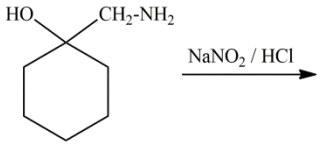
Duration: 2 ½ Hrs. **Total Marks: 60**

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

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

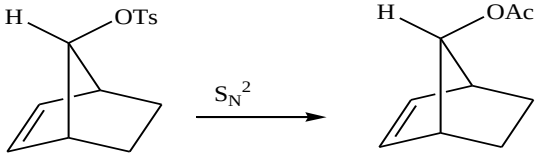
(i) Explain molecular orbital basis for the α-effect.

(ii) Predict the product formed in the following reaction and suggest a possible mechanism.



(iii) Give reaction for generating aryne from
(I) Phthalic anhydride (II) 1-aminobenzotriazole
What is the action of the following on benzyne?
(I) Anthracene (II) Furan

(iv) Explain the following reaction with mechanism:



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

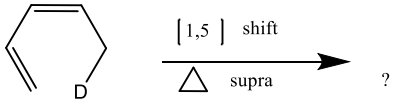
(i) Explain any four features of Pericyclic reactions with suitable examples.

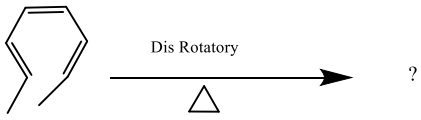
(ii) Draw the molecular orbitals of 1,3,5-hexatriene and comment upon their symmetry properties.

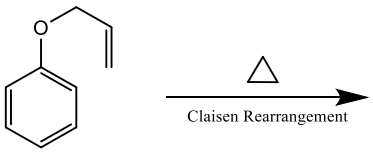
Q. 2 **(a)** **Attempt any two of the following:** **08**

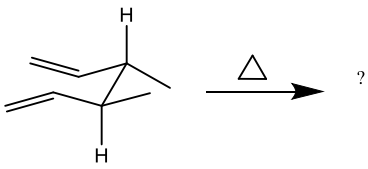
(i) What are the ENE-reactions? Explain with any two suitable examples.

(ii) Predict the products in following reaction:







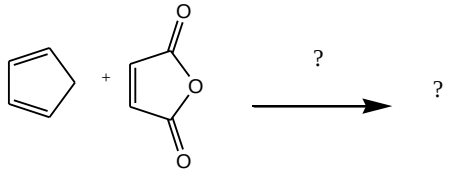


(iii) Explain regioselectivity & Peri-selectivity in pericyclic reactions with suitable examples.

(iv) Explain symmetry approach in the ring closer reaction of 1,3 – Butadiene using correlation diagram approach.

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

(i) Complete the following reaction & explain the stereochemistry involved.



(ii) Give the synthesis of Citral using pericyclic reactions.

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

(i) Assign the point groups to the following molecules:
CH_2Cl_2, CH_4, staggered ethane and $CHCl_3$

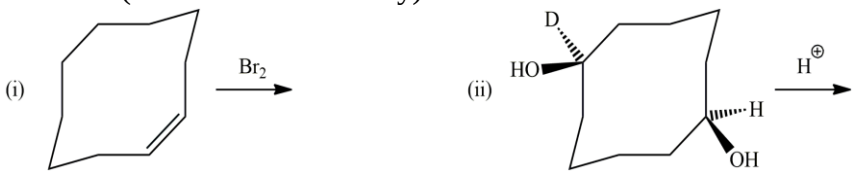
(ii) Discuss the conformational features of cyclddecane ring system.

(iii) Explain the stereochemistry and stability of hydrindane.

(iv) "Dehydrochlorination of menthyl chloride is slower than neomenthyl chloride." Explain this observation.

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

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



(ii) Draw all the diastereomers of perhydroanthracene and comment on optical activity of each diastereomer.

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

(i) What are photochemical quenchers? Discuss the principle involved in photoquenching process.

(ii) Discuss the cleavage of a bond β to the carbonyl group in photochemical reactions of ketones with a suitable example.

(iii) Explain the mechanism of di-π methane rearrangement.

(iv) Explain the two examples of the following reactions with mechanism: -
I) photodimerisation reaction
II) 1, 4 addition reaction of arenes

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

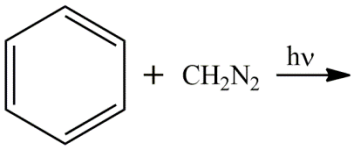
(i) What is Paterno-Buchi reaction? Give its mechanism and stereochemical consequences.

(ii) Explain the process of chemiluminiscence with examples.

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

(i) Draw the molecular orbitals of allyl system and ethylene. Comment upon their symmetry properties.

(ii) Explain structure of carbene. Predict the product/s of following reaction.



(iii) What are Chelatropic reactions? Explain with suitable examples.

(iv) Define Retro – Diels-Alder reaction. Explain the effect of substituents in Diels-Alder reaction.

(v) Explain I strain concept with examples.

(vi) Explain Bredt's rule with two examples.

(vii) What is Photo-Fries rearrangement? Give examples.

(viii) Write a note on photo-oxygenation reactions.

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