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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
IV	PART-III	CORE-4	U23CH404	GENERAL CHEMISTRY-IV

Date & Session: 05.11.2025/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 an intensive property? a) mass b) volume c) temperature d) total energy
CO1	K2	2.	In a cyclic process, the change in internal energy (ΔE) is a) positive b) negative c) zero d) undefined
CO2	K1	3.	A limitation of the First Law of Thermodynamics is that it cannot predict a) energy conversion b) direction of spontaneous reaction c) heat exchange d) work done
CO2	K2	4.	Entropy change for mixing two ideal gases is a) positive b) negative c) zero d) undefined
CO3	K1	5.	Among the following, which element exhibits the highest number of oxidation states? a) Scandium b) Manganese c) Zinc d) Titanium
CO3	K2	6.	The color of transition metal complexes is due to a) nuclear spin b) d-d electronic transition c) nuclear charge d) ionization energy
CO4	K1	7.	Epoxides are also called a) aldehydes b) ketones c) oxiranes d) alcohols
CO4	K2	8.	Benzoin condensation involves which catalyst? a) base b) acid c) cyanide ion d) peroxide
CO5	K1	9.	Which of the following increases the acidic strength of benzoic acid? a) electron donating group b) electron withdrawing group c) alkyl group d) none
CO5	K2	10.	Bouveault-Blanc reduction reduces esters to a) alcohols b) acids c) ketones d) aldehydes

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.	Differentiate between state functions and path functions with suitable examples.
CO1	K3	11b.	(OR) Describe how pressure affects the enthalpy of reactions.
CO2	K3	12a.	Explain the working of a Carnot engine with a neat labelled diagram.
CO2	K3	12b.	(OR) Define Gibbs free energy (G) and Helmholtz free energy (A).
CO3	K4	13a.	Analyze the reasons for variable oxidation states in transition elements.
CO3	K4	13b.	(OR) Discuss the cause of colour in transition metal ions.
CO4	K4	14a.	Differentiate between symmetrical and unsymmetrical ethers using structure and reactivity.
CO4	K4	14b.	(OR) Differentiate between Clemmensen and Wolff-Kishner reductions.
CO5	K5	15a.	Discuss the mechanism of Hunsdiecker reaction
CO5	K5	15b.	(OR) Evaluate the importance of keto-enol tautomerism.

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.	State the first law of thermodynamics and explain its significance in physical and chemical processes.
CO1	K3	16b.	(OR) Explain the effect of temperature on the enthalpy of reaction using Kirchhoff's equation.
CO2	K4	17a.	Explain the significance of Maxwell's relations in thermodynamics.
CO2	K4	17b.	(OR) Interpret an Ellingham diagram to predict the feasibility of a reduction reaction.
CO3	K4	18a.	Compare the magnetic behavior of first-row vs third-row transition elements.
CO3	K4	18b.	(OR) Discuss the lanthanide contraction and its impact on the properties of 2nd and 3rd transition series.
CO4	K5	19a.	Evaluate the stability and synthetic usefulness of cyclic ethers (epoxides) compared to open-chain ethers.
CO4	K5	19b.	(OR) Discuss the mechanism of the following base-catalyzed reactions involving aldehydes and ketones: i) Aldol condensation ii) Cannizzaro reaction
CO5	K5	20a.	Discuss the preparation of hydroxy acids from aldehydic and ketonic acids.
CO5	K5	20b.	(OR) Evaluate the influence of electron-donating and electron-withdrawing substituents on the acidic strength of aromatic carboxylic acids.