20P311 (Pages: 2) Name……..

Reg. No…….…….

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2021

(CBCSS-PG)

(Regular/Supplementary/Improvement)

CC19P CHE3 C10 - ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

(Chemistry)

(2019 Admission onwards)

Time: Three Hours Maximum: 30 Weightage

Section A

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

1. What hapticities are possible for 1,3-butadiene with a transition metal? Sketch the interactions.
2. Explain the bonding mode of acetylene to a metal ion.
3. What is Collman's reagent? Give one example for its synthetic application.
4. Using Wade-Mingo's-Lauher rule comment on the structure of $[Re_4(CO)_{12}]^{2-}$.
5. Explain olefin metathesis reaction with a suitable example.
6. Discuss the effects of CO and H_2 pressure on hydroformylation reaction.
7. Palladium does not readily form stable carbonyl clusters; why?
8. How does dioxygen binding affect the spin state of iron in haemoglobin?
9. Haemocyanin is colourless; but in the oxy form it is coloured; why?
10. Explain the structure and functions of peroxidase.

(8 × 1 = 8 Weightage)

Section B

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

11. Discuss the structure and bonding in metal carbonyls.
12. Comment on the selectivity of Na^+-K^+ pump in transporting the Na^+ and K^+ ions. How do vanadate ion interfere with the activity of Na^+-K^+ pump?
13. How can you distinguish linear and bent metal nitrosyl using spectroscopy?
14. Briefly explain the isolobal analogue with suitable example.
15. If both haemoglobin and myoglobin bind oxygen reversibly, then why their bonding curves are qualitatively different?
16. Discuss the catalytic cycle for the hydroformylation reaction.
17. Describe the structure and functions of 'siderophores'.
18. Write a note on classification of carbenes and outline their synthesis.

(6 × 2 = 12 Weightage)

Section C

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

19. (a) Discuss the mechanism of oxidative addition and reductive elimination reactions of organometallic compounds with suitable examples.

    (b) Draw the catalytic cycle involved in Wacker process and explain the reactions involved.

20. (a) Give an account of the synthesis and structure of carbene and carbyne complexes.

    (b) Write a note on fullerene complexes.

21. Discuss the structural features of Hemerythrin and Hemocyanin. How does oxygen uptake occur in these systems?

22. What is biological nitrogen fixation? Explain the role of M-cluster and P-cluster of nitrogenases in nitrogen fixation.

(2 × 5 = 10 Weightage)

****