QP Code: P25C012

Reg. No : ....
Name : ....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

III SEMESTER (CBCSS-PG) DEGREE EXAMINATIONS, OCTOBER 2025
M. Sc. Chemistry
CHE3C10 : ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY
2024 Admission Onwards

Time: 3 Hours **Maximum Weightage: 30**

Section A

Answer **any eight** questions. Weightage **1** for each question. **(8x1 = 8 Weightage)**

1. Demonstrate the classification of organometallic compounds based on the nature of metal-carbon bonding with examples.
2. Demonstrate the structure and bonding of metal carbenes.
3. Interpret linear and bent bonding modes of nitrosyl transition metal complexes.
4. What are fluxional organometallics?
5. Describe the hapticities possible for benzene and sketch the interactions.
6. Analyse reductive elimination in the organometallic reaction mechanism.
7. Define radical mechanisms in the context of organometallic chemistry.
8. Differentiate between bulk and trace metal ions in biological systems. Provide examples and explain their physiological functions.
9. Compare the function of oxidase and superoxide dismutase.
10. Argue that nitrogenase is sensitive to oxygen. Explain its structure and function.

Section B

Answer **any six** questions. Weightage **2** for each question. **(6x2 = 12 Weightage)**

11. Discuss the bonding and structure of ferrocene.
12. How is Ziese's salt synthesized? Give an account of the structure and bonding of this compound.
13. Review the synthesis and reactions of 1,3-butadiene organometallic compounds.
14. Describe the mechanism and significance of Ziegler-Natta polymerization.

Turn Over

15. What are the nucleophilic and electrophilic attacks on a coordinated ligand in an organometallic complex? Explain the mechanisms

16. Explain the Na^+/K^+ pump and its mechanism.

17. Prepare a detailed note on peroxidase enzymes. How do they differ from catalase in terms of structure and function?

18. What are coenzymes? Discuss the structure and function of Vitamin B_{12}.

Section C

Answer **any two** questions. Weightage **5** for each question. **(2x5 = 10 Weightage)**

19. Give an account of the synthesis, structure, bonding, and any two reactions of metal carbonyls.

20. Analyze the reaction mechanism and catalytic cycle of the Wacker process, and evaluate its advantages over alternative oxidation methods.

21. Interpret the following mechanisms in organometallic complexes: (a) Insertions involving alkenes (b) SO_2 insertions.

22. Analyse the structure and function of hemoglobin and myoglobin. Compare their roles in oxygen transport and storage.

****