D3ACH1902 **(2 Pages)** **Name.....**
Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2020
CHEMISTRY
FCHE3C10 - ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

Time: Three Hours **Maximum Weightage: 30**

Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.

1. Based on 18- electron rule determine the value of 'n' in the following complexes.

   (i) $Ir\ Br_2(CO)_n(PPh_3)_2(CH_3)$ (ii) $Rh\ (\eta^5 - C_5H_5)(CO)_n$

2. $V(CO)_6$ readily react with Na to give $Na[V(CO)_6]$. Why?
3. Give the preparation and draw the structure of Zeise's salt.
4. Explain stereochemical non-rigidity with one example.
5. Distinguish between oxidative addition and reductive elimination using suitable examples.
6. What is Collman's reagent? Give its importance in organic synthesis.
7. Calculate the number of metal-metal bonds in the following complexes which obey 18-electron rule.
   (i) $(CO)_2Rh(\mu\text{-}Cl)_2Rh(CO)_2$ (ii) $Ir_4(CO)_{12}$
8. What are zintl ions? Give examples.
9. Free heme is oxidized but haemoglobin is not oxidized by dioxygen. Why?
10. What are ionophores? Give examples.
11. Give the structural features and functions of carboxy peptidase.
12. What are iron-sulphur proteins? Draw the structure of any one of ferredoxins.

(8 × 1 = 8 weightage)

Section B: Short Essay Question. Answer any *four* questions. Each carries *three* weightage.

13. Write a note on dinitrogen and dihydrogen complexes.
14. Discuss the synthesis, structure and bonding in alkyne complexes.
15. Elaborate the mechanistic aspects of olefine hydrogenation by Wilkinson catalyst.
16. Write a note on chevrel phases.

(P.T.O.)

17. Discuss the mechanism of sodium- potassium pump.
18. Explain the bonding in metal carbonyls.
19. Give the structural features of the active site of cytochrome P-450. How it transfers an O-atom?

(4 × 3 = 12 weightage)

Section C: Essay questions. Answer any *two* questions. Each carries *five* weightage.

20. Discuss the synthesis, structure, bonding and properties ferrocene.
21. (a) How is Ziegler-Natta catalyst useful in stereospecific polymerization?

    (b) Briefly explain isolobal relationship with suitable examples.
22. Discuss the structure, functions and mechanism of dioxygen binding of Haemoglobin and Myoglobin.
23. (a) Give an account of biological nitrogen fixation.

    (b) Discuss the structural features and biochemical importance of vitamin B_{12}.

(2 × 5 = 10 weightage)