

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
MSc DEGREE EXAMINATION MAY 2024
(First Semester)

Branch -CHEMISTRY

ORGANIC REACTION MECHANISM AND STEREOCHEMISTRY

Time: Three Hours

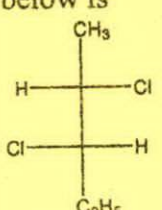
Maximum: 75 Marks

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	Na ⁺ is an example of a) Hard acid b) Soft acid c) Hard base d) Soft base	K1	CO1
	2	Which of the following has more +I effect? a) CH ₃ CH ₂ - b) CH ₃ - c) (CH ₃) ₃ C+ d) (CH ₃) ₂ CH-	K2	CO1
2	3	[10]-Annulene is non-aromatic, the reason being a) (4n+2) rule is not satisfied b) (4n+2) rule is not satisfied but rings are planar c) (4n+2) rule is not satisfied but rings are not planar d) (4n+2) rule is not satisfied and rings are not planar	K1	CO2
	4	Monocyclic hydrocarbons that contain conjugate double bonds are a) Azulenes b) Annulenes c) Fulvenes d) Ferrocenes	K2	CO2
3	5	Stork-Enamine reaction is useful for a) C-halogenation b) C-alkylation at less hindered site c) C-alkylation at more hindered site d) O-alkylation	K1	CO3
	6	In electrophilic aromatic substitution reactions, nitro-group is meta-directing because the nitro group a) increases electron density at meta position b) increases electron density at ortho-para position c) decreases electron density at meta position d) increases electron density at ortho-para position	K2	CO3
4	7	The reaction which will take place in presence of ultraviolet light is a) Wittig reaction b) Fries rearrangement c) Curtius rearrangement d) Claisen rearrangement	K1	CO4
	8	In which of the following reactions, amide is reduced to amine which has one carbon less than the starting material? a) Lossen rearrangement b) Beckmann rearrangement c) Dickmann rearrangement d) Hoffmann rearrangement	K2	CO4
5	9	The configuration at C-2 and C-3 of the compound given below is  a) 2R, 3S b) 2S, 3R c) 2S, 3S d) 2R, 3R	K1	CO4
	10	The most stable conformation in 1,4-disubstituted cyclohexane is a) trans (a, a) b) trans (e, e) c) cis (a, e) d) cis (e, a)	K2	CO5

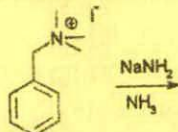
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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Produce the derivation of Hammett and Taft equations.	K3	CO1
		(OR)		
	11.b.	i) Interpret the factors that affect the strength of acids and bases. (5) ii) Outline the Bronsted and Lewis concepts of acids and bases. (2)		
2	12.a.	Utilize the effects of aromaticity on electronic absorption spectra, resonance energies and induced ring current.	K3	CO2
		(OR)		
	12.b.	Apply and explain the Craig's rule to ferrocene, annulene and Syndnones compounds.		
3	13.a.	Analyze the following, i) Friedel Crafts acylation at olefinic carbon ii) Metals as electrophiles in substitution reactions	K4	CO3
		(OR)		
	13.b.	Examine the following mechanisms, i) Riemer-Tieman reaction ii) Hofmann-Martius reaction		
4	14.a.	i) Detect the product and write down the mechanism of the following reaction,  ii) In which medium does Favorskii rearrangement occur? (6) (1)	K4	CO4
		(OR)		
	14.b.	Examine the mechanism for Demzenov rearrangement with examples.		
5	15.a.	Estimate the different approaches to determining configuration.	K5	CO5
		(OR)		
	15.b.	Explain the stereospecific and stereoselective synthesis with examples.		

SECTION - C (30 Marks)

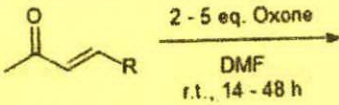
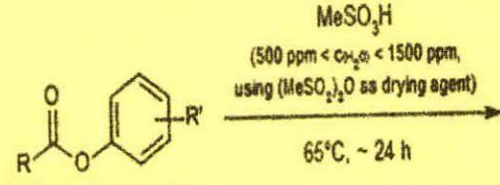
Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Explain the following, a) Delocalized bonds, b) Rules of Resonance c) Steric inhibition of resonance, d) Cross conjugation	K5	CO1
2	17	Apply the Huckel's rule for following compounds, a) Cyclopropenium cation, b) Cyclopentadienyl anion, c) Azulene, d) Tropolone, e) Tropylium	K4	CO2
3	18	Examine the mechanism, orientation, and reactivity of aromatic electrophilic substitution using appropriate examples.	K4	CO3

Cont...

4	19	<p>Inspect the compound's product and write down the mechanism,</p> <p>i)  (5)</p> <p>ii)  (5) R: alkyl, benzyl, Ph</p>	K4	CO4																														
5	20	<p>a) Determine cyclohexane and disubstituted cyclohexane's conformational analysis and stereochemistry. (8)</p> <p>b) Select the correct answer using the code given below the lists. (2)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">List-I</td> <td style="width: 50%;">List-II</td> </tr> <tr> <td>A. Meso compounds</td> <td>1. An equimolar mixture of enantiomer</td> </tr> <tr> <td>B. Enantiomers</td> <td>2. Stereoisomers that are not mirror images</td> </tr> <tr> <td>C. Diastereoisomers</td> <td>3. Non-superimposable mirror images</td> </tr> <tr> <td>D. Racemate</td> <td>4. An optically inactive compound whose molecules are achiral even though they contain chiral centre.</td> </tr> </table> <table border="0" style="width: 100%; margin-top: 10px;"> <tr> <td style="width: 25%;">A</td> <td style="width: 25%;">B</td> <td style="width: 25%;">C</td> <td style="width: 25%;">D</td> </tr> <tr> <td>(a) 3</td> <td>4</td> <td>1</td> <td>2</td> </tr> <tr> <td>(b) 3</td> <td>4</td> <td>2</td> <td>1</td> </tr> <tr> <td>(c) 4</td> <td>3</td> <td>1</td> <td>2</td> </tr> <tr> <td>(d) 4</td> <td>3</td> <td>2</td> <td>1</td> </tr> </table>	List-I	List-II	A. Meso compounds	1. An equimolar mixture of enantiomer	B. Enantiomers	2. Stereoisomers that are not mirror images	C. Diastereoisomers	3. Non-superimposable mirror images	D. Racemate	4. An optically inactive compound whose molecules are achiral even though they contain chiral centre.	A	B	C	D	(a) 3	4	1	2	(b) 3	4	2	1	(c) 4	3	1	2	(d) 4	3	2	1	K5	CO5
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