Reg. No. | | | | | | | | |

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

UG DEGREE END SEMESTER EXAMINATIONS - APRIL 2025.

(For those admitted in June 2021 and later)

PROGRAMME AND BRANCH: B.Sc., CHEMISTRY

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
IV	PART – III	CORE	U21CH406	INORGANIC CHEMISTRY III

Date & Session: 26.04.2025/AN **Time: 3 hours** **Maximum: 75 Marks**

Course Outcome	Bloom's K-level	Q. No.	SECTION – A (10 X 1 = 10 Marks) Answer ALL Questions.
CO1	K1	1.	Which of the following ligands is an example of a bidentate ligand? a) Cl^- b) NH_3 c) Ethylenediamine d) CN^-
CO1	K2	2.	According to Valence Bond (VB) Theory, a square planar complex generally results from _____ hybridization. a) sp^3 b) dsp^2 c) sp^2d d) d^2sp^3
CO2	K1	3.	Which of the following factors affects the magnitude of crystal field splitting in a coordination complex? a) The nature of the ligand b) oxidation state of the central metal ion c) geometry of the complex d) All of the above
CO2	K2	4.	The spectrochemical series is a ranking of ligands based on their ability to---- a) Form coordination bonds b) Donate electron density to the metal center c) Induce crystal field splitting d) Increase the oxidation state of the metal
CO3	K1	5.	The trans effect in square planar complexes is best explained by _____. a) Steric hindrance theory b) Electrostatic theory c) π-bonding and polarization effects d) HSAB theory
CO3	K2	6.	Which of the following factors determines whether a complex is labile or inert? a) size of the metal ion b) oxidation state c) ype of ligands attached to the metal d) Both b and c
CO4	K1	7.	The 18-electron rule is used to predict _____. a) stability of organometallic compounds b) oxidation state of a metal c) solubility of metal complexes d) color of coordination complexes
CO4	K2	8.	Which of the following metals is used in the Wilkinson's catalyst for alkene hydrogenation? a) Nickel b) Cobalt c) Rhodium d) Iron
CO5	K1	9.	According to Adamson's rules, photo substitution reactions in Cr(III) complexes generally involve _____. a) Ligand addition b) Bond breaking in the excited state c) Electron transfer without bond breakage d) Direct oxidation of Cr(III)
CO5	K2	10.	What is the primary mechanism involved in photochemical conversion of solar energy? a) Thermal conduction b) Electron excitation c) Nuclear fusion d) Mechanical movement

Course Outcome	Bloom's K-level	Q. No.	**SECTION – B (5 X 5 = 25 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	11a.	Explain the classification of ligands based on their denticity with examples. What is an ambidentate ligand? Give examples. **(OR)**
CO1	K3	11b.	Explain the application of Valence Bond Theory (VBT) in predicting the geometry and magnetic properties of tetrahedral complexes.
CO2	K3	12a.	Enumerate the crystal field stabilization energy and their uses. **(OR)**
CO2	K3	12b.	Summarize on magnetic properties of transition metal complexes.
CO3	K4	13a.	Explain the concept of labile and inert complexes with suitable examples. **(OR)**
CO3	K4	13b.	Describe anation reactions occurring in octahedral complexes.
CO4	K4	14a.	Explain the Effective Atomic Number (EAN) rule and the 18-electron rule. How do these rules predict the stability of organometallic compounds? **(OR)**
CO4	K4	14b.	Illustrate the catalytic role of Wilkinson's catalyst in alkene hydrogenation. What are its advantages and limitations?
CO5	K5	15a.	Discuss the working principles of semiconductor-based photovoltaic cells. **(OR)**
CO5	K5	15b.	Describe the photo-isomerization process in Pt(II) complexes.

Course Outcome	Bloom's K-level	Q. No.	**SECTION – C (5 X 8 = 40 Marks)** **Answer ALL Questions choosing either (a) or (b)**
CO1	K3	16a.	What is structural and stereoisomerism in coordination compounds? Explain different types of isomerism with suitable examples. **(OR)**
CO1	K3	16b.	Describe the nomenclature rules for coordination complexes as per IUPAC conventions, with examples of mononuclear and dinuclear complexes.
CO2	K4	17a.	Describe the Crystal Field Theory and explain how the d-orbitals split in octahedral coordination complexes. **(OR)**
CO2	K4	17b.	Analyze the applications of effective atomic number rule.
CO3	K4	18a.	Explain the trans effect. Discuss the mechanism of substitution reactions in square planar complexes. **(OR)**
CO3	K4	18b.	Derive the mechanism for outer-sphere electron transfer reactions.
CO4	K5	19a.	Explain the working mechanism of the Ziegler-Natta catalyst in the polymerization of olefins. **(OR)**
CO4	K5	19b.	Formulate the preparation of organometallic compounds of magnesium zinc, lithium and Copper.
CO5	K5	20a.	Explain the mechanism of photolytic cleavage of water into hydrogen and oxygen. **(OR)**
CO5	K5	20b.	Illustrate bimolecular quenching. Discuss the different mechanisms of energy transfer in metal complexes. Give their applications.