

**M. Sc. CHEMISTRY EXAMINATION, 2023**

(3rd Semester, CBCS)

**PAPER: XI-O****[ ORGANIC CHEMISTRY SPECIAL ]**

Time : Two Hours

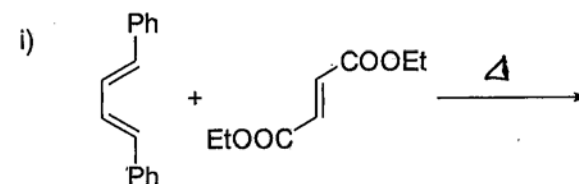
Full Marks : 40

(20 marks for each Unit)

Use a separate answer script for each Unit.

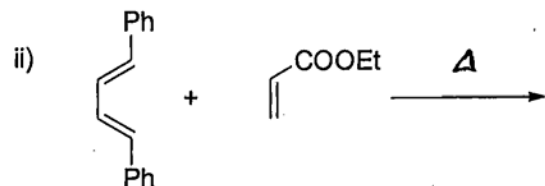
**UNIT - O - 3111**

- Draw the  $\pi$ -MOs for 1,3,5-hexatriene. Also calculate the energy and lobe coefficients for its HOMO and LUMO. 2
  - Explain the feasibility of [2+2] cycloaddition reaction under thermal and photochemical conditions with the help of FMO approach. Can [2+2] cycloaddition reaction take place under thermal conditions? If yes, explain with proper example and orbital diagram. 2+2
- Answer any *seven* of the following questions : 2x7
  - Draw the structure of the product(s) in following transformations, showing proper stereochemistry wherever applicable :

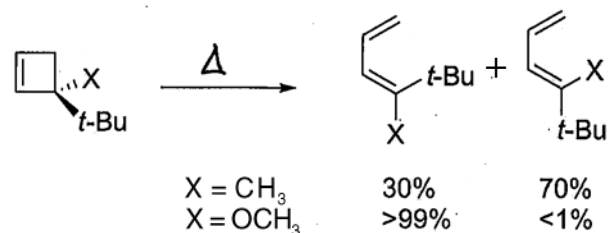


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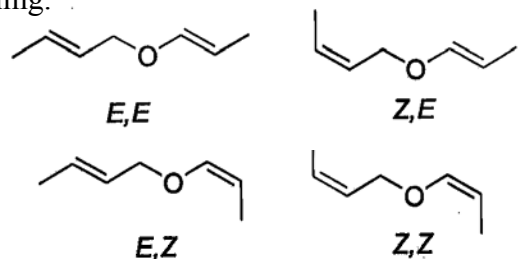
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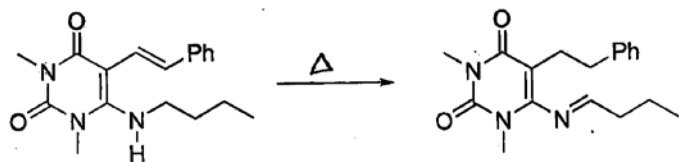
(b) Explain the following observation with proper reasoning :



(c) Arrange the following four stereoisomers of 1-(prop-1-en-1-yloxy)but-2-ene in the order of increasing rates towards Claisen rearrangement, with proper reasoning.



(d) Write the mechanism for the following transformation :



[ 5 ]

(iii) Under photochemical condition, 1,3-acyl shift of enamide follows an intermolecular mechanism via radical intermediate.

(iv) Di- $\pi$ -methane rearrangement in the acyclic system occurs through S<sub>1</sub> excited state.

4. Carry out the following transformations :

(Answer any *two*)

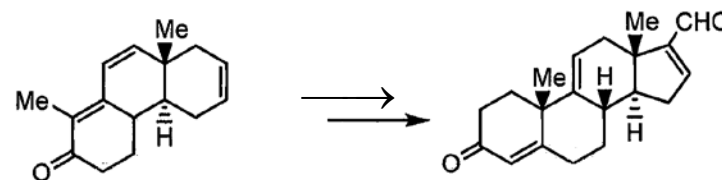
2x2

(i) cholesterol  $\rightarrow$  testosterone

(ii) naphthalene  $\rightarrow$  Diels' hydrocarbon

(iii) cholesterol  $\rightarrow$  progesterone

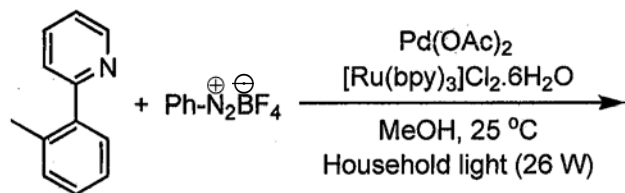
5. Write down all the intermediate steps for the following conversion. 4



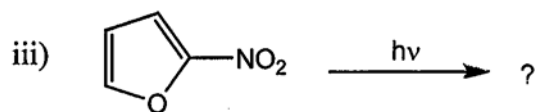
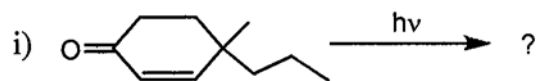
[ 4 ]

## UNIT - O - 3112

3. (a) Write down the product with suitable mechanism for the following reaction. 2



- (b) Write down the probable product(s) with plausible mechanism. (answer *any two*) 2x2

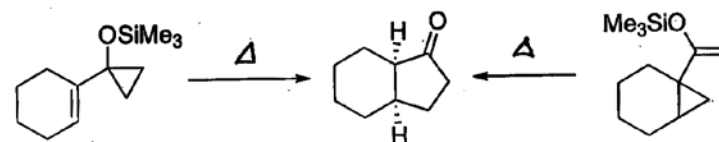


- (c) Give evidence in favour of the following statements:  
Answer *any three* : 2x3

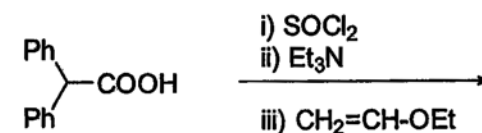
- (i) Paterno Büchi reaction proceeds through diradical intermediate.  
(ii) Barton reaction involves a 6-membered cyclic transition state.

[ 3 ]

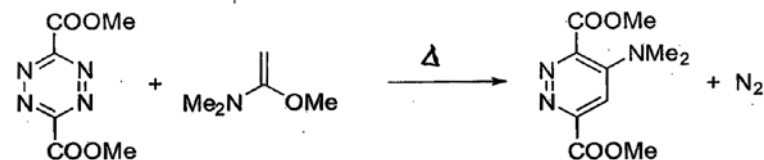
- (e) Explain the following transformation with proper mechanism :



- (f) Write the structure of the product formed in the following reaction. Explain your answer with proper mechanism.



- (g) Write proper mechanism for the following transformation :



- (h) Write the structure of the product formed when furan reacts with maleic anhydride under thermal condition. Give proper explanation and mechanism.

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