K-5/2110 7405/N

PHOTOCHEMISTRY AND PERICYCLIC REACTIONS-321
(SEMESTER-3rd)

Maximum Marks: 55
Time allowed: 2 Hours

Note: Attempt any four questions. All questions carry equal marks.

Q. 1 Define the following photochemical processes with suitable examples:

(a) Singlet and Triplet states **4.75 marks**

(b) Quantum Efficiency **3 marks**

(c) Quenching **3 marks**

(d) Energy Transfer **3 marks**

Q. 2 (a) What is Jablonski Diagram? Draw this diagram in a systematic way and also explain the various term involved therein. **9 marks**

(b). Elaborate the phenomena of "Detection of Intermediates" with the help of suitable photochemical reactions.

4.75 marks

Q. 3 (a) What are Norrish Type-II Reactions? Describe the mechanism of the various photoproducts formations by taking appropriate examples in favor of your answer. **9 marks**

(b). Describe the Photocyclodimerization of Aromatic compounds by taking examples.

4.75 marks

Q. 4 (a) Explain the Intermolecular Cycloaddition Reactions of conjugated dienes in the presence of a photosensitizer. Provide your answer with the help of appropriate photochemical reactions

7 marks

(b). Describe the mechanism and product formations in the [2+2] photocycloaddition reactions of carbonyl compounds with appropriate olefins. **6.75 marks**

Q. 5 (a) Describe the various photoproducts formations and their mechanisms when benzene molecule is photoirradiated. **7 marks**

(b). Explain the photochemistry of 2,2,6-trimethyl-cyclohexanone. Provide the appropriate mechanism of the various photoproducts obtained in this reaction. **6.75 marks**

Q. 6 (a) Explain the Sigmatropic Rearrangements of β,γ-unsaturated ketones by taking at least three examples. **7 marks**

(b). Describe the role of FMO approach in the analysis of suitable Dipolar Cycloaddition Reactions. **6.75 marks**

Q. 7 Explain the following reactions involving ionic transition state with suitable examples:

(a) Cycloaddition reactions **5 marks**

(b) Sigmatropic reaction **4.75 marks**

(c). Electrocyclic reactions **4 marks**

Q. 8 What is Perturbational Molecular Orbital approach? How this theory helpful in the analysis of pericyclic reactions? Describe your answer by taking the analysis of suitable chemical reactions. **13.75 marks**

Q. 9 (a) Describe the photoreduction reactions of "Acetone" and "Benzophenone" with their suitable mechanisms. **5 marks**

(b) Discuss the product of reaction when Acetophenone is treated with Cyclohexene in the presence of dry toluene as the solvent. **4 marks**

(c). What is Cope Rearrangement? How will you analyze this rearrangement by using the Frontier Molecular Orbital Approach? **4.75 marks**