods and synthetic application of organocopper compounds.

**Unit-II**

2. Explain structure and bonding of ferrocene.

*Or*

Explain structure and bonding of Zeise's salt.

**Unit-III**

3. Discuss the mechanism of hydrogenation of propene catalysed by Wilkinson's catalyst.

*Or*

Which one is better catalyst for hydroformylation  $\text{CO}_2(\text{CO})_8$  or  $\text{RhH}(\text{CO})(\text{PPh}_3)_2$  and why ? Explain in detail.

**Unit-IV**

4. Discuss the structure and bonding in dihydrogen complex.

*Or*

Discuss the fluxionality in  $\text{Fe}(\text{CO})_5$ ,  $\eta^3$ -allyl complex and cyclopentadienyl complexes.

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