

M.Sc. DEGREE (CSS) EXAMINATION, AUGUST 2014

Second Semester

Faculty of Science

Branch : Chemistry

AN 2C 05/AP 2C 05/CH 2C 05/PH 2C 05/POH 2C 05 – CO-ORDINATION CHEMISTRY

(2012 Admission onwards)

Time : Three Hours

Maximum Weight : 30

Section A*Answer any ten questions.**Each question carries a weight of 1.*

1. What is chelate effect?
2. Give any two evidences for covalency in metal-ligand bonds.
3. What is LFSE?
4. What are Racah parameters?
5. Cite any two demerits of Orgel diagrams.
6. What is Curie-Weiss law?
7. Complexes of Pt (II) have been attractive for rate studies? Elucidate the reasons.
8. How are metal ions classified based on the rate of exchange of co-ordinated water in the case of octahedral substitution?
9. Explain Marcus theory in electron transfer reactions.
10. How ORD is useful in determining the absolute configuration of metal complexes?
11. What is linkage isomerism? Give one example.
12. What are the consequences of Lanthanide contraction?
13. What are actinides? Why are they so called?

(10 × 1 = 10)

Section B*Answer any five questions.**Each question carries a weight of 2.*

14. Explain the factors affecting the stability of complexes.
15. Explain what is meant by nephelauxetic effect. How does this effect explain the contribution of covalent bonding in metal-ligand bonds?

Turn over

16. Write note on charge-transfer spectra.
17. Distinguish between Orgel diagram and Tanabe-Sugano diagram.
18. Explain Taube mechanism with suitable example.
19. Explain in what way the acid-hydrolysis of $[\text{Co}(\text{en})_2 \text{Cl} (\text{OH})]^+$ complex differs from that of $\text{Fe}(\text{OH})_3$ complex.
20. Explain an asymmetric synthesis catalysed by co-ordination compounds.
21. Write notes on Lanthanides complexes as shift reagents.

(5 × 2 = 10)

Section C

Answer any **two** questions.

Each question carries a weight of 5.

22. Discuss the structure of the following complexes on the basis of crystal field theory :
 - (a) $[\text{Co} (\text{NH}_3)_6]^{3+}$.
 - (b) $[\text{Co F}_6]^{3-}$.
 - (c) $[\text{Fe} (\text{H}_2\text{O})_6]^{2+}$.
23. (a) State and explain the selection rules for electronic spectra of transition metal complexes.
(b) Discuss the electronic spectra of $[\text{Ni} (\text{H}_2\text{O})_6]^{2+}$.
24. Discuss the outer sphere and inner sphere mechanism of electron transfer reactions.
25. (a) What is meant by CD? How is it used for the determination of absolute configuration of complexes?
(b) Explain the factors that mitigate against the formation of lanthanide complexes.

(2 × 5 = 10)