D 111108 **(Pages : 2)** **Name.....**

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2024

(CBCSS)

Chemistry

CHE 3C 10—ORGANOMETALLIC AND BIO-INORGANIC CHEMISTRY

(2019 Admission onwards)

Time : Three Hours Maximum : 30 Weightage

Section A

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

1. Give the structure of $Mn_2(CO)_{10}$ and $Fe_3(CO)_{12}$.
2. Show that $(\eta 5 - C_5H_5)_2$ Fe obey 18 electron rule
3. How does fluxionality differ from tautomerism ?
4. Write down any one methods of preparation for η^4 butadiene complex.
5. Metal-Metal bonds are formed when metal atom is in low oxidation state. Why ?
6. Give a short note on Chevrel phases.
7. Illustrate isolobal concept with a suitable example.
8. Draw the oxy- and de-oxy form of oxygen transfer protein hemocyanin.
9. Explain the role of proximal histidine and distal histidine in controlling the Oxygen binding properties of hemoglobin.
10. Write down the balanced equation for biological nitrogen fixation.

(8 × 1 = 8 weightage)

Turn over

Section B

Answer any **six** *questions.*
Each question carries a weightage of 2.

11. Distinguish between Fischer and Schrock type carbene complexes with examples.

12. Give a brief note on Fullerene complexes.

13. Exemplify (a) Oxidative addition ; and (b) Reductive elimination in organometallic reactions.

14. Determine the number of metal -metal bonds in (i) $\left[Co_4(CO)_{12}\right]$; and (ii) $Fe_2(CO)_9$.

15. Calculate the number of skeleton electron pairs of $\left[Os_8(CO)_{22}\right]^{2-}$ and $\left[Fe(CO)_{12}\right]^{2-}$.

16. Give short notes on Zintl anions and cations.

17. Draw the active site structures of catalase and peroxidase and mention the functions of each enzyme.

18. Distinguish Ferritin and Transferrin in their structure and activities.

(6 × 2 = 12 weightage)

Section C

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

19. Organometallic compounds are well known catalysts. Justify the statement by use of their applications with respect to

    (a) Hydroformylation ; and

    (b) Monsanto acetic acid process.

20. (a) Explain the bonding involved in metal carbonyls.

    (b) Give a note on metal nitrosyl complexes.

21. (a) What is cytochrome P-450 ? Why is it called so ? Write down the reactions catalyzed by cytochrome P 450.

    (b) Explain photosystem II.

22. (a) Discuss the significance and mechanism of Sodium/Potassium pump.

    (b) Differentiate the structure and functions of haemoglobin and myoglobin.

(2 × 5 = 10 weightage)