2022

Time - 3 hours

Full Marks - 60

*Answer **all groups** as per instructions.*
Figures in the right hand margin indicate marks.
Candidates are required to answer
in their own words as far as practicable.

GROUP – A

1. Answer all questions and fill in blanks as required. [1 × 8

(a) Write the IUPAC name of $[CON_3(NH_3)_5]SO_4$.

(b) Which complexes do not show optical isomerism ?

(c) Which transition element has maximum oxidation state ?

(d) Ni^{4+} compounds are _____ stable than Pt^{4+} compounds.

(e) Write a complex in which cobalt has –1 oxidation state.

(f) V^{4+} compounds (d^1 configuration) have _____ colour.

(g) White the electronic configuration of Gd (Gadolinium).

(h) Intake of excessive iron causes _____.

GROUP – B

2. Answer any eight of the following questions within two to three sentences each. [1½ × 8

(a) What is crystal field stabilization energy (CFSE) ?

(b) Which type of compounds show geometrical as well as optical isomerism ?

(c) Why Cu^{2+} ions are more stable than Cu^{+} ions in their aqueous solutions ?

(d) What is the unit of magnetic moment and what is its expression ?

(e) Why Ti^{IV} compounds are colourless ?

(f) Write a reaction in which $TiCl_4$ acts as an oxidant.

(g) Write the synthesis of Turnbull's blue.

(h) What are actinides ?

(i) Why Eu exhibits +2 oxidation state but La does not ?

(j) What is cooperativity effect ?

GROUP – C

3. Answer any eight of the following questions within 75 words each. [2 × 8

(a) Why tetrahedral complexes are generally high spin complexes ?

(b) What is Chelate effect ? Give one example.

(c) How emf values determine the stability of various oxidation states ?

(d) Why first row transition metal compounds have unusual magnetic moment ?

(e) What is the unique feature of Vanadium chemistry ?

(f) Write the structure of CrO_5. How is it made stable ?

(g) What is Reinecke's salt ? Write the coordination number of its central atom.

(h) What is Lanthanide contraction ?

(i) Is Ce^{4+} paramagnetic or diamagnetic ? Explain.

(j) Write a brief note on heme.

GROUP – D

*Answer **any four** questions within 500 words each.*

4. Write the postulates of Werner's coordination theory. Give its drawbacks. [6

5. What are labile and inert complexes ? Explain them with suitable examples. [6

6. Describe the magnetic properties of elements of second and third transition series. [6

7. What are frost diagrams ? Describe the various steps to construct frost diagram from Latimer diagrams. [6

8. Describe the chemistry of $Fe^{(III)}$ complexes. [6

9. Describe the chemistry of CO(II) and CO(III) complexes. [6

10. Describe the chemistry of various oxidation states of lanthanides. [6

11. Describe the functions of haemoglobin in transport of oxygen. [6