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

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

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

(i) Stability of carbocation is also achieved through neighbouring group effect. Explain this giving mechanism of reaction of SbF_5 in liq. SO_2 on *p*-$MeOC_6H_2CH_2Cl$.

(ii) What is neopentyl rearrangement? Explain with mechanism.

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

(iv) What do you understand from frontier orbitals? Explain with schematic diagram. Elaborate on what happens when a molecule/ion is irradiated with suitable wavelength of light?

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

(i) How is benzyne generated from chlorobenzene? Give the reaction of benzyne with the following: Benzoic acid, Anthracene and Furan.

(ii) Explain the following:

Symmetry properties of molecular orbital,

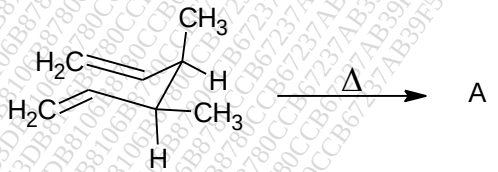
&

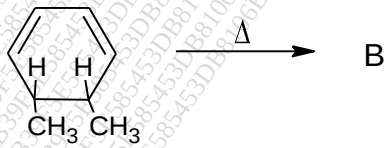
Conservation of molecular orbital symmetry in concerted reactions.

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

(i) Discuss the theory of cycloaddition reaction according to FMO method with specific reference to thermal and photo induced [2+2] cycloaddition reactions.

(ii) Complete the following reactions and identify A and B :-





(iii) Explain the mechanism of Claisen rearrangement.

(iv) Explain with the help of electrocyclic ring opening of cis & trans – 3,4-dimethylcyclobutene via thermal & photo induced process.

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

(i) Explain the site selectivity of Diel's-Alder reactions.

(ii) Discuss sigmatropic rearrangement with respect to [1,3] & [1,5] shift with suitable examples.

8106B8780CCB67237AB39F5E585453DB

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

i) Discuss the conformational features of the cyclooctane ring system. **08**

ii) Explain the influence of conformation in the deamination of 2-aminocyclohexanol.

iii) What is meant by torsional angle of junction? Explain it with respect to decalin. Draw the conformation of cis-decalin exhibiting ring inversion and torsional angle of junction.

iv) Explain, with any two examples, the selection of substrate for the study of conformation in reactivity correlation.

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

i) Discuss the mechanism and stereochemistry of bromination of cyclohexene.

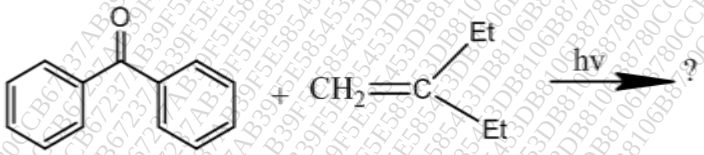
ii) Give any two examples of transannualar reactions with their appropriate stereochemical outcome.

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

(i) With the help of a schematic representation, discuss the various changes which occur in a molecule after it photochemically gets promoted to the excited state.

(ii) Explain and give mechanism of Barton reaction with a suitable example.

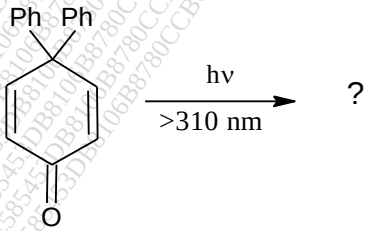
(iii) Complete the following reaction, give its name and mechanism.



(iv) Give two examples for the following reactions:
Photo-oxygenation & Single oxygen reaction

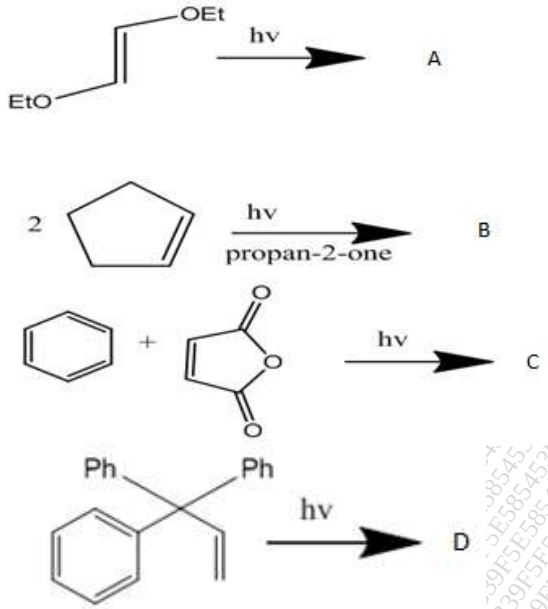
(b) Attempt any **one** of the following: **04**

(i) Complete the following reaction with mechanism.



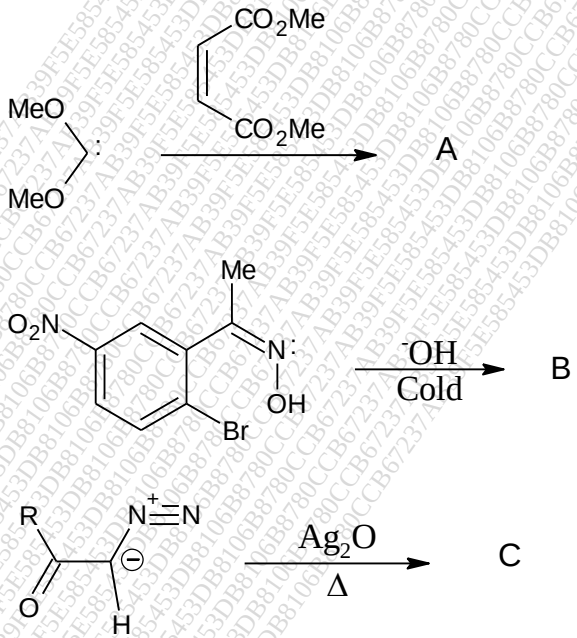
8106B8780CCB67237AB39F5E585453DB

(ii) Complete the following reactions. Give structure for A, B, C and D. (Mechanism NOT EXPECTED):



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

(a) Complete the following reactions and identify A, B and C:-



(b) Comment on selection rules for electrocyclic reactions by HUCKEL – MOBIUS method with respect to array of π electrons involved in 4n and (4n+2) system.

(c) Write a brief note on cheletropic reactions.

(d) Discuss formation of vitamin D from 7-dehydrocholesterol using pericyclic reaction.

e) Suggest the symmetry elements and point group present in naphthalene.

f) Explain the stereochemistry of reduction of cyclohexanone with hydrides.

g) Discuss with suitable example and mechanism: "Photo-Fries Rearrangement".

h) Explain the terms: Quantum Yield and Photosensitization

****

8106B8780CCB67237AB39F5E585453DB