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	U21CH407	PHYSICAL CHEMISTRY –II

Date & Session: 28.04.2025/FN **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 is not a state function among the following? a) Pressure b) energy c) Temperature d) Work
CO1	K2	2.	Free expansion represents expansion of a gas in _____. a) Zero external pressure b) Vacuum c) Both 'a' and 'b' d) ice cold condition
CO2	K1	3.	The liquid that deviates from the Trouton's rule is _____. a) HCl b) H_2SO_4 c) H_3PO_4 d) CH_3COOH
CO2	K2	4.	Find out whether the following reaction is spontaneous or not at 127 degrees centigrade? $N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$; ΔH = 92.22 kJ/mol and ΔS = -198.75 J/K-mol. a) spontaneous b) not spontaneous c) may be spontaneous d) cannot predict
CO3	K1	5.	Le Chatelier Principle is applicable to _____. a) heterogeneous reaction b) homogeneous reaction c) irreversible reaction d) system in equilibrium
CO3	K2	6.	In what manner will the increase of pressure affect the following equation: $C(s) + H_2O \rightarrow CO(g) + H_2(g)$. a) shift in the reverse direction b) shift in the forward direction c) increase in the yield of hydrogen d) no effect
CO4	K1	7.	In cholesteric liquid crystals, molecules are _____. a) arranged in a helical structure b) aligned in parallel with no layering c) form distinct layers with no preferred orientation d) in vertical plane
CO4	K2	8.	Azeotropic mixture are a) mixture of two or more liquids b) boil at a constant temperature c) those which boil at different temperatures d) Both 'a' and 'b'
CO5	K1	9.	Which of the following is a key factor that limits the validity of Walden's Rule? a) Temperature b) concentration c) nature of the ions d) solvent's ability to hydrate ions differently
CO5	K2	10.	What is the value of the ionic product of water at 298k? a) $7 \times 10^{-14}/mol^2L^2$ b) $1 \times 10^{-10}/mol^2L^2$ c) $1 \times 10^{-14}/molL^2$ d) $1 \times 10^{-14}/mol^2L^2$

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.	Define heat capacities at constant volume (Cv) and at constant pressure (Cp) and derive a relationship between them. **(OR)**
CO1	K3	11b.	Distinguish: (i) Eextensive and intensive properties (ii) state functions and path functions.
CO2	K3	12a.	Evaluate the physical significance of entropy. **(OR)**
CO2	K3	12b.	Express entropy as a function of temperature and pressure.
CO3	K4	13a.	Assess the pressure dependence of equilibrium constant. **(OR)**
CO3	K4	13b.	State and explain the law of mass action.
CO4	K4	14a.	Define critical solution temperature. Explain any one system with upper and lower CST. **(OR)**
CO4	K4	14b.	Distinguish Ideal and non-ideal solutions on the basis of Raoult's law.
CO5	K5	15a.	Summarize on Debye – Huckel – Onsager theory of strong electrolytes. **(OR)**
CO5	K5	15b.	List out the applications of conductance measurements.

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 an expression for Joule-Thomson coefficient. **(OR)**
CO1	K3	16b.	Analyze zeroth law and first law of thermodynamics.
CO2	K4	17a.	Derive Gibbs Helmholtz equation. **(OR)**
CO2	K4	17b.	Illustrate how do temperature and pressure influences G.
CO3	K4	18a.	State Le-Chatelier principle and apply the same to any one homogenous equilibrium. **(OR)**
CO3	K4	18b.	Derive relationship between Kp & Kc.
CO4	K5	19a.	What are liquid crystals? Explain nematic, smectic and cholesteric types. **(OR)**
CO4	K5	19b.	Criticize on different methods for expressing concentration of solutions.
CO5	K5	20a.	Determine the transport number by Hittorf and moving boundary methods. **(OR)**
CO5	K5	20b.	How does conductance vary with dilution?