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Name.....

Reg. No.....

FOURTH SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, APRIL 2023

(CBCSS)

Chemistry

CHE 4E 08—ORGANOMETALLIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours

Maximum: 30 Weightage

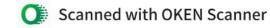
Section A

Answer any **eight** questions. Each questions carries a weightage of 1.

- 1. Give the structure of $CO_2(CO)_8$ and $Ru_3(CO)_{12}$.
- 2. Find out the hapticity of cyclo octa tetraene (COT) complexes which obeys 18 electron rule:
 - (a) Cr(CO)₃(COT); and
 - (b) Ru(CO)₃(COT).
- 3. What is Colman's reagent? Give its structure and use.
- 4. How is enanatioselective synthesis carried out using metal complexes? Give an example.
- 5. Give the nucleophilic addition reactions of an η^4 diene complex.
- 6. Write down the reaction of metal vapor synthesis for $\eta^6\, arene$ complexes.
- When PPh₃ is added to a solution of Wilkinson's catalyst reduces the rate of hydrogenation of propylene. Explain the observation in terms of the mechanism of the catalysis involved.
- 8. What are the disadvantages of hydroformylation of alkenes when carried out by Cobalt catalyst?
- 9. Write down the applications of poly(ferrocenylsilane)s.
- 10. Give an example for $S\dot{N}^2$ organometallic reaction.

 $(8 \times 1 = 8 \text{ weightage})$

Turn over



Section B

Answer any six questions.

Each question carries a weightage of 2.

- Distinguish between Fischer and Schrock type carbene complexes with examples.
- Discuss the application of NMR spectroscopy in the study of fluxional organometallics.
- 13. Exemplify:
 - Insertion reactions; and (a)
 - Isomerization of alkenes.
- 14. Discuss the application of organo copper in organic synthesis.
- η^5 C_5H_5 ligand is susceptible both to nucleophilic and electrophilic attack. Justify.
- 16. Write down the mechanism for the catalytic hydroformylation of $\mathrm{CH_3CH} = \mathrm{CH_2}$.
- Differentiate oxidative coupling and reductive doupling in organometallic reactions.
- 18. Discuss the Hydrosilation of alkenes.

 $(6 \times 2 = 12 \text{ weight})$

Section C

Answer any two questions.

Each question carries a weightage of 5.

- 19. Organometallic compounds are well known catalysts. Justify the statement by use of (a) Wacker Process; and

 - (b) Ziegler-Natta catalysis.
- Discuss the nature of bonding and structure of metal carbonyls. How does IR spectroscopy help
- 21. Explain the bonding and structure of Ferrocene in terms of molecular orbital treatment. (a) Organometallic dendrimers;

 - (b) Polygermanes; and
 - (c) Polystannanes.