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M.Sc. Chemistry
Third Semester-End term Examination (2023)

Paper Name: Photochemistry & Pericyclic Reactions
Time: 2.5 hours

Paper Code: MCHCCO-303
Maximum Marks: 60

Note: This paper has 3 sections A, B, and C, Attempt all three sections

Section A: Answer all the questions; Section B: Answer any 3 out of 5; Section C: Answer all the questions, each question has an internal choice

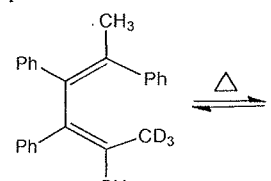
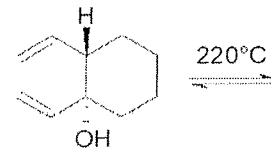
Abbreviations Used:

CLO- Course Outcome, PLO- Program Outcome, BTL- Bloom Taxonomy Level: BT level 1 1-Remember; BT level 1 2-Understand; BT level 1 3-Apply; BT level 1 4-Analyse; BT level 1 5-Evaluate, BT level 1 6-Create

Section-A

Very Short type questions

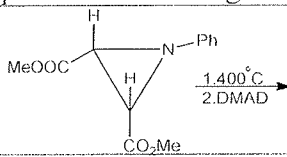
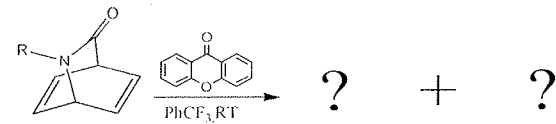
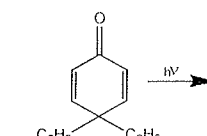
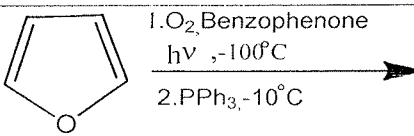
10*1.5=15

Q.No	Question	BTL	CLO	PLO
1	Which of the following is not correct (a) Internal Conversion occurs between the vibrational energy levels with same spin multiplicity (b) Inter-system crossing lead to delayed process (c) During Intersystem crossing spin multiplicity remains intact. Intersystem crossing does not led to fluorescence	2	1	1
2	What type of following electrocyclic reactions will hexatriene undergo? (a) Conrotatory thermal (b) Conrotatory photochemical (c) Disrotatory thermal (d) Disrotatory photochemical	4	1	2
3	State Grothus-Draper Law.	5	2	3
4	Define Quantum Yield. Why it is important to know the quantum yield of a photochemical reaction?	3	5	2
5	What are Cheletropic reactions t?	1	5	3
6	Give an example showing the endo product is preferentially formed over the 'exo' product in $(4\pi+2\pi)$ cycloaddition reaction.	4	5	2
7	List various types of photochemical reactions.	4	1	1
8	Predict the product for the following reaction with stereochemistry. 	6	4	1
9		2	3	2
10	In the conversion of 11 cis Rhodopsin to all trans-Rhodopsin, Specify the carbon atom across which the configuration changes by photoirradiation.	3	1	1

SECTION B

Long type Questions (Attempt any two out of four)

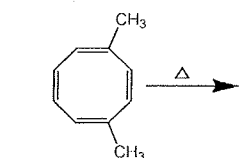
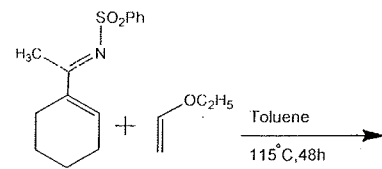
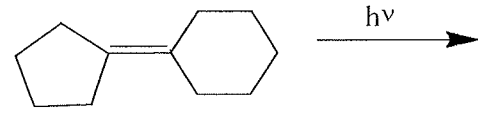
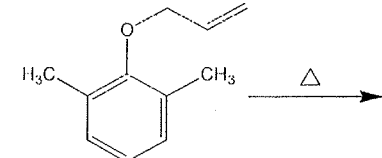
(2*10=20 marks)

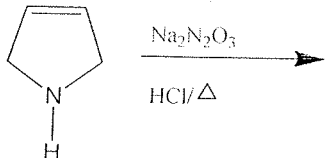
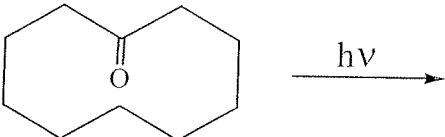
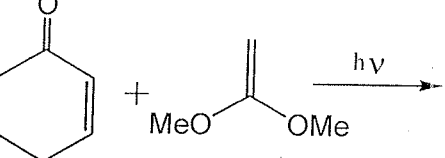
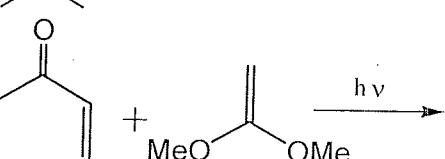
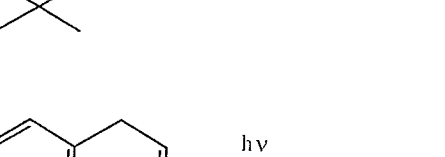
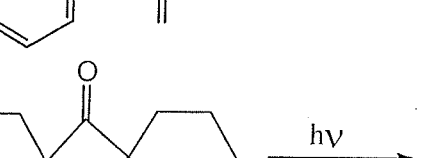
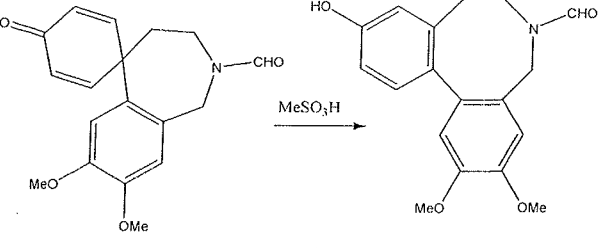
Q.No	Question	BTL	CIO	PLO
1	Using the Orbital Correlation diagram show that $(4\pi+2\pi)$ cycloaddition is thermally allowed, with a justification of the use of particular symmetry.	4	5	3
2	Explain the Zimmermann mechanism for the rearrangement of a dienone to phenol.	4	5	3
3	Complete the following with the mechanism.			
a.		4	5	3
b		4	5	3
c		4	5	3
d		4	5	3
4	Discuss briefly the chemistry of vision giving various photochemical reactions taking place in light and dark.	2	1	1

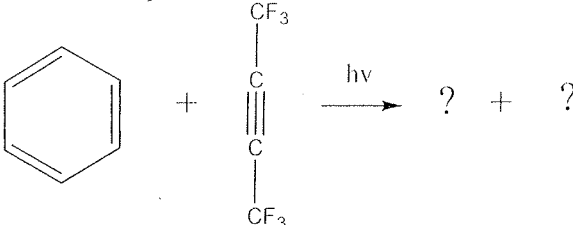
SECTION C

Short-type Questions. (Attempt all questions)

(5*5=25 marks)

Q.No	Question	BTL	CIO	PLO
1	Complete the reaction by giving appropriate stereochemistry wherever possible	4	5	3
a				
b				
c				
d				

	e				
		OR			
		Discuss the photoreduction of carbonyl compounds giving suitable examples	2	1	1
2	(a)		4	4, 5	3
	(b)				
	(c)				
	(d)				
	(e)				
		OR			
		Using the Jablonskii diagram explain all the transitions that occur in a photochemical excitation.	4	4	2
3		Discuss Norrish type-I reaction with mechanism and example.	2	1	1
		OR			
		Predict the mechanism for the following conversion:	4	4	2
					

4	Predict the products and deduce the mechanism. 	4	4	2
	OR			
	The Lumis ketone rearrangement is stereospecific and can be described as a [2a +2a] cycloaddition, Justify	2	1	1
5	Predict the mechanism for the following conversion:  (added after 5 min) 0°C, 1.5 - 12 h R, R': 1° alkyl	4	4	2
	OR			
	For a mono-substituted diene, which major Diels Ader products will be obtained on reaction with ethene if an electron-donating substituent is placed at C-2 and C-3? Justify your answer by quoting suitable examples	4	4	2