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UG DEGREE END SEMESTER EXAMINATIONS - NOVEMBER 2025.

(For those admitted in June 2021 and later)

PROGRAMME AND BRANCH: B.Sc., CHEMISTRY

SEM	CATEGORY	COMPONENT	COURSE CODE	COURSE TITLE
V	PART-III	CORE	U21CH510	PHYSICAL CHEMISTRY-III

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.	The rate constant for a first order reaction is _____. a) $k = 2.303/t \log a/x$ b) $k = 2.303 \log a/(a-x)$ c) $k = 2.303/t \log a/(a-x)$ d) $k = 2.303/t \log (a-x)/a$
CO1	K2	2.	The collision theory is satisfactory for _____. a) unimolecular reaction b) bimolecular reaction c) termolecular reaction d) any order reaction
CO2	K1	3.	The polar molecule among the following is _____. a) CO ₂ b) CS ₂ c) SO ₂ d) diphenyl
CO2	K2	4.	Antiferromagnetism is related to _____. a) absolute temperature b) Neel temperature c) Curie temperature d) critical temperature
CO3	K1	5.	In solution, which is a weak electrolyte _____. a) HCl b) CH ₃ COONa c) CH ₃ COOH d) NaCl
CO3	K2	6.	If S mol lit ⁻¹ is the solubility of Mg(OH) ₂ then its solubility product is _____. a) S ² b) S ³ c) 4S ³ d) 3S
CO4	K1	7.	In the reaction $Zn + Cu^{2+} \rightarrow Cu + Zn^{2+}$ a) Zn gets oxidised and Cu gets reduced b) Zn and Cu ²⁺ both are oxidised c) Zn is oxidised and Cu ²⁺ is reduced d) Cu is oxidised and Zn is reduced
CO4	K2	8.	For determination of pH of a solution, calomel electrode is coupled with _____. a) Cu-electrode b) Pt-electrode c) glass electrode d) Ag-electrode
CO5	K1	9.	Anodic oxidation of carboxylic acid to give dimeric product is called _____. a) Grignard reaction b) Wittig reaction c) Kolbe reaction d) Michael reaction
CO5	K2	10.	The ships in sea are protected from corrosion by _____. a) anodic protection method b) cathodic protection method c) deaeration method d) anodic inhibitor method

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.	What is residual entropy? Give an example. (OR)
CO1	K3	11b.	Explain the concept of partial molar free energy.
CO2	K3	12a.	Using the Arrhenius equation, determine the activation energy from rate constant data at two different temperatures. (OR)
CO2	K3	12b.	Calculate the rate constant for a first-order reaction.
CO3	K4	13a.	Differentiate between adsorption and absorption. (OR)
CO3	K4	13b.	Explain the principle behind BET theory and how it is applied experimentally to measure the surface area of porous solids.
CO4	K4	14a.	Compare the Arrhenius, Brønsted-Lowry, and Lewis concepts of acids and bases with suitable examples. (OR)
CO4	K4	14b.	Differentiate between acidic and basic buffers.
CO5	K5	15a.	Critically evaluate the design and usage of the Weston standard cell. (OR)
CO5	K5	15b.	Compare and analyze the working of concentration cells with and without transference.

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.	Derive the Clausius-Clapeyron equation from the Clapeyron equation (OR)
CO1	K3	16b.	Define activity and activity coefficient. How do they help in correcting deviations from ideality in solutions?
CO2	K4	17a.	Compare and contrast zero, first, second, and third-order reactions based on their: Rate law and Half-life. (OR)
CO2	K4	17b.	Critically evaluate the Lindemann theory of unimolecular reactions and its improvement over classical collision theory.
CO3	K4	18a.	Derive the Michaelis-Menten equation for enzyme kinetics, explaining the steady-state approximation. (OR)
CO3	K4	18b.	Compare acid-base catalysis, enzyme catalysis, and phase-transfer catalysis in terms of their mechanisms and reaction conditions.
CO4	K5	19a.	Explain how the working range of an acid-base indicator is related to its pKa value. (OR)
CO4	K5	19b.	Interpret the role of common ion effect in reducing the solubility of sparingly soluble salts.
CO5	K5	20a.	Compare and evaluate the reliability of hydrogen, quinhydrone, and glass electrodes for pH measurement in acidic, neutral, and basic solutions. (OR)
CO5	K5	20b.	Interpret the titration curves obtained using potentiometric methods and how does the shape of the curve helps in identifying the equivalence point accurately?