D 6819 (Pages : 2) Name.....

Reg. No.....

THIRD SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2016

(CUCSS)

Chemistry

CH 3C 10—ORGANOMETALLIC AND BIOINORGANIC CHEMISTRY

(2015 Admissions)

Time : Three Hours Maximum : 36 Weightage

Section A

Answer **all** *questions.*

Each question carries weightage of 1.

1. What do you mean by hapticity of ligands ? Explain.
2. State and explain 18-electron rule as applied to organometallics.
3. Draw the structure of :
   (a) $Fe_3(CO)_{12}$.
   (b) $Mn_2(CO)_{10}$.
4. Which is more basic ; ferrocene or aniline ? Substantiate your answer.
5. Explain carbonylation reaction with an example.
6. Explain olefin metathesis reaction.
7. What are naked clusters ? Write examples.
8. Calculate the number of metal-metal bonds in :
   (a) $Os_6(CO)_{18}$.
   (b) $[Os_5(CO)_{15}]^{2-}$.

   (Atomic number of Os = 76).
9. Selection of water as the biological medium is a unique choice ; justify.
10. Which one gets saturated with oxygen at a faster rate ; haemoglobin or myoglobin ? Why ?
11. What is the necessity of entatic state in metalloenzymes ?
12. Differentiate between metallo enzymes and metal activated enzymes, citing examples.

(12 × 1 = 12 weightage)

Turn over

Section B

Answer any **eight** *questions.*
Each question carries weightage of 2.

13. Write a note on metal carbine complexes.

14. Comment on the stability of $Mo(CO)_7$ and $V(CO)_6$.

15. How is Zeise's salt synthesised ? What are the changes that occur in olefinic bond length on forming Zeise's salt ?

16. Cyclobutadiene is unstable whereas $[C_4H_4Fe(CO)_3]$ is stable. Account for this observation.

17. Draw the catalytic cyclic for hydroformylation reaction involving rhodium complex as catalyst.

18. Why Ziegler-Natta polymerization is called stereoregular polymerization ?

19. Distinguish between metal-metal bonded complexes and polynuclear complexes giving suitable examples.

20. Show that 86 is the right number of cluster valence electrons required for the stability of an octahedral carbonyl cluster.

21. How are ionophores classified in terms of the mechanism of ion transport. How do you distinguish them ?

22. Describe the structure and functions of siderophores.

23. Explain the structure and functions of superoxide dismutase.

24. Discuss the role of manganese in photosynthetic process.

(8 × 2 = 16 weightage)

Section C

Answer any **two** *questions.*
Each question carries weightage of 4.

25. (a) Discuss the structure and bonding in metal nitrosyls.

    (b) How are linear and bent metal nitrosyls distinguished by spectroscopic technique ?

26. (a) How ferrocene is synthesised ? Discuss its structure and reactivity,

    (b) Discuss the role of a co-catalyst in Wacker process ?

27. (a) Explain 'isolobal concept' with suitable examples.

    (b) Discuss the co-operative interaction and Bohr effect during the oxygenation of haemoglobin.

28. (a) Describe the structure and functions of ferritin and transferrin in iron metabolism.

    (b) Write a note on anticancer drugs.

(2 × 4 = 8 weightage)