

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2024
(Regular/Improvement/Supplementary)
CHEMISTRY
FCHE3C10 - ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

Time: 3 Hours**Maximum Weightage: 30****Section A: Short answer questions. Answer any *eight* questions. Each carries *one* weightage.**

1. Which is more reactive: Fisher Carbene or Schrock Carbene? Substantiate your answer.
2. Explain the role of cocatalyst in Wacker process.
3. What do you mean by 'Red drop' in Photosynthesis?
4. Simple heme units cannot act as oxygen carriers. Why?
5. What hapticities are possible for 1,3-butadiene with a transition metal atom? Sketch the interactions.
6. Hemocyanin is colourless, but its oxy form is coloured. Why?
7. What is superoxide dismutase? Explain its structure and function.
8. Draw the structures of:

a) $\text{Fe}_3(\text{CO})_{12}$ b) $\text{Mn}_2(\text{Co})_{10}$
9. Explain the bonding mode of acetylene to metal atom.
10. Differentiate between active and passive transport across cell membrane.
11. What is Aurofin? What is its use?
12. Comment on the basicity of ferrocene and aniline.

(8 × 1 = 8 weightage)**Section B: Short essay question. Answer any *four* questions. Each carries *three* weightage.**

13. Discuss briefly the structure and bonding in metal carbonyls.
14. Describe the catalytic process and mechanism of reaction involved in Monsanto acetic acid process.
15. Briefly explain the mode of transport and storage of iron in living systems.
16. Write a note on fullerene complexes.
17. Discuss Chevrel compounds? Give their method of preparation and structure. Discuss their important application.
18. Describe the structure and functions of myoglobin.
19. Give the method of preparation of cyclobutadiene complex and discuss the bonding. Cyclobutadiene is more stable in complex form than in free ligand, why?

(4 × 3 = 12 weightage)
(P.T.O.)

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

20. a) Explain the mechanisms of oxidative addition and reductive elimination reactions of organometallic compounds.
- b) Explain the mechanism of polymerisation of ethylene in presence of Zeigler- Natta Catalyst.
21. a) Discuss the structure and bonding in metal nitrosyls.
- b) How are linear and bent metal nitrosyls distinguished by spectroscopic technique?
22. a) What are isolobal fragments? Explain with an example.
- b) Discuss the structure and bonding in $[\text{Re}_2\text{Cl}_8]^{2-}$.
23. What is biological nitrogen fixation? Explain the structure and functions of M-Cluster and P-Cluster nitrogenase in nitrogen fixation. Mention the role of metal dinitrogen complexes in nitrogen fixation.

(2 × 5 = 10 weightage)