

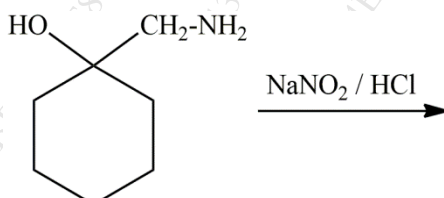
(2½ Hours)

Total Marks: 60

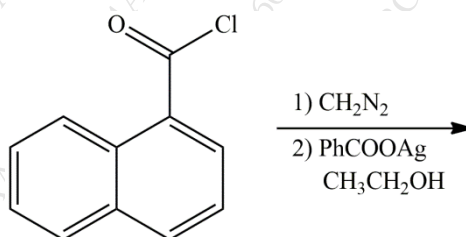
Instructions:

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

- Q. 1 (a) Attempt any **two** of the following: 08
 (i) Predict the product formed in the following reaction and suggest a plausible mechanism.



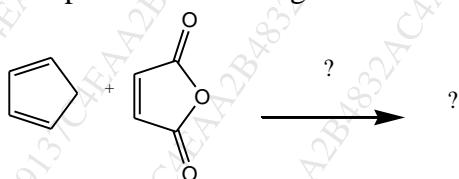
- (ii) Give stereochemical evidence for NGP reaction with a suitable example.
 (iii) Explain molecular orbital basis for the α -effect.
 (iv) Predict the product formed in the following reaction and suggest a plausible mechanism.



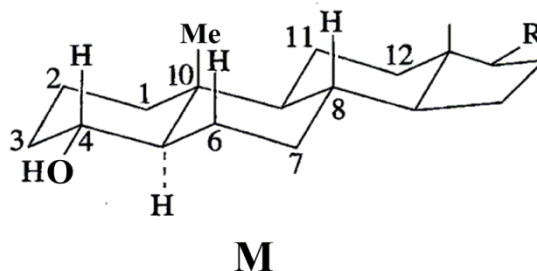
- (b) Attempt any **one** of the following: 04
 (i) Draw the molecular orbitals of 1,3,5-hexatriene and comment upon their symmetry properties.
 (ii) Explain any four features of Pericyclic reactions with suitable examples.

- Q. 2 (a) Attempt any **two** of the following: 08
 (i) Explain the mechanism of Claisen rearrangement with suitable example.
 (ii) With the help of FMO approach, show that $[4+4] \pi$ cycloaddition reaction is photochemically allowed reaction.
 (iii) Explain symmetry approach in the ring closer reaction of 1,3-Butadiene using correlation diagram approach.
 (iv) Discuss the Sigma-tropic rearrangements with respect to $[1,3]$ & $[1,5]$ shift with suitable example.

- (b) Attempt any **one** of the following: 04
 (i) Give the synthesis of Vit-D from 7-dehydrocholesterol.
 (ii) Complete the following reaction & explain the stereochemistry involved.

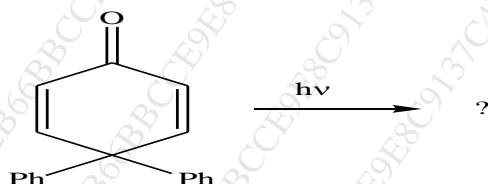


- Q. 3 (a) Attempt any **two** of the following: 08
- Discuss the conformation and stereochemistry of D-ring in steroids.
 - What is meant by torsional angle of junction? Explain it with respect to decalin. Draw the conformation of cis-decalin exhibiting ring inversion and torsional angle of junction.
 - Explain the influence of conformation in the deamination of 2-aminocyclohexanol.
 - Cholestan-4 α -ol (**M**) is oxidized by chromic acid twice fast than cholestan-3 β -ol. Elucidate this observation by giving chromic acid mechanism.



- (b) Attempt any **one** of the following: 04
- Draw the conformers of cyclononane and give the evidences of its most stable conformer.
 - Reduction of cyclohexanone with LiAlH_4 is faster as compared to reduction of cyclodecanone. – Explain this observation with suitable diagrams.

- Q. 4 (a) Attempt any **two** of the following: 08
- Explain the mechanism of photosensitization.
 - Explain the following: -
 - Quantum Yield
 - Norrish-II Cleavages
 - Give mechanism of the following reaction.

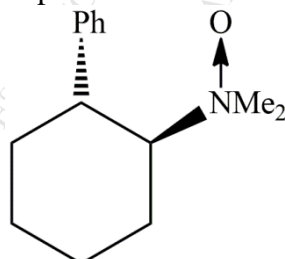


- (iv) Discuss the mechanism and stereochemistry of Paterno-Buchi reaction.

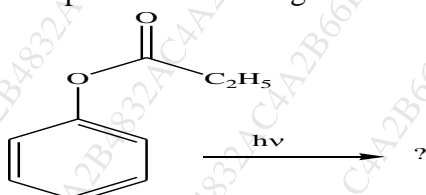
- (b) Attempt any **one** of the following: 04
- Explain the following reactions with examples:
 - Cis-trans isomerization
 - Photodimerisation
 - Explain the two examples of the following reactions with mechanism: -
 - Singlet oxygenation reaction
 - 1, 4 addition reaction of arenes

- Q. 5 Attempt any **four** of the following: 12
- Write the reaction of generation of carbene. Explain the stability of carbene.
 - Discuss the role of FMO in reactions involving hard and soft nucleophiles and electrophiles.

- (c) What is Diel's Alder & Retro Diel's Alder reaction? Explain both with suitable example of each.
- (d) What are Chelotropic reactions? Explain with suitable example.
- (e) Suggest the symmetry elements and point group present in (R)-1,3-dichloroallene.
- (f) Explain the stereochemistry and the formation of major product by Cope elimination of following compound:



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



- (h) Complete the following reactions:

