Duration: 2hours 30 minutes **Total Marks: 60**

Instructions:
(1) All questions are compulsory.
(2) Figures to the right indicate full marks.

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

(i) Write mechanism of Schmidt rearrangement and discuss features of the intermediate involved.

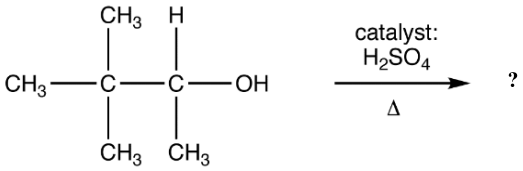
(ii) Explain why reaction of sodium 2-bromopropanoate with methanolic sodium methoxide results in formation of product with retention of configuration.

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

(iv) Draw the molecular orbitals of 1,3-butadiene and comment upon their symmetry properties.

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

(i) Complete the following reaction and give it's mechanism.



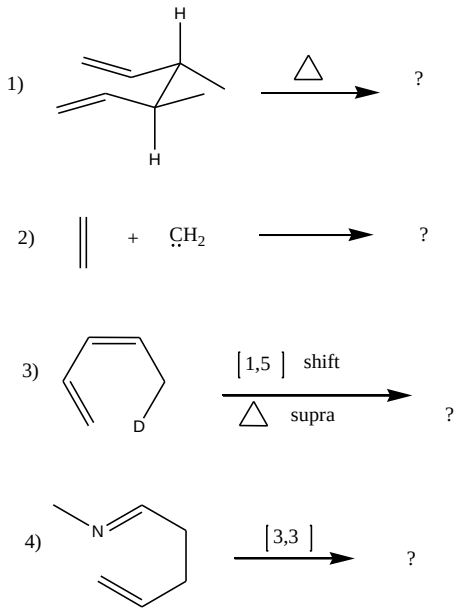
(ii) Explain the following:

A. Symmetry properties of molecular orbitals.

B. Conservation of molecular orbital symmetry in concerted reactions.

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

(i) Predict the products in following reaction:



(ii) Explain stereochemistry in [1,3] and [1,5] suprafacial sigmatropic hydrogen shift with suitable example.
(iii) Explain regioselectivity & Peri-selectivity in pericyclic reactions with suitable examples.
(iv) With the help of correlation diagram, explain dis-rotatory opening of cyclobutene.

(b) Attempt any **one** of the following: **04**
(i) Give the synthesis of Citral using pericyclic reactions.
(ii) Explain Diels-Alder reaction with suitable example. Describe the effects of substituents in Diels-Alder reaction.

Q. 3 (a) Attempt any **two** of the following: **08**
(i) Discuss the structural features of cis and trans hydrindane.
(ii) Draw all possible conformers of decaline. Explain why cis-decaline cannot be resolved through dissymmetric.
(iii) Draw the conformations of cyclooctane and discuss the evidence in favour of its most stable conformation.
(iv) State Bredt's rule. Explain why bicyclo [3.2.2]non-7-ene does not follow Bredt's rule.

(b) Attempt any **one** of the following: **04**
(i) Explain the stereochemistry of perhydroanthracenes.
(ii) Explain the stereochemistry of oxidation of cyclohexanol.

Q. 4 (a) Attempt any **two** of the following: **08**
(i) Draw and explain Jablonski diagram.
(ii) What are the photochemical quenchers? Discuss the principle involved in photoquenching process.
(iii) Discuss the cleavage of a bond β to carbonyl group in photochemical reactions of ketones. Give mechanism.
(iv) Discuss the mechanism and stereochemistry of Paterno-Buchi reaction.

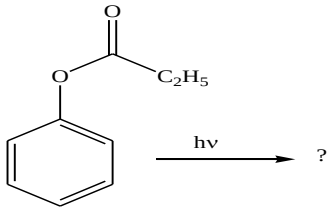
(b) Attempt any **one** of the following: **04**
(i) Explain the mechanism of di-π methane rearrangement.
(ii) Discuss singlet oxygenation reaction with two examples.

Q. 5 Attempt any **four** of the following: **12**
(a) Give any two methods for generation of ketenes. Give the reaction of ketene with ammonia.
(b) Justify the following statement:
The rate of acetolysis of trans-2-iodocyclohexylbrosylate is much faster than acetolysis of its cis isomer.
(c) Explain cope & aza-Cope rearrangement with suitable example.
(d) Explain ring closer reaction of 4 π electron system under thermal & photochemical condition with suitable example.

(e) Suggest the symmetry elements and point group present in 1,3-dimethylallene.

(f) Explain the stereochemistry of steroids.

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



(h) Explain :- cis-trans isomerization and photochemical cross-coupling.

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