22CHU625N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION MAY 2026
(Sixth Semester)

Branch – **CHEMISTRY**

PHYSICAL CHEMISTRY – II

Time: Three Hours Maximum: 75 Marks

SECTION-A (10 Marks)
Answer **ALL** questions
ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	The differential method is used to determine: i) Order of reaction ii) Rate constant iii) Activation energy iv) Molecularity of reaction	K1	CO1
	2	The temperature coefficient of a reaction is: i) Ratio of rate constants at two temperatures ii) Ratio of activation energies at two temperatures iii) Ratio of rate constants at 25°C and 35°C iv) Ratio of concentrations at two temperatures	K2	CO1
2	3	Photochemical reactions are: i) Initiated by light ii) Initiated by heat iii) Initiated by a catalyst iv) Not affected by light	K1	CO2
	4	The theory of absolute reaction rate (ARRT) is: i) Collision theory ii) Transition state theory iii) Arrhenius theory iv) Quantum theory	K2	CO2
3	5	Guoy's method is used to measure: i) Dipole moment ii) Magnetic susceptibility iii) Polarizability iv) Refractive index	K1	CO3
	6	The unit of magnetic susceptibility is: i) $cm^3\ mol^{-1}$ ii) $cm^3\ g^{-1}$ iii) mol^{-1} iv) g^{-1}	K2	CO3
4	7	The Pb-Ag system is an example of: i) Simple eutectic system ii) Compound formation system iii) Solid solution system iv) Immiscible system	K1	CO4
	8	The eutectic point is: i) The highest melting point ii) The lowest melting point iii) The critical point iv) The triple point	K2	CO4
5	9	The Hamiltonian operator is: i) $\hat{H} = T + V$ ii) $\hat{H} = T - V$ iii) $\hat{H} = V - T$ iv) $\hat{H} = T/V$	K1	CO5
	10	The Schrödinger equation is: i) $\hat{H}\psi = E\psi$ ii) $\hat{H}\psi = E$ iii) $\psi = E\hat{H}$ iv) $E = \hat{H}\psi$	K2	CO5

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SECTION - B (35 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** Marks (5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	State the integrated rate equations and provide the units of the rate constant for zero, first, and second-order reactions.	K1	CO1
		(OR)		
	11.b.	Explain the Half-life period ($t_{1/2}$) of a reaction.		
2	12.a.	Compare and contrast Collision Theory with the Theory of Absolute Reaction Rate (ARRT).	K2	CO2
		(OR)		
	12.b.	State the laws of Photochemistry.		
3	13.a.	Identify and apply the applications of dipole moment measurements in modelling the shapes of H_2O and CO_2 molecules.	K3	CO3
		(OR)		
	13.b.	Build a conceptual framework to explain the terms: magnetic permeability, magnetic susceptibility, and magnetogyric ratio.		
4	14.a.	Analyze the Sulphur system and discover why it is considered a four-phase system.	K4	CO4
		(OR)		
	14.b.	Distinguish between congruent and incongruent melting points. Analyze the $FeCl_3$-H_2O system to identify the various hydrated compounds formed.		
5	15.a.	Classify non-linear molecules into Cn and Cnh point groups.	K4	CO5
		(OR)		
	15.b.	Compare Eigenvalues and Eigenfunctions.		

SECTION -C (30 Marks)

Answer **ANY THREE** questions

ALL questions carry **EQUAL** Marks (3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain the kinetics of the H2-Br2 chain reaction: List the elementary steps (Initiation, Propagation, and Termination).	K1	CO1
2	17	Explain and summarize the following photophysical phenomena with suitable examples: (i)Chemiluminescence (ii)Bioluminescence (iii)Thermoluminescence (iv) Phosphorescence	K2	CO2
3	18	Construct a schematic diagram and model the experimental procedure of Gouy's method to measure the magnetic susceptibility of a transition metal complex.	K3	CO3
4	19	Analyze the Lead-Silver (Pb-Ag) system. Conclude how the principle of the eutectic point is utilized in the desilverization of lead (Pattinson's process).	K4	CO4
5	20	Derive the Hamiltonian operator (H) from the total energy of a system. Show its application in the Schrödinger time-independent equation.	K5	CO5

Z-Z-Z END