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G. VENKATASWAMY NAIDU COLLEGE (AUTONOMOUS), KOVILPATTI – 628 502.



UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2025.

(For those admitted in June 2023 and later)

PROGRAMME AND BRANCH: B.Sc., CHEMISTRY

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
V	PART - III	CORE - 6	U23CH506	INORGANIC CHEMISTRY-I

Date & Session: 06.11.2025/FN

Time : 3 hours

Maximum: 75 Marks

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer <u>ALL</u> Questions.
CO1	K1	1.	Which of the following is the correct IUPAC name of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$? a) Hexaammine cobalt(III) chloride b) Cobalt(III) hexaammine chloride c) Hexaamminecobalt trichloride d) Cobalt trichloride hexaammine
CO1	K2	2.	Geometrical isomerism is possible in which of the following complexes? a) $[\text{Co}(\text{NH}_3)_6]^{3+}$ b) $[\text{CrCl}_6]^{3-}$ c) $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ d) $[\text{Ni}(\text{CO})_4]$
CO2	K1	3.	The complex $[\text{Ti}(\text{H}_2\text{O})_6]^{3+}$ appears violet due to -----. a) Charge transfer spectrum b) d–d transition within t_{2g} and e_g orbitals c) $d_1 \rightarrow d_1$ transition d) Ligand-to-metal charge transfer
CO2	K2	4.	Which among the following gives the correct order of ligands in the spectrochemical series? a) $\text{I}^- < \text{Br}^- < \text{Cl}^- < \text{H}_2\text{O} < \text{CN}^-$ b) $\text{H}_2\text{O} < \text{I}^- < \text{Br}^- < \text{Cl}^- < \text{CN}^-$ c) $\text{CN}^- < \text{H}_2\text{O} < \text{Cl}^- < \text{Br}^- < \text{I}^-$ d) $\text{CN}^- < \text{H}_2\text{O} < \text{I}^- < \text{Br}^- < \text{Cl}^-$
CO3	K1	5.	The geometry of $\text{Fe}(\text{CO})_5$ is -----. a) Octahedral b) Tetrahedral c) Square planar d) Trigonal bipyramidal
CO3	K2	6.	The colour of ferrocene is -----. a) Yellow b) Red c) Orange d) Blue
CO4	K1	7.	The general electronic configuration of f-block elements is -----. a) $(n-1)d^{1-10}ns^2$ b) ns^2np^{1-6} c) $(n-1)d^{1-5}ns^2$ d) $(n-2)f^{1-14}(n-1)d^{0-1}ns^2$
CO4	K2	8.	The most common oxidation state of lanthanoids is -----. a) +2 b) +3 c) +4 d) +5
CO5	K1	9.	The repeating unit of silicones is -----. a) $-\text{Si}-\text{C}-$ b) $-\text{Si}-\text{Si}-$ c) $-\text{Si}-\text{O}-$ d) $-\text{C}-\text{C}-$
CO5	K2	10.	Borazine has the formula of the following is -----. a) BN b) $\text{B}_3\text{N}_3\text{H}_6$ c) $\text{B}_4\text{N}_4\text{H}_8$ d) B_2H_6
Course Outcome	Bloom's K-level	Q. No.	SECTION – B (5 X 5 = 25 Marks) Answer <u>ALL</u> Questions choosing either (a) or (b)
CO1	K3	11a.	Write the IUPAC names of the following complexes. (i) $[\text{Co}(\text{NH}_3)_5\text{Cl}]\text{Cl}_2$ (ii) $[\text{Cr}(\text{en})_3]\text{Cl}_3$ (iii) $[\text{Cu}(\text{NH}_3)_4]\text{SO}_4$
CO1	K3	11b.	(OR) Draw the possible geometrical isomers of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]^+$ and explain.

CO2	K3	12a.	Using Werner's Coordination Theory, how does explain the structures of $[\text{CoCl}_3 \cdot 6\text{NH}_3]$, $[\text{CoCl}_3 \cdot 5\text{NH}_3]$ and $[\text{CoCl}_3 \cdot 4\text{NH}_3]$? (OR)
CO2	K3	12b.	Discuss the factors influencing the magnitude of crystal field splitting.
CO3	K4	13a.	Classify the metal carbonyls with suitable examples. (OR)
CO3	K4	13b.	Examine the aromaticity of ferrocene.
CO4	K4	14a.	Infer Lanthanoids contraction. (OR)
CO4	K4	14b.	Compare and Contrast of lanthanoids and actinoids.
CO5	K5	15a.	Compile the industrial applications of inorganic polymers. (OR)
CO5	K5	15b.	Give the preparation and properties of polydimethylsiloxane.

Course Outcome	Bloom's K-level	Q. No.	SECTION – C (5 X 8 = 40 Marks) Answer <u>ALL</u> Questions choosing either (a) or (b)
CO1	K3	16a.	Using Crystal Field Theory, deduce the geometry and magnetic property of $[\text{Fe}(\text{CN})_6]^{4-}$ (OR)
CO1	K3	16b.	How will you estimate the hardness of water using EDTA method?
CO2	K4	17a.	Calculate the CFSE of the following complexes: i) $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ ii) $[\text{NiCl}_4]^{2-}$ (OR)
CO2	K4	17b.	Compare VBT from CFT.
CO3	K4	18a.	i) Applying 18e ⁻ rule to check which of the following complexes obey that rule? (a) $[\text{Mn}(\text{CO})_5]$ (b) $[\text{Co}(\eta^5\text{-C}_5\text{H}_5)_2]$ (c) $[\text{Cr}(\eta^5\text{C}_5\text{H}_5)_2]$ ii) Calculate the EAN value for each of the following species: (a) $\text{Cr}(\text{C}_2\text{H}_5)(\text{CO})_3$ (b) $\text{Fe}(\pi\text{-C}_5\text{H}_5)(\text{CO})_3$ (OR)
CO3	K4	18b.	Using EAN rule for $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{Co}(\text{NH}_3)_6]^{3+}$ and $[\text{Ni}(\text{CO})_4]$ and predict the stability of coordination compounds.
CO4	K5	19a.	Evaluate the advantages and disadvantages of different extraction methods of thorium and uranium from their ores. (OR)
CO4	K5	19b.	Analyse the industrial importance of thorium dioxide and uranyl acetate, highlighting both their applications and hazards.
CO5	K5	20a.	Examine the preparation of phosphorous based polymer: i) polyphosphazenes and ii) polyphosphonitrilic chloride. (OR)
CO5	K5	20b.	Discuss the general properties and classification of inorganic polymers.