

**PARUL UNIVERSITY**  
**FACULTY OF APPLIED SCIENCE**  
**M.Sc. Summer 2018-19 Examination**

**Semester: 3**  
**Subject Code: 11205201**  
**Subject Name: Pericyclic Reactions, Photochemistry and Free Radicals**

**Date: 02/04/2019**  
**Time: 02:00 pm to 04:30 pm**  
**Total Marks: 60**

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

**Q.1. A) Essay type/ Brief note (4x2) (Each of 04 marks) (08)**

- (a) Draw energy correlation diagram of 1,3,5-hexatriene showing electronic configurations in ground state and excited state in HOMO and LUMO.
- (b) Discuss in detail the Molecular Orbitals (MOs) of allyl system.

**Q.1. B) Answer the following questions (Any two)**

- (a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks) (04)
  1. Draw and explain the dis- and con-rotatory motion of orbitals?
  2. Explain Gomberg reaction with suitable example.
- (b) Explain Cope rearrangement with suitable example. (04)
- (c) What are the laws of photochemistry? (04)

**Q.2. A) Answer the following questions.**

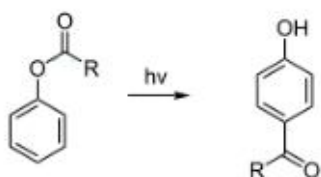
- (a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks) (04)
  1. What are non-radiative transitions?
  2. What are fluxional molecules?
- (b) Why thermal 2+2 cycloaddition of ethylene (ethene) is forbidden whereas photochemically allowed? (04)

**Q.2. B) Answer the following questions (Any two)**

- (a) Choose the correct option- (Each of 01 marks) (03)
  1. Number of nodes present in LUMO of 1,3-butadiene  
i) 0 ii) 1 iii) 2 iv) 3
  2. Bullvalene formula is-  
i) C<sub>5</sub>H<sub>10</sub> ii) C<sub>10</sub>H<sub>10</sub> iii) C<sub>5</sub>H<sub>20</sub> iv) C<sub>10</sub>H<sub>20</sub>
  3. Examples of sigmatropic rearrangements  
i) Cope rearrangement ii) Claisen rearrangement iii) Carroll rearrangement
- (b) Explain the mechanism of fluorescence and phosphorescence (03)
- (c) Explain Woodward–Hoffman sigmatropic shift nomenclature. (03)

**Q.3. A) Answer the following question in brief (08)**

- (a) Discuss in detail the Molecular Orbitals (MOs) of allyl system.
1. (b) Give name and mechanism of the below reaction.

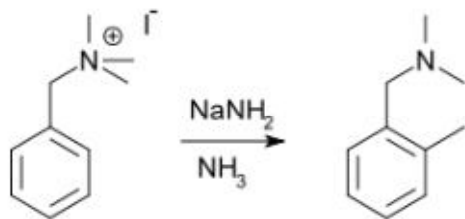


**Q.3. B) Answer the following questions (Any two)**

(a) Short note/ Brief note (2x2)/ Schematically label the figures (2x2) (Each of 02 marks)

**(04)**

1. Give the name of the below reaction.



2. What do you mean by Suprafacial and Antrafacial interactions?

(b) Explain with suitable diagram why the thermal [2+2] cycloaddition of ethylene (ethene) is forbidden whereas photo-chemically allowed? **(04)**

(c) Explain Claisen rearrangement of allyl vinyl ether. Why this reaction is irreversible? **(04)**

**Q.4. A) Answer the following questions.**

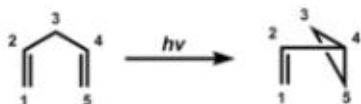
(a) Short note/ Brief note (2x2)/ Fill in the blanks. (Each of 02 marks)

**(04)**

1. Draw a well labeled Jablonski Diagram?

2. What is beer lambert law? What are the limitations of this law?

(b) Give the name and mechanism of the below reaction. **(04)**



**Q.4. B) Answer the following questions (Any two)**

(a) Short note/ Multiple choice questions. (Each of 01 marks)

**(03)**

1. For highest energy MO which is/are correct-

i) It has zero nodes    ii) All p orbitals in same phase    iii) Both of these

2. "No-mechanism" reaction is another name for \_\_\_\_\_

3. Stability of free radicals is due to \_\_\_\_\_

(b) What are FMOs? **(03)**

**(03)**

(c) Discuss  $\pi \rightarrow \pi^*$  transitions in ethene, 1,3-butadiene, and 1,3,5-hexatriene. **(03)**

**(03)**