D 150266 **(Pages : 2)** **Name.....**

Reg. No.....

THIRD SEMESTER M.Sc. [REGULAR/SUPPLEMENTARY] DEGREE EXAMINATION, NOVEMBER 2026

(CBCSS)

Chemistry

CHE 3C 10—ORGANOMETALLIC AND BIO-INORGANIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Part A

Answer any **eight** *questions.*

Each question carries a weightage of 1.

1. What is meant by hapticity of ligands ? What hapticities are possible for 1, 3-butadiene with a metal ion ?
2. Among the following metal carbonyls, which can be easily reduced ? Substantiate your answer.

   $Ni(CO)_4$, $Fe(CO)_5$, $V(CO)_6$, $Mn_2(CO)_{10}$.
3. Explain the reductive carbonylation reaction with an example.
4. How is Zeise's salt prepared ? Draw it's structure.
5. Bring out the effect of increase of the CO and H_2 pressure on hydroformylation reaction.
6. What are the factors that favour the formation of metal clusters ?
7. Comment on the magnetic properties of haemoglobin and oxyhaemoglobin.
8. Identify the co-ordination sites in α-alanine.
9. Differentiate between metalloenzymes and metal activated enzymes with examples.
10. Explain the function of peroxidase.

(8 × 1 = 8 weightage)

Turn over

Part B

Answer any **six** *questions.*

Each question carries a weightage of 2.

11. State and explain 18-electron rule as applied to organometallic compounds, with suitable examples.

12. Discuss the structure and bonding in metal dinitrogen complexes.

13. Write briefly on fluxional organometallics.

14. What is Fischer-Tropsch synthesis ? Explain.

15. Discuss the structure and bonding in $[Re_2Cl_8]^{-2}$.

16. Explain the role of calcium in blood clotting.

17. Discuss the structure and functions of SOD.

18. Explain the role of Mn in photosynthetic process.

(6 × 2 = 12 weightage)

Part C

Answer any **two** *questions.*

Each question carries a weightage of 5.

19. (a) Give a brief account of the classification of organometallic compounds.

    (b) How is trimethylaluminium (III) prepared ? Draw its structure.

20. (a) Discuss the synthesis, structure and reactivity of ferrocene.

    (b) Write a note on Chavrel phases.

(4 + 1 = 5 weightage)

21. Draw the catalytic cycle and explain the mechanism of the reactions involved in Wackers process. Explain the role of a co-catalyst in this process.

22. (a) Describe the function of $Na^+ – K^+$ pump in biological system.

    (b) Write briefly on the structure and functions of Cytochrome P_{450}.

(3 + 2 = 5 weightage)

(2 × 5 = 10 weightage)