

QP CODE: 23004201



Reg No : .....

Name : .....

**M Sc DEGREE (CSS) EXAMINATION, JUNE 2023**

**Fourth Semester**

**M Sc CHEMISTRY**

**Elective - CH800401 - ADVANCED INORGANIC CHEMISTRY**

2019 ADMISSION ONWARDS

8026B330

Time: 3 Hours

Weightage: 30

**Part A (Short Answer Questions)**

*Answer any **eight** questions.*

*Weight **1** each.*

1. Draw the energy diagram for the P and F terms in octahedral and tetrahedral fields for a  $d^7$  configuration.
2. What happens to the Carbonyl stretching frequency in acetyl acetone in IR spectrum on complexation with metal ion? Interpret the observation.
3. Give an account of any one photochemical reaction of Ruthenium complexes.
4. Write any one method for the synthesis of platinum nanoparticles.
5. How are nano biosensors superior to natural biosensors?
6. Body heat powered wrist watches are available in market. Based on which phenomenon these watches works? Explain.
7. What are polymer modified ceramics? Give examples.
8. Discuss about Lewis acid frameworks.
9. Discuss about covalent post-synthetic modification of MOFs
10. Discuss about the supramolecular self assembly caused by ionic interactions in amides.

(8×1=8 weightage)

**Part B (Short Essay/Problems)**

*Answer any **six** questions.*

*Weight **2** each.*

11. Pictorially depict the interaction of the LGOs ( $p\pi$  orbitals) of the Cp rings with the symmetry matching valence orbitals of Fe in staggered ferrocene.



12. Discuss the symmetry species of the various vibrational modes of  $ML_4$  complex in a square planar geometry and tetrahedral geometry.
13. Using Mossbauer spectroscopy, explain the influence of ligands in Iron complexes.
14. Discuss the dissociative photochemistry with an example.
15. Explain UV and XRD analysis of nanoparticles and their significance.
16. Discuss about combinatorial synthesis which is a synthetic strategy for inorganic material design.
17. Discuss how MOFs can be used for hydrogen storage application.
18. Explain the features of any two inorganic supermolecules.

(6×2=12 weightage)

### Part C (Essay Type Questions)

Answer any **two** questions.

Weight **5** each.

19. Explain the hybridization scheme for  $\pi$ -bonding in square planar  $ML_4$  complexes.
20. What is Electron paramagnetic resonance spectroscopy? Elaborate with reference to EPR spectrum of  $d^1$  and  $d^9$  transition metal ions.
21. Discuss about a) Metal complex sensitizers and b) Semiconductor supported metal oxide systems in inorganic photochemistry.
22. What are biosensors? How do they function? How does nanotechnology support designing the biosensors?

(2×5=10 weightage)

