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Total No. of Pages : 3

**PC 13101-N**

**L-3/2111**

**PHOTOCHEMISTRY AND PERICYCLIC REACTIONS—321**

**Semester—III**

Time Allowed : Three Hours]

[Maximum Marks : 55

**Note** :- Attempt *five* questions only selecting *two* questions from each of Section A and B. Section C is compulsory.

**SECTION—A**

- I. (a) How to ascertain the presence of singlet and triplet states in photochemical excitation ? 4
- (b) Give two different examples of detection of intermediate for studying the mechanism of the photochemical reaction. 4
- II. Discuss the photophysical processes in details as a result of fate of excited molecule using modified Jablonski diagram. 8
- III. (a) Discuss :
- (i) Chelotropic reaction, and
- (ii) Degenerate Cope rearrangement using FMO approach. 4
- (b) Describe peripatetic cyclopropane bridge involving ionic transition state. 4

- IV. Discuss one example each of electrocyclic reaction and cycloaddition reaction involving ionic transition states and explain application of Evan's and Dewar's rules for these reactions. 8

**SECTION—B**

- V. (a) Explain the product(s) formation in photoreduction of carbonyl compound involving inter and intramolecular hydrogen abstraction. 4½  
(b) Discuss the photoaddition of (i) cyclopentenone and (ii) carvone. 4
- VI. (a) Write the product of cycloaddition reaction under thermal condition between cyclopentadiene and acrolein and explain the stereochemistry. 4½  
(b) Give two examples of oxetane formation by photoaddition of excited carbonyl compound with enoether. 4
- VII. (a) Discuss the photochemical cis-trans isomerization of alkenes. 4  
(b) Write the products(s) of photorearrangement of 2, 4-cyclohexadienones with justification. 4½
- VIII. (a) Discuss the photochemical reactions of cyclobutanone. 4  
(b) Explain the sigmatropic isomerization and sigmatropic rearrangement of  $\beta$ ,  $\gamma$ -unsaturated enone. 4½

**SECTION—C**

- IX. (a) Define and explain symmetry-forbidden transition.  
(b) How the selection of sensitizer is made for studying the mechanism of photochemical reaction ?

- (c) How an intermediate is detected in photochemical reaction ?  
(d) Discuss the reaction conditions of group transfer pericyclic reaction.  
(e) Define and explain PMO approach with suitable example.  
(f) Explain most useful application of Evan's and Dewar's rules to pericyclic reactions.  
(g) Provide an example of photocyclodimerisation of aromatic compound.  
(h) How cis-trans isomerization of cycloalkene is carried out ?  
(i) Write the product of photochemical reaction between bicyclo [2.2.1] hept-2, 5-diene and ethene.  
(j) What is photovalence isomerization ?  
(k) Write the photolysis products of 2E, 4E-hexadiene.

11×2=22