

Roll No. \_\_\_\_\_

**M. Sc. CHEMISTRY**  
**SCHOOL OF CHEMICAL AND LIFE SCIENCES**  
**SEMESTER III EXAMINATION -2019**  
**PAPER TITLE: PHOTOCHEMISTRY AND PERICYCLIC REACTIONS**  
**PAPER CODE: MCHCCO-303**

**Time: 3hrs**

**Max. marks: 75**

**(Write your Roll No. on the top immediately on receipt of this question paper)**

**Q1. Answer briefly**

**1.5 x 10 = 15**

- i) What are the appropriate reasons for the deviation from the Beer's law?
- ii) How do endoperoxides (APO) act as actinometers?
- iii) What is Stokes shift?
- iv) Write the statement of second law of photochemistry.
- v) Is Diels Alder reaction photochemically allowed? Give reason
- vi) What is a sigmatropic rearrangement?
- vii) What is con and disrotatory movement of orbitals? Illustrate with examples
- viii) What is quenching?
- ix) Give  $\pi$  molecular orbital diagram of 1,3,5,7-octatetraene
- x) What is Alder's endo rule? Give example

**Q2. Answer any three of the following**

**5 x 3 = 15**

- A. Discuss what could be the different possible fates of an excited molecule
- B. Explain the mechanism and kinetics of photochemical interaction of hydrogen and chlorine
- C. How is Quantum yield of a photochemical reaction determined?
- D. Differentiate between adiabatic or diabatic photochemical reactions?
- E. What are chemical actinometer systems?

**Q3. Answer any three of the following**

**5 x 3 = 15**

- A. What are non-equilibrating excited rotamers (NEER)?
- B. Give a synthetic application of photochemical geometric isomerization of alkenes
- C. Acyclic dienes, in general, undergo the Zimmerman reaction from the excited singlet state, justify
- D. Give mechanism of Norrish Type II process.
- E. Discuss the photochemical addition of cyclic enones to alkenes.

**Q4. Answer any three of the following**

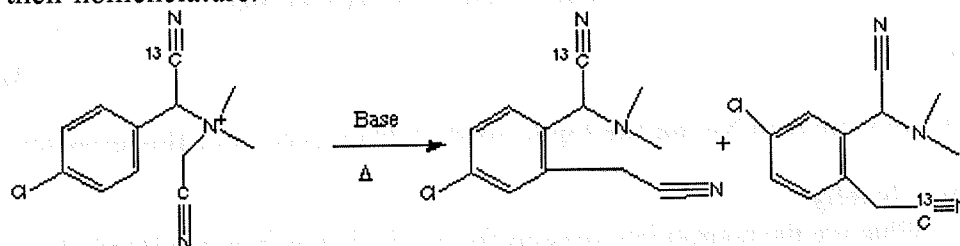
**5 x 3 = 15**

- A. Which are the major classes of photochemical reaction for aromatic compounds, Give one example of each?
- B. Discuss the photochemical reactions in smog
- C. How can Norrish reactions lead to degradation in polymer structure?
- D. How is cis trans isomerization about a double bond involved in our vision?
- E. How can singlet oxygen be used as a versatile synthetic reagent?

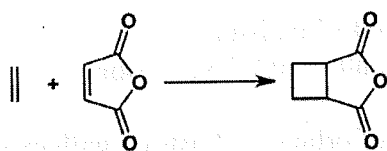
**Q5. Answer any three of the following**

**5 x 3 = 15**

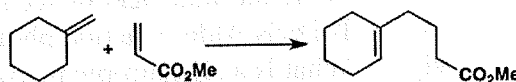
- A. When compound **1** is treated with base and heated, it rearranges to give the products shown. The  $^{13}\text{C}$  isotope is distributed unequally between two products. Explain this result in mechanistic terms, and clearly indicate the type of reactions occurring and their nomenclature.



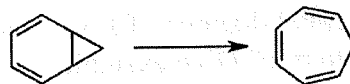
- B. Which of the following reactions is **not** thermally allowed and why?



(a)

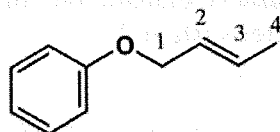


(b)



(c)

- C. What product would (2*E*, 4*E*, 6*E*)-1,3,5-hexatriene give upon heating or absorption of light?
- D. Which side-chain carbon makes a new bond to the benzene ring upon Claisen rearrangement of the following allylic phenyl ether? Give the mechanism



- A. Give classification of pericyclic reactions, with one example each.

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