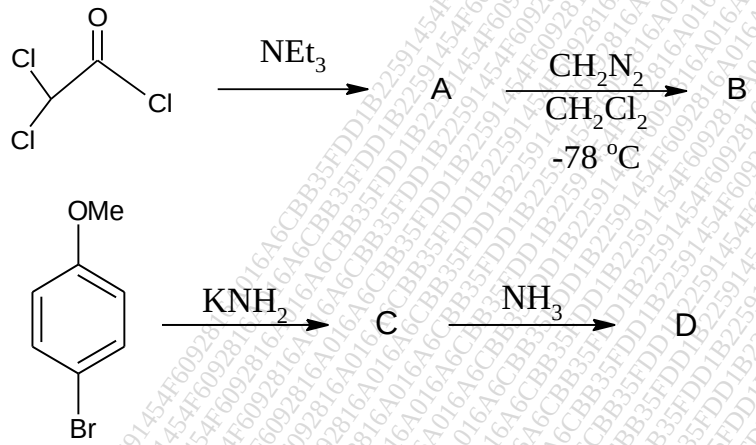
Q. P. Code : 26659

[Time: $2\frac{1}{2}$ Hours] **[Marks: 60]**

N. B. 1. All Questions are compulsory.
2. Figures to the right indicate maximum marks.

1. **(a)** Attempt any **two** of the following: **08**

(i) Complete the following reactions and identify the reactive species generated in each of the reactions :-



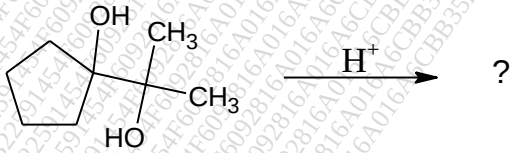
(ii) Write mechanism of Hoffmann & Schmidt rearrangement and discuss the salient features of intermediates involved.

(iii) Explain the role of FMO in reactions involving hard & soft nucleophiles and electrophiles.

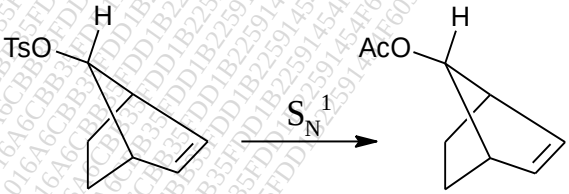
(iv) Draw molecular orbitals of hexa-1,3,5-triene and comment upon their symmetry properties.

(b) Attempt any **one** of the following: **04**

(i) Complete the following reaction and give its mechanism.



(ii) Explain the following reaction with mechanism-



2. **(a)** Attempt any **two** of the following: **08**

(i) With the help of correlation diagram explain whether the ring closing electrocyclic reaction of 1,3-butadiene can take place thermally or photo-chemically.

(ii) Discuss the Huckel-Mobius method for $2\pi+2\pi$ and $4\pi+2\pi$ cycloaddition reactions.

(iii) Explain molecular orbital basis for the α-effect.

(iv) Explain the mechanism of Claisen rearrangement.

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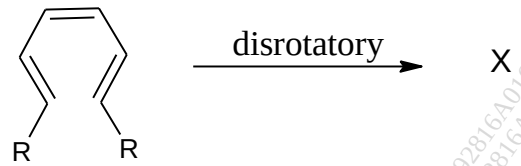
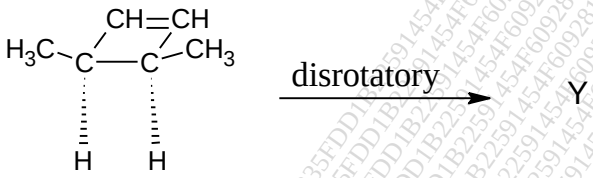
(b) Attempt any **one** of the following: **04**

(i) Give the synthesis of vitamin D from 7-dehydrocholesterol.

(ii) On the basis of FMO method, explain the following reactions -

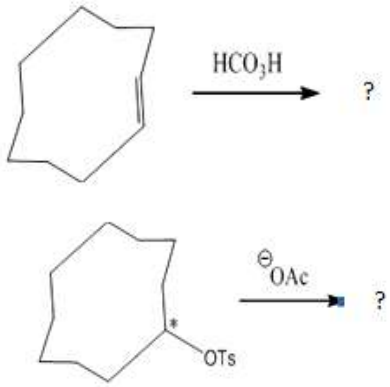




Q. 3 **a)** Attempt any **two** of the following: **08**

i) Draw the conformers of cyclodecane and discuss characteristic features of its major conformer.

ii) Complete the following reactions with their appropriate stereochemical outcome (and mechanism if any) :



iii) Explain the stereochemistry and stability of hydrindane.

iv) Conformation reactivity correlation depends on selection of substrate. Explain this statement by considering conformationally mobile diastereomers.

b) Attempt any one of the following: 04

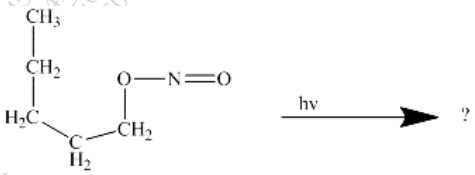
i) Explain the reactivity and mechanism of E_2 elimination as shown by pair of epimers of menthyl chloride.

ii) Illustrate Curtin- Hammett principle with one example.

Q. 4 **(a)** Attempt any **two** of the following: **08**

(i) Discuss the Patterno-Buchi reaction with mechanism and stereochemical outcome.

(ii) Complete the following reaction, give its name and mechanism.



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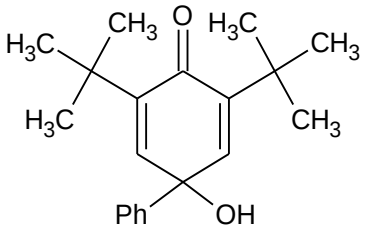
(iii) Draw and explain Jablonskii Diagram.

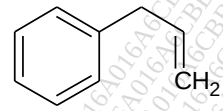
(iv) Discuss the following with two examples each:
Singlet oxygen reactions and 1,4-addition reactions of arenes.

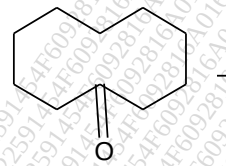
(b) Attempt any **one** of the following: **04**

(i) Complete the following reaction with mechanism:

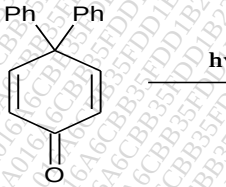


(ii) Complete the following reactions. (No mechanism expected)





$(CH_3)_2C(COCH_3)CH=CH_2 \xrightarrow{h\nu}$?

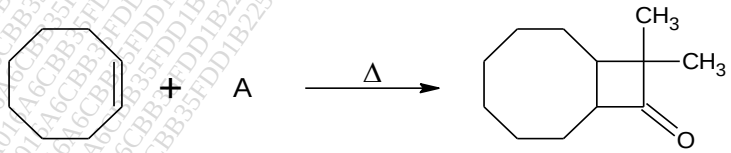


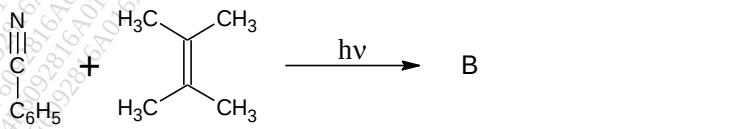
Q. 5 Attempt any **four** of the following: **12**

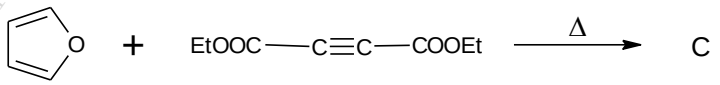
(a) Explain with mechanism the reaction of phenol with chloroform in presence of NaOH.

(b) Discuss the correlation diagram for conrotatory & disrotatory interconversion of cyclohexadiene -- hexatriene system.

(c) Complete the following reactions by identifying A, B and C :







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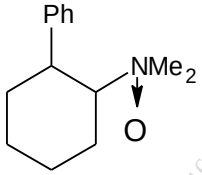
(d) Give synthesis of citral using pericyclic reaction.

e) Explain the stereochemistry and the formation of major product by Cope elimination of following compound:



f) Suggest the symmetry elements and point group present in ethylene molecule.

g) Explain the following terms: Quenching and Quantum Yield.

h) Give the mechanism of the vapour phase photolysis of cyclohexanone.

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