

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2026
(Sixth Semester)

Branch - **CHEMISTRY**

ORGANIC 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	Electrophilic substitution in pyrrole mainly occurs at the 2 position (C2) due to _____ (i) Steric hindrance is less (ii) Nitrogen withdraws electrons (iii) σ -complex is the least stable (iv) Intermediate is more resonance- stabilised	K1	CO1
	2	OsO ₄ convert an alkene into a vicinal diol through (i) a carbocation intermediate (ii) cyclic osmate ester formation (iii) a free radical mechanism (iv) anti-addition of hydroxyl groups	K2	CO1
2	3	Why does glycine predominantly exist as a zwitterion at pH 7? (i) pH equals pK _a of -COOH group (ii) pH equals pK _a of -NH ₂ group (iii) Peptide bond formation occurs (iv) acidic and basic groups are ionized	K1	CO2
	4	Loss of biological activity during protein denaturation is mainly due to disruption of which structural levels? (i) Amino acid composition (ii) Primary structure (iii) Secondary and tertiary structures (iv) Peptide bonds	K2	CO2
3	5	In the Beckmann rearrangement of an unsymmetrical ketoxime, which factor determines the product formed? (i) Acid concentration (ii) Molecular weight of substituents (iii) Reaction temperature (iv) Group anti to the leaving group	K1	CO3
	6	Why does MPV reduction reduce aldehydes and ketones but not esters? (i) Aluminium alkoxide does not coordinate with esters (ii) Esters lack suitable carbonyl geometry (iii) Hydride transfer is reversible (iv) Esters form stable carbocations	K2	CO3
4	7	Why does the benzyne mechanism give two different products in aromatic nucleophilic substitution? (i) Radical intermediates (ii) Unsymmetrical benzyne intermediate (iii) Loss of aromaticity (iv) Carbocation rearrangement	K1	CO4
	8	S _N ¹ reactions are favoured by (i) Primary carbocations (ii) Polar aprotic solvents (iii) Polar protic solvents (iv) Strong nucleophiles	K2	CO4
5	9	In aromatic nucleophilic substitution via the benzyne mechanism, which sequence of steps does the reaction proceed through? (i) Addition followed by elimination (ii) Elimination followed by addition (iii) Rearrangement reaction (iv) Free radical substitution	K1	CO5
	10	In monosubstituted cyclohexane, the axial conformer is less stable due to (i) 1,3-diaxial interactions (ii) van der Waals attraction (iii) Torsional strain (iv) Angle strain	K2	CO5

Cont...

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.	Analyse how the heteroatom influences aromaticity and chemical reactivity in pyrrole and pyridine, with suitable examples.	K3	CO1
		(OR)		
	11.b.	Illustrate the mechanism of SeO ₂ oxidation and show its use in the selective oxidation of allylic and benzylic positions.		
2	12.a.	Classify amino acids and analyse how their structural features influence their chemical properties.	K4	CO2
		(OR)		
	12.b.	Outline the secondary structure of proteins and illustrate why the α -helix is more stable than a random coil.		
3	13.a.	Describe the significance of benzilic acid rearrangement in organic synthesis and provide an example of its mechanism.	K2	CO3
		(OR)		
	13.b.	Write the mechanism underlying the pinacol-pinacolone rearrangement and explain how carbocation stability governs it.		
4	14.a.	Explain why Saytzeff product predominates in E2 elimination, but Hofmann product forms in certain cases.	K2	CO4
		(OR)		
	14.b.	Discuss the role of the leaving group and nucleophile in determining SN1 and SN2 mechanisms.		
5	15.a.	Apply ring strain in cycloalkanes using Baeyer strain theory and the orbital concept.	K3	CO5
		(OR)		
	15.b.	Discuss Coulson and Moffit's concept for cycloalkanes.		

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	Compare the aromaticity and reactivity of furan, pyrrole, and thiophene and give their applications	K4	CO1
2	17	Explain how protein structure determines its biological function, and discuss the roles of hydrogen bonding and denaturation.	K2	CO2
3	18	Outline a reaction sequence starting from a secondary alcohol that involves oxidation, rearrangement, and reduction steps.	K3	CO3
4	19	Evaluate how substrate structure, nucleophile/base strength, solvent, and temperature affect the mechanisms, kinetics, and stereochemistry of SN ¹ , SN ² reactions.	K5	CO4
5	20	Discuss the theories explaining ring strain in cycloalkanes and their limitations.	K4	CO5