24P311 (Pages: 2) Name: .....

Reg.No: .....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2025

(CBCSS - PG)

(Regular/Supplementary/Improvement)

CC19PCHE3C10 - ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

(Chemistry)

(2019 Admission onwards)

Time : 3 Hours Maximum : 30 Weightage

Section A

Answer any ***eight*** questions. Each question carries 1 weightage.

1. Calculate the electron count for (a) $[Ni(CO)_4$ and (b) $[Mn(CO)_5]$ using 18-electron rule in the neutral atom method.
2. Explain Fischer carbenes.
3. Draw the structure of $[Re_2X_8]^{2-}$. Mention the different types of bonds in it.
4. Find the number of cluster electrons involved in the following clusters.
   (a) $[Ru_6(CO)_{17}C]$ (b) $Os_6(CO)_{18}$ (c) $Os_5(CO)_{16}$ (d) $Fe_5(CO)_{15}C$
5. Name four examples of homogeneous catalysts. Suggest the reactions in which each of them is used.
6. Suggest two catalysts for olefin metathesis.
7. Classify the following metal ions as trace or bulk: Fe, Cu, Zn, Na, K, Mg, Ca, Co, Cr, Ni, and V.
8. Write a note on hemerythrin.
9. What are the functions of peroxidase?
10. What are tyrosinase?
11. What are metalloenzymes? Give one example.
12. What are fluxional organomettalic componds?

(8 × 1 = 8 Weightage)

Section B

Answer any ***four*** questions. Each question carries 3 weightage.

13. Write a note on nitrosyl complexes.
14. Discuss the structure and bonding in Zeise's salt.
15. Comment on the isolobal analogy of metal cluster.

16. Write a note on oxidative addition reaction.

17. Draw and explain catalytic cycle for the formation of ethanoic (acetic) acid with a rhodium-based catalyst.

18. Explain the role of transferrin and ferritin.

19. Discuss the structures of haemoglobin and myoglobin.

(4 × 3 = 12 Weightage)

Section C

Answer any ***two*** questions. Each question carries 5 weightage.

20. Discuss the synthesis and reactions of metal carbonyls.

21. How is Ferrocene synthesized? Describe its reactions.

22. Discuss the following: (a) Ion transport across membranes (b) Structural role of calcium.

23. Discuss the structure and functions of superoxide dismutase.

(2 × 5 = 10 Weightage)

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