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

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

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
I	PART-III	CORE	U21CH102	PHYSICAL CHEMISTRY-I

Date & Session: 03.11.2025/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.	RMS velocity is given by _____. a) sqrt(3RT)/M b) sqrt(8RT)/πM c) sqrt(3P)/D d) sqrt(3PV)/πM
CO1	K2	2.	The average distance travelled by a molecule between two successive collision is a) degree of freedom b) mean velocity c) mean free path d) Maxwell distribution
CO2	K1	3.	Thermal reactions are also known as a) heat reactions b) dark reactions c) photo reactions d) primary reactions
CO2	K2	4.	Mercury vapour is used as a _____ in photochemical reactions a) catalyst b) photo catalyst c) photo sensitizer d) promoter
CO3	K1	5.	Isotopes have same _____ number a) atomic number b) mass number c) magic number d) oxidation number
CO3	K2	6.	Radioactive cobalt (Co^{60}) is used for the treatment of _____ a) cancer b) thyroid c) tooth decay d) both (a) and (b)
CO4	K1	7.	The Bragg's equation is a) $2d\sin\theta=n\lambda$ b) $n\lambda=2\sin\theta$ c) $n\lambda=3d\sin\theta$ d) $n\lambda=2\cos\theta$
CO4	K2	8.	Sodium chloride crystal belong to _____ lattice a) BCC b) FCC c) edge centered d) both b and c
CO5	K1	9.	Relative lowering of vapour pressure is directly proportional to a) molarity b) mole fraction c) molality d) both b and c
CO5	K2	10.	Osmotic pressure is a _____ property a) colligative b) relative c) individual d) high temperature
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.	Use the given diameter and number density to calculate the mean free path of gas molecules. **(OR)**
CO1	K3	11b.	Apply kinetic theory to predict the change in the coefficient of viscosity with pressure for an ideal gas.

CO2	K3	12a.	Use Beer-Lambert's Law to calculate the absorbance of a solution, given path length and concentration. **(OR)**
CO2	K3	12b.	Apply the principle of stimulated emission to explain how a laser works.
CO3	K4	13a.	Analyze how a Geiger-Müller counter detects radioactivity and explain the limitations of this method for different types of radiation. **(OR)**
CO3	K4	13b.	Evaluate the hazards of radiation exposure and describe safety measures used in handling radioactive materials.
CO4	K4	14a.	Compare the lattice energy of NaCl and MgO and relate it to the charge and ionic radii of the constituent ions. **(OR)**
CO4	K4	14b.	Apply the radius ratio rule to predict the coordination number in ionic crystals.
CO5	K5	15a.	Evaluate the limitations of van't Hoff's law of osmotic pressure when applied to highly concentrated or non-ideal solutions. **(OR)**
CO5	K5	15b.	Evaluate the factors leading to abnormal molecular masses and propose how to distinguish between dissociation and association using colligative property data.

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.	Use the combined gas law to determine the final volume of a gas when its temperature and pressure are changed simultaneously. **(OR)**
CO1	K3	16b.	Apply the postulates of the kinetic theory of gases to explain why gases expand to fill their containers.
CO2	K4	17a.	Compare and contrast fluorescence, phosphorescence, chemiluminescence, and bioluminescence in terms of their mechanisms and energy sources. **(OR)**
CO2	K4	17b.	Compare photochemical and thermal reactions based on energy input, temperature dependence, mechanism, and product formation.
CO3	K4	18a.	Analyze the use of Carbon-14 dating in archaeology and determine the age of an artifact using half-life data **(OR)**
CO3	K4	18b.	Compare the liquid drop model and the nuclear shell model in explaining the binding energy and stability of nuclei.
CO4	K5	19a.	Evaluate how lattice energy determines the melting point, solubility, and thermal stability of ionic compounds. **(OR)**
CO4	K5	19b.	Evaluate the efficiency and stability of CCP vs BCC structures in terms of packing density and void space.
CO5	K5	20a.	Compare and critically evaluate the Gottrell's method and Rast method for measuring freezing point depression in terms of accuracy, sensitivity, and practical applicability. **(OR)**
CO5	K5	20b.	Critically assess the significance of relative lowering of vapor pressure as a colligative property in the context of ideal and non-ideal solutions.