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## B04-402(A)

Fourth Semester Online Examination, May-June, 2022

M. Sc. CHEMISTRY

Paper - IV (Elective - A)

### ORGANOTRANSITION METAL CHEMISTRY

Time : Three Hours ] [ Maximum Marks : 80

*Note : (i) Part A and B of each question in each Unit consist of very short answer type questions which are to be answered in one or two sentences.*

*(ii) Part C (Short answer type) (Word limit 200-250) and Part D (Long answer type) of each question should be answered within the word limit (400-450 words) mentioned.*

#### UNIT-I

1. (A) What is dual character of ligation of allyl group ? 2
- (B) What is fluxional behaviour of compounds ? 2
- (C) Explain Michael addition reaction mechanism in organo copper compound. 4

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Or

Explain stability and  $\beta$ -elimination pathway for decomposition of transition metal alkyls.

- (D) Discuss the structure and nature of bonding of transition metal alkyls and aryls. 12

Or

How MMR Spectroscopy technique can be used to study fluxional behaviour of organometallic compounds.

#### UNIT-II

2. (A) Write the chemical reaction of Schrock carbene complexes react with carbonyl compounds. 2
- (B) Write the example of Fischer and Schrock carbene complexes. 2
- (C) What are Carbenes ? Distinguish between singlet and Triplet carbenes. 4

Or

What is agostic C-H bond ? Why egostic interaction is not observed in Fischer-carbene complexes ?

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**B04-402 (A)**

- (D) What are transition metal carbyne complexes ?  
Explain Fischer and Shrock carbyne complexes.

12

**Or**

Distinguish between Fischer and Schrock carbene complexes. Write down the method of preparation, structure and bonding of Schrock carbene complexes.

**UNIT-III**

3. (A) In how many ways the cyclopentadienyl group can be attached to the metal atom ? 2
- (B) What are  $\eta^4$  diene complexes ? Give one example. 2
- (C) Describe the preparation, structure and bonding in ferrocene. 4

**Or**

Distinguish between  $\eta^6\text{-C}_6\text{H}_6$  and  $\eta^6\text{C}_7\text{H}_8$  complexes.

- (D) Discuss the following : 12
- (i) Dicarboxylic derivative
- (ii) Amine derivative
- (iii) Diacetyl derivative
- (iv) Podo derivative

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**B04-402 (A)****Or**

Discuss the following :

- (i) Structure and bonding of zeise's salt
- (ii) Cycloheptatriene complexes.

**UNIT-IV**

4. (A) Write the formula of Wilkinson's catalyst. 2
- (B) Write two homoleptic polyhydrido anions. 2
- (C) What is C-H activation ? Discuss some methods for C-H activation. 4

**Or**

Write the methods of preparation of transition metal hydrides.

- (D) Write notes on the following : 12
- (a) Ziegler-Natta polymerisation of olefins.
- (b) Fischer-Tropsch synthesis.

**Or**

Explain the mechanism of hydrogenation of propene cetchysed by (a) Wilkinson's catalyst (b)  $\text{RhH}(\text{Co})(\text{pph}_3)_3$ .

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