22PHU310N

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

BSc DEGREE EXAMINATION DECEMBER 2025
(Third Semester)

Branch - **PHYSICS**

CHEMISTRY - I

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	What is the shape of XeF_4? a) Tetrahedral b) Square planar c) Trigonal bipyramidal d) Octahedral with two lone pairs	K1	CO1
	2	Relate EAN rule is satisfied in a) $[Ni(CO)_4]$ b) $[Fe(CN)_6]^{3-}$ c) $[CoCl_6]^{2-}$ d) $[MnO_4]^-$	K2	CO1
2	3	A dye which becomes insoluble in the fiber after application is classified as a) Acid dye b) Vat dye c) Basic dye d) Mordant dye	K1	CO2
	4	Teflon (PTFE) is formed by polymerization of a) C_2H_2 b) CH_2=CHCN c) CF_2=CF_2 d) CH_2=CHCl	K2	CO2
3	5	Weiss indices of intercepts (a/2, b/3, ∞c) are a) (2 3 0) b) (1/2 1/3 0) c) (3 2 0) d) (0 0 1)	K1	CO3
	6	Why does graphite conduct electricity? a) Free movement of ions b) Delocalized π-electrons c) Presence of defects d) High bond energy	K2	CO3
4	7	The half-life ($t_{½}$) of a first-order reaction is related to the rate constant (k) by which expression? a) $t_{½}$ = 1/k b) $t_{½}$ = 1/2k c) $t_{½}$ = 2.303/k d) $t_{½}$ = 0.693/k	K1	CO4
	8	Brownian motion arises due to a) Electrostatic forces b) Molecular bombardment c) Diffusion d) Adsorption	K2	CO4
5	9	Which of the following is a negative catalyst? a) Pt in contact process b) MnO_2 in decomposition of $KClO_3$ c) Glycerol in decomposition of H_2O_2 d) Ni in hydrogenation	K1	CO5
	10	What does the Grothuss–Draper law state? a) Only absorbed light produces photochemical reaction b) Each photon excites multiple molecules c) Quantum yield must be one d) Absorbed light is re-emitted only	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 postulates of VSEPR theory.	K2	CO1
		(OR)		
	11.b.	Write the preparation and uses of sodium hydrosulphite.		
2	12.a.	Explain the isolation and uses of nicotine.	K2	CO2
		(OR)		
	12.b.	Compare acid and basic dyes with one example each.		
3	13.a.	Determine the Miller indices of a crystal plane that intercepts the axes at 2a, 3b, and 4c. Draw a diagram showing the plane in a unit cell and explain your steps.	K3	CO3
		(OR)		
	13.b.	Explain how this arrangement contributes to diamond's hardness and high melting point.		
4	14.a.	Give the integrated rate law for a first-order reaction and derive its half-life expression.	K3	CO4
		(OR)		
	14.b.	Construct the concept of protective colloids with examples.		
5	15.a.	Differentiate between positive and negative catalysis.	K2	CO5
		(OR)		
	15.b.	Define quantum yield and Why is it high in the reaction of $H_2 + Cl_2$?		

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 Werner's theory of coordination compounds	K4	CO1
2	17	With suitable examples, Elaborate the role of biodegradable polymers in reducing environmental pollution.	K2	CO2
3	18	Derive the number of atoms per unit cell for BCC and FCC lattices.	K3	CO3
4	19	Explain any two methods of determining the order of a reaction.	K3	CO4
5	20	Discuss the mechanism of enzyme catalysis with the lock-and-key and induced-fit models.	K2	CO5

Z-Z-Z END