**Name:**

**Enrolment No:**

**UPES**

**End Semester Examination, December 2024**

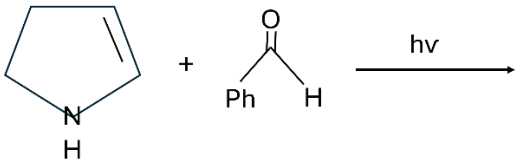
**Course: Pericyclic & Photochemistry** **Semester : III**

**Program: M.Sc. Chemistry** **Time : 03 hrs.**

**Course Code: CHEM8046** **Max. Marks: 100**

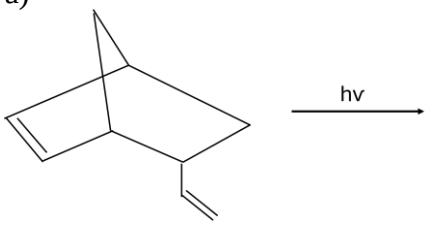
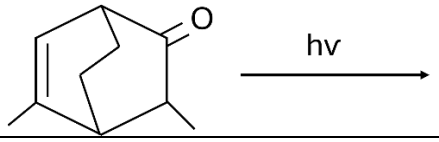
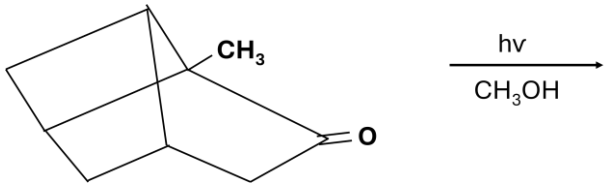
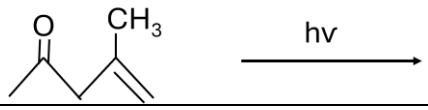
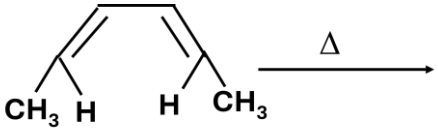
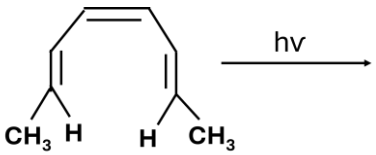
**Instructions:** 1. Write your Enrollment number on the question paper.
2. Internal choices are given in question numbers 8 and 11.
3. Attempt all parts of a question at one place only.

**SECTION A**
**(5Qx4M=20Marks)**

| S. No. | | Marks | CO |
|---|---|---|---|
| Q 1 | Define sigmatropic rearrangements. Give two examples. | **4** | **CO2** |
| Q 2 | What is photosensitization? Mention an example also. | **4** | **CO1** |
| Q 3 | Differentiate the process of fluorescence and phosphorescence considering Jablonski diagram. | **4** | **CO1** |
| Q 4 | Benzil is used as sensitizer for the dimerization of cis-butadiene rather than trans-butadiene. Give reason. | **4** | **CO1** |
| Q 5 | Complete the following reaction:<br>  | **4** | **CO2** |

**SECTION B**
**(4Qx10M= 40 Marks)**

| | | | |
|---|---|---|---|
| Q 6 | Explain the electrocyclic closure of ring in $(4n+2)\pi e^-$ system under thermal and photochemical conditions. | **5+5** | **CO2** |
| Q 7 | a) 1,3-cyclopentadiene on chlorination gives hexachlorocyclopentadiene (A). Compound 'A' reacts with maleic anhydride to give compound 'B' which is used as flame retardant. Give the structure of 'A' and 'B'.<br>b) Describe Hofmann-Loeffler-Freytag reaction. | **10** | **CO2** |
| Q 8 | Discuss the mechanism of [1,3]-sigmatropic rearrangement using FMO approach.<br>**OR** | **10** | **CO3** |

| | | | |
|---|---|---|---|
| | Complete the following reactions and discuss the mechanism:<br>a)<br>  <br><br>b)<br>  <br> | **10** | |
| Q 9 | Suggest the mechanism in the following photoreactions and predict the products:<br>a)<br>  <br><br>b)<br>  <br> | **5+5** | **CO3** |
| | **SECTION-C**<br>**(2Qx20M=40 Marks)** | | |
| Q 10 | a) Illustrate the thermal-induced [4+2] cycloaddition using FMO approach.<br>b) Complete the reactions:<br>i)<br>  <br><br>ii)<br>  <br><br>Also, mention the names of reactants and products. | **6+14** | **CO2** |
| Q 11 | Discuss the photochemical reactions in the following classes of compounds:<br>a) organic nitrites<br>b) phenolic esters<br>**OR**<br>a) Write down the selection rules for cycloadditions and electrocyclic reactions.<br>b) Mention the products and discuss the reactions when: | **10 + 10** | **CO2** |

| | | | | |
|---|---|---|---|---|
| | i)<br>ii) | trans-3,4-dimethyl cyclobutene undergoes thermal treatment.<br>cis-5,6-dimethyl-1,3-cyclohexadiene undergoes photochemical treatment. | **10+10** | |