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Name.....

Reg. No.....

# THIRD SEMESTER M.Sc. DEGREE (REGULAR/SUPPLEMENTARY) EXAMINATION, NOVEMBER 2022

(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 weight of* 1.

1. What is transmetallation ? How this reaction is useful for the synthesis of organometallic compounds ?
2. What hapticities are possible for benzene ? Sketch the interactions.
3. Do you find any change in Fe-C bond length during the oxidation of $FeCp_2$ to $[FeCp_2]^+$. Give reasons.
4. Account for the changes that occur to C=C bond, when it gets co-ordinated to Pt(II) in Zeise's salt.
5. Bring out the effect of increasing the CO and $H_2$ pressure on hydroformylation reaction.
6. What are 'naked clusters' ? Give two examples.
7. Describe the factors that favour the formation of metal-metal bond.
8. Bring out the role of calcium in blood clotting process.
9. Describe the structure and functions of peroxidase.
10. Which one gets saturated with oxygen at a faster rate ; hemoglobin or myoglobin ? Give reasons.

(8 × 1 = 8 weightage)

### Section B

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

11. Give an account of the classification of organometallic compounds.
12. What are fluxional organometallics ? How $^1H$ NMR spectroscopy is useful in the structural study of such compounds ?

**Turn over**

13. Write a note on water gas shift reaction.

14. 'Isolobal concept provides a bridge between organic and inorganic chemistry'. Comment on this statement.

15. Describe the role of ferritin and transferrin in iron metabolism in human body.

16. How do you justify nature's selection of Zn(II) in the activities of nucleic acid ?

17. Explain the role of managnese in photosynthetic process.

18. Explain how 'CO insertion' occurs into $[MeMn(CO)_5]$ ? Give experimental evidences to support your answer.

(6 × 2 = 12 weightage)

## Section C

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

19. Distinguish between carbene and carbyne organometallics. Give an account of the synthesis, structure and reactivity of Fischer and Schrock carbenes.

20. Describe the catalytic cycle and the reactions involved in Wacker process. Explain the role of the co-catalyst in this process.

21. Discuss the physiology and functions of myoglobin and hemoglobin. Explain the mechanism to account for the co-operativity of four heme groups in hemoglobin.

22. Write briefly on :

    a) Superoxide dismutase.

    b) Hemerythrin.

    c) Structure and bonding in $[Re_2Cl_8]^{2-}$.

(2 × 5 = 10 weightage)