QP CODE: 25024587

25024587

Reg No : .....

Name : .....

M.Sc DEGREE (CSS) EXAMINATION, APRIL 2025

Fourth Semester

M Sc CHEMISTRY

ELECTIVE - CH800401 - ADVANCED INORGANIC CHEMISTRY

2019 ADMISSION ONWARDS

50585CC8

Time: 3 Hours

Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. What is non-crossing rule? Explain.
2. Distinguish between nitro and nitrito complexes using IR spectroscopy.
3. Give a brief account of metal sensitisers.
4. Differentiate between the top-down and the bottom-up approaches for the synthesis of nanomaterials.
5. Explain the importance of nanoparticles in bio-imaging applications.
6. Explain the concept of superplasticity and fracture observed in ceramic materials.
7. What is the chemical in the organic film that forms on the windshield of a new car? What is responsible for the "new car smell"?
8. Discuss about Lewis acid frameworks.
9. What is post-synthetic modification of metal organic frameworks?
10. What are super–adamantoid cages?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. How do the d orbitals split under the influence of different crystal field - tetrahedral, octahedral and square planar? Depict each case with a diagram.
12. Discuss the symmetry species of the various vibrational modes of ML_4 complex in a square planar geometry and tetrahedral geometry.
13. What are g values? Explain the factors affecting the g values in transition metal complexes.

14. Explain the photochemistry of of Cr(III) complexes.

15. Explain UV and Raman analysis of nanoparicles. Give their significance.

16. Explain direct combination in synthetic strategies.

17. Discuss how MOFs can be used for hydrogen storage application.

18. Give an account of Diamondoid networks.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Construct the molecular orbital energy level diagram of $[Co(NH_3)_6]^{3+}$ by formulating appropriate LGOs.

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

21. Describe a) the role of manganese-based photosystems for the conversion of water into oxygen
    b) Photochromism

22. What are nano shells? Write their characterization and applications.

(2×5=10 weightage)