

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, APRIL 2024

(Regular/Improvement/Supplementary)

CHEMISTRY

FCHE2C06: CO-ORDINATION CHEMISTRY

Time: 3 Hours

Maximum Weightage: 30

Section A: Short answer questions. Answer any *eight* questions. Each carries 1 weightage.

1. Give any two methods of determining stability constants of complexes.
2. What is template effect? Give one example.
3. List out the defects of valence bond theory.
4. Which of the two, $[\text{CoCl}_4]^{2-}$ and $[\text{CoI}_4]^{2-}$, is expected to have higher Δ_t and why?
5. Calculate the ground term symbol of Mn in $[\text{Mn}(\text{H}_2\text{O})_6]^{2+}$.
6. Though the ion CrO_4^{2-} is a d^0 system, it is coloured. How can this be rationalized?
7. Explain briefly the significance of Doppler effect in Mossbauer spectroscopy.
8. How will you distinguish *cis* and *trans* isomers of $[\text{Pt}(\text{Cl})(\text{Br})(\text{PR}_3)_2]$ using ^{31}P NMR spectroscopy.
9. Differentiate between labile and inert complexes.
10. What is cis effect?
11. The electron transfers from $[\text{Fe}(\text{CN})_6]^{4-}$ to $[\text{Fe}(\text{CN})_6]^{3-}$ is very rapid. Why?
12. Explain anti-ferromagnetism with suitable examples.

(8 × 1 = 8 weightage)

Section B: Short essay questions. Answer any *four* questions. Each carries 3 weightage.

13. Explain the application of Mossbauer spectroscopy in iron complexes.
14. Explain macrocyclic effect with suitable examples.
15. Discuss the crystal field splitting of d-orbitals in square planar complexes.
16. Briefly discuss the orbital contributions to magnetic moment and its quenching.
17. Discuss in detail the selection rules for electronic transitions in complexes.
18. Write a note on photo-substitution reactions in complexes.
19. Discuss the important theories of trans effect.

(4 × 3 = 12 weightage)

(P.T.O.)

Section C: Essay questions. Answer any *two* questions. Each carries 5 weightage.

20. Discuss in detail the dissociative, associative and interchange mechanisms in complexes.
21. Write notes on:
 - a) The determination of binary formation constant by P^H-metry.
 - b) Jahn Teller effect.
22. Elaborate on the applications of ESR Spectroscopy to copper complexes.
23. Describe:
 - a) Molecular orbital diagram of octahedral complexes with π -bonding.
 - b) Outer sphere mechanism in electron transfer reactions.

(2 × 5 = 10 weightage)