Exam. Code : 210403
Subject Code : 3824

M.Sc. (Chemistry) 3rd Semester

PHOTOCHEMISTRY AND PERICYCLIC REACTIONS

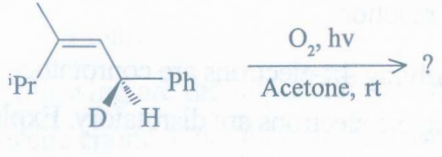
Course–XX

Time Allowed—3 Hours] [Maximum Marks—50

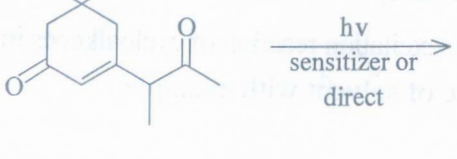
SECTION—A

Note :— All questions are compulsory. Each question carries **1** mark.

1. What is difference between prompt and delayed fluorescence ?
2. In spectral term, what is the basic requirement for efficient energy transfer between donor and acceptor ?
3. Draw excited state model structure of alkene.
4. Write the possible product(s) for the following reaction :

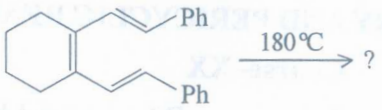


5. Draw LUMO orbital of 1,3-butadiene.
6. Write the possible product(s) for the following reaction :



7. For butadiene-cyclobutene transformation axis of rotation is maintained during disrotatory of conrotatory process.

8. Write the possible product(s) for the following reaction :



9. What is photoenolization ?

10. What is Beer-Lambert Law ?

SECTION—B

Note :— Attempt any **EIGHT** questions. Each question carries **3** marks.

11. What is Cheleotropic reaction ? Discuss this reaction by citing suitable examples.

12. What is Cycloaddition and 1,3-dipolar cycloaddition reaction ? Discuss the effect of substituents on the rate of cycloaddition reaction.

13. Reactions involving 4π-electrons are conrotatory whereas those involving 6π-electrons are disrotatory. Explain with example that this statement is correct or not.

14. Construct orbital symmetry correlation diagram for $[\pi^2_s + \pi^4_s]$ cycloaddition of ethene and 1,3-butadiene.

15. Explain photoexcitation reaction of cycloalkenes in absence and presence of solvent with example.

16. Explain different methods used for the determination of photochemical mechanisms.

17. Discuss fragmentation reactions of photoexcited carbonyl group (saturated cyclic or acyclic)

18. Explain photochemical rearrangement reactions of linear-conjugated cyclohexadienone.

19. Discuss photochemical [2 + 2] cycloaddition reaction of ketones/aldehydes with alkenes.

20. Explain mechanism of photolysis reaction of organic nitrites with examples.

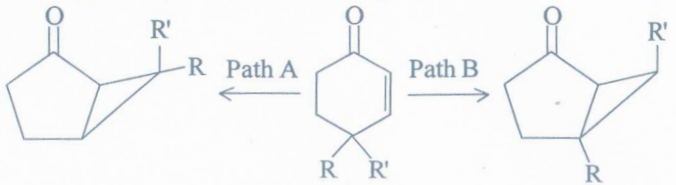
21. Discuss photochemical cycloaddition reactions of cyclic α,β-unsaturated ketone with examples.

22. Discuss types of electronic excitation available for most organic molecules with complete discussion and examples.

SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **8** marks.

23. Following are the important rearrangement reactions of cyclic enone. Give their names, mechanism and provide detailed discussion with examples :



(A) (B)

24. What are sigmatropic rearrangements ? Discuss with mechanism [3, 3] sigmatropic rearrangements in 1,5-hexadiene systems with or without oxygen. Also discuss in detail the stereochemical aspects in these rearrangements.

25. Discuss with examples the possible chemical pathways that can be taken by an excited molecule (*please note that photochemistry is largely the chemistry of triplet state*).

26. Discuss *cis-trans* mechanism and photobleaching process of chromophore in Rhodopsin (vision).