
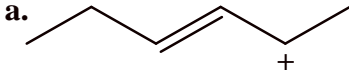
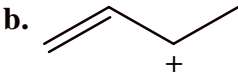
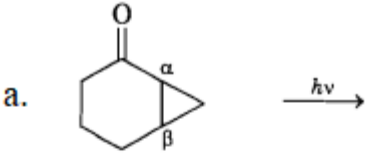
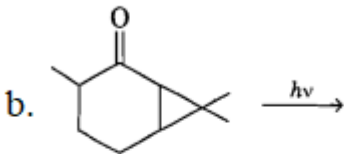
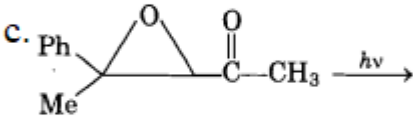
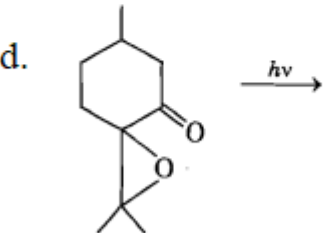
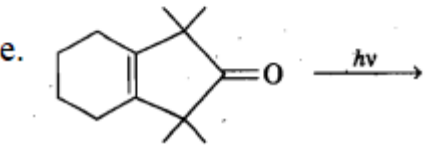


Name:			
Enrolment No:			
<b>UPES</b> <b>End Semester Examination, May 2023</b>			
<b>Course: Photochemistry and Pericyclic Reactions</b> <b>Semester: II</b> <b>Program: MSc. Hons. Chemistry</b> <b>Course Code: CHEM7021P</b>			
		<b>Time: 03 hrs.</b> <b>Max. Marks: 100</b>	
<b>Instructions:</b>			
<b>SECTION A</b> <b>(5Qx4M=20Marks)</b>			
S. No.		Marks	CO
Q 1	Draw the $\pi$ molecular orbital diagram of 1,3,5-hexatriene and identify the number of nodes present in $\psi_3$ and $\psi_5$ molecular orbitals.	4	CO1
Q2	Differentiate between radiative and non-radiative processes. What is the origin of these processes in a $\pi$ system.	4	CO2
Q3	Identify the HOMO and LUMO for ground state and first excited state of 1,3-butadiene.	4	CO2
Q4	Differentiate between $\alpha$ - and $\beta$ - cleavage in Norrish Type reactions. Also mention the products that are formed in the primary step of these reactions.	4	CO3
Q5	What are the LUMO in the ground state for the following molecules? Explain with the help of a diagram.	4	CO2
	a.  b. 		
<b>SECTION B</b> <b>(4Qx10M= 40 Marks)</b>			
Q6	Diagrammatically explain the $\pi$ molecular orbitals in 2,4-pentadienyl system. Can this system be formed from ethylene and trienyl residues? Explain with reasons.	10	CO3
Q7	Explain the following with a Jablonski Diagram <ol style="list-style-type: none"> <li>Radiative and Non-radiative process</li> <li>Phosphorescence</li> <li>Intersystem crossing</li> <li>Internal conversion</li> <li>Photoluminescence</li> </ol>	10	CO1

Q8	<p>a. What is the difference between a concerted and a stepwise pericyclic reaction?</p> <p>b. How do pericyclic reactions obey the conservation of orbital symmetry?</p>	10	CO3
Q9	What is a sigmatropic rearrangement? Give examples. Also explain how it is different from an electrocyclic and cycloaddition reaction?	10	CO2
<b>OR</b>			
	What are the factors that influence the quantum yield of a photochemical reaction, and how can they be improved? Give examples of reactions with very high quantum yield.		CO2

**SECTION-C**  
(2Qx20M=40 Marks)

Q 10	<p>Identify the final products in the following Norrish-type reactions.</p> <p>a. </p> <p>b. </p> <p>c. </p> <p>d. </p> <p>e. </p>	4+4+4+4+4	CO3
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Q11	<p>Answer the following:</p> <ol style="list-style-type: none"> <li>What is the importance of a photosensitizer in photochemistry? What are the criteria for a compound to behave like a photosensitizer?</li> <li>Comment on the singlet and triplet states of a carbonyl group.</li> <li>Give the mechanism of 1,5-sigmatropic shift in the 'ene' reaction.</li> <li>Sketch the pi molecular orbitals of the allyl system. Give electron occupancy in allyl carbanion, allyl free radical and allyl carbanion.</li> </ol>	<b>5+5+5+5</b>	<b>CO2</b>
<b>OR</b>			
	<p>Answer the following:</p> <ol style="list-style-type: none"> <li>Draw molecular orbitals of allyl system using the linear combination of molecular orbital of one ethylene molecule and one <i>p</i>-atomic orbital. Also identify the HOMO and LUMO for this system.</li> <li>What are the different products obtained for <math>\beta</math>-cleavage in cyclopropyl ketones and <math>\alpha</math>, <math>\beta</math>-epoxy ketones</li> </ol>	<b>10+10</b>	<b>CO2</b>