QP CODE: 24018293

24018293

Reg No : .....

Name : .....

M Sc DEGREE (CSS) EXAMINATION, APRIL 2024

Fourth Semester

M Sc CHEMISTRY

Elective - CH800401 - ADVANCED INORGANIC CHEMISTRY

2019 ADMISSION ONWARDS

853A7EBE

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Determine the IR and Raman active vibrations using character tables in tetrahedral complexes.
2. How many signals are possible in the ESR spectrum of vanadyl ion? Draw the spectrum.
3. Describe intra ligand excited states in metal complexes.
4. How are iron oxide nanomaterials synthesized by the bottom up approach?
5. What are the different types of nanoshells?
6. What are ceramics ?
7. What type of hydrogen storage materials are generally used in alkaline batteries? Explain.
8. The selective usage of organic linkers result in the formation of metal organic frameworks with tunable surface area. Justify the above statement by selecting MOF-5 and MOF-177 as examples.
9. Distinguish between elecrochemical synthesis and sonochemical synthesis of metal organic frameworks.
10. Briefly explain organometallic crystal engineering.

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Discuss the hybridisation for σ bonding in tetrahedral complexes.

12. How is the spin multiplicity of terms determined using method of descending symmetry? Explain with a suitable example.

13. With suitable examples, explain the use of IR spectroscopy in the structural determination of metal carbonyls.

14. Explain the water photolysis reaction with mechanism.

15. What are the advantages of nano particles in medical imaging and cancer therapy ?

16. Write a short note on low temperature techniques and direct combination methods used in the design of inorganic materials.

17. Explain the role of metal organic frameworks in the separation and purification of gases.

18. What are the strategies adopted for the synthesis of inorganic supermolecules and coordination polymers?

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Discuss the molecular orbital treatment of eclipsed ferrocene by constructing the SALCs and depicting the MO diagram.

20. How does Mossbauer spectroscopy help in the understanding the different Fe complexes?

21. Disuss about the terms a) Chemical actinometry b) photochemistry of metal-metal multiple bonds and c) Application of dissociative photochemistry

22. Elaborate on : (i) Atomic Force Microscopy (ii) Scanning Electron Microscopy

(2×5=10 weightage)