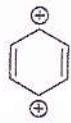
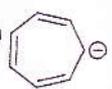
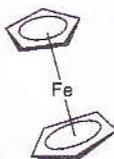


		<b>Sanjay Ghodawat University, Kolhapur</b> Established as State Private University under Govt. of Maharashtra. Act No XL, 2017		2018-19
<b>Year and Program:</b> MSc Chem		<b>School of Science</b>		<b>Department of Chemistry</b>
<b>Course Code:</b> CHS 602		<b>Course Title:</b> Theoretical Organic Chemistry, Pericyclic reactions & Photochemistry		<b>Semester – Even (IV)</b>
<b>Day and Date:</b> 21 May, 2019 Tuesday		<b>End Semester Examination</b>		<b>Time: 3 hrs, Max Marks: 100</b> 2:30 pm to 3:00 pm
<b>PRN:</b>		<b>Seat No:</b>		<b>Section A Marks out of 20:</b>
<b>Jr. Supervisor Signature</b>		<b>Student Signature</b>		

### Section A

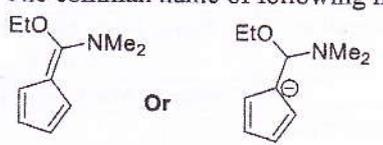
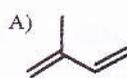
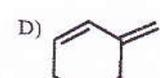
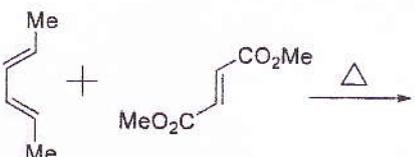
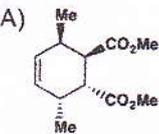
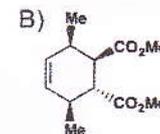
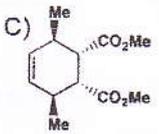
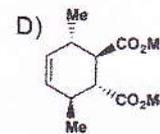
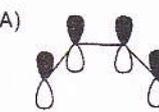
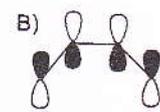
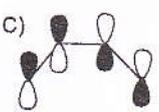
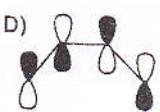
- Instructions:**
- 1) All Questions are compulsory.
  - 2) For MCQs mark/tic ( $\surd$ ) for correct answer. No marks for multiple tics ( $\surd$ ).
  - 3) Section A should be submitted to Jr Supervisor immediately after first 30 Min.

- Q.1 Multiple choice questions.**
- |  | Marks     | level | CO |
|--|-----------|-------|----|
|  | <b>20</b> |       |    |
| 1 “Bonding molecular orbital are having less energy than antibonding molecular orbitals”   | 01        | L1    | 1  |
| A) The above statement is true.<br>B) The above statement is false.<br>C) It is can not predictable.<br>D) All of the above.   |           |       |    |
| 2 Which of the following molecule is planer.   | 01        | L2    | 1  |
| A)  B)  C)  D) All of the above |           |       |    |
| 3 ... number of the $\pi$ electron are in the following molecule   | 01        | L1    | 1  |
|   |           |       |    |
| A) 10 $\pi$ electron<br>B) 6 $\pi$ electron<br>C) 8 $\pi$ electron<br>D) None of the above   |           |       |    |
| 4 The following molecule will give .... $^1\text{H}$ NMR signal  | 01        | L1    | 2  |



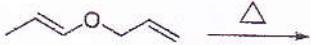
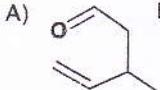
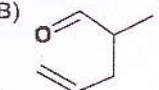
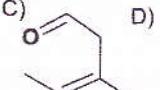
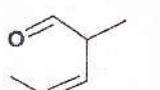
**ESE**

A) One B) Two C) Five D) Ten

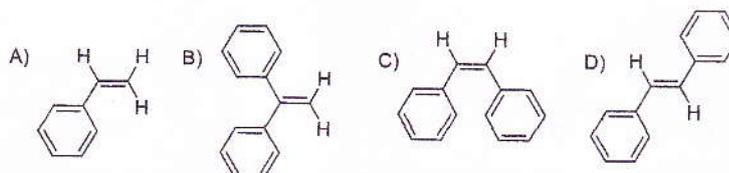
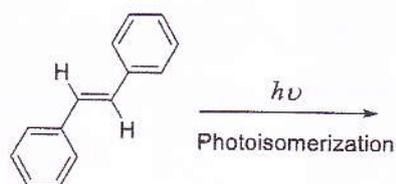
- 5  $^1\text{H-NMR}$  of tropylium cation shows the singlet at  
 A) 9.8 ppm  
 B) 7.5 ppm  
 C) 7.2 ppm  
 D) 5.5 ppm 01 L2 2
- 6 The common name of following molecule is...  
 Or  
 A) Fullerenes  
 B) Fulvenes  
 C) Tropolone  
 D) None of above 01 L1 2
- 7 Which of the following Dienes cannot undergo Diels-Alder reactions?  
 A)  B)  C)  D)  01 L1 3
- 8 Find suitable adduct is the main product of the following Diels-Alder reaction?  
  
 A)  B)  C)  D)  01 L2 3
- 9 Which of the following molecular orbital picture is HOMO for 1,3-Butadiene?  
 A)  B)  C)  D)  01 L2 3
- 10 Which of the following is correct statement for Pericyclic reactions?  
 A) Concerted, cyclic transition state, single step  
 B) Non-concerted, cyclic transition state, single step 01 L1 3

C) Concerted, cyclic transition state, two steps

D) Non-concerted, non-cyclic transition state, single step

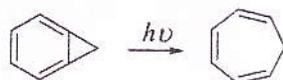
- 11 Identify the product for the following sigma tropic rearrangement. 01 L2 3
- 
- A)  B)  C)  D) 
- 12 Pericyclic reaction involves ... reactive intermediates. 01 L1 3
- A) Cation  
B) Anion  
C) Radical  
D) None of the above
- 13 How many MO's are involved in 1,3-butadiene pericyclic reaction. 01 L1 3
- A) Four  
B) Six  
C) Eight  
D) Zero
- 14 Which wavelength of light is used for photochemical reactions 01 L1 4
- A) 200-800 nm  
B) 200-800 mm  
C) 1-100 nm  
D) All of the above
- 15 Molecular spin in singlet excited state is... 01 L1 4
- A) 1  
B) 5  
C) 7  
D) 3
- 16 ..... phenomenon happens when molecule returns from excited state to ground state without going into ISC. 01 L2 4
- A) Phosphorescences  
B) Fluorescences  
C) Neutral  
D) None of above
- 17 The compound absorbs light and initiates the photochemical reaction called as 01 L2 4
- A) Photosensitizer  
B) Activator  
C) Catalyst  
D) All of above
- 18 What is the product of the following reaction 01 L2 4

ESE



19 The name reaction exist in the following scheme is....

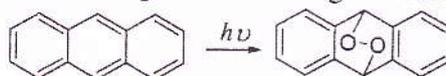
01 L2 4



- A) Cope  
 B) Oxe-Cope  
 C) Fries Rearrangement  
 D) None of above

20 Find the reagent for following reaction.

01 L2 4

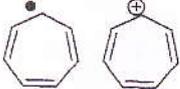
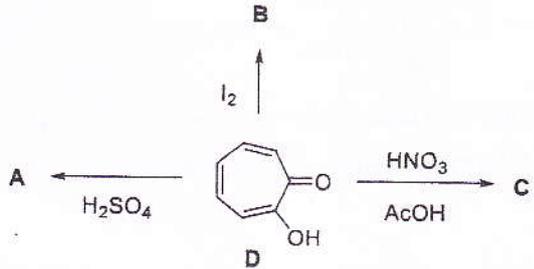


- A)  $^1\text{O}_2$  B)  $\text{O}_2$  C) Singlet oxygen D) A, B and C

**ESE**

	<b>Sanjay Ghodawat University, Kolhapur</b> Established as State Private University under Govt. of Maharashtra. Act No XL, 2017	2018-19
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<b>Course Code:</b> CHS 602	<b>Course Title:</b> Theoretical Organic Chemistry, Pericyclic reactions & Photochemistry	<b>Semester – Even (IV)</b>
<b>Day and Date:</b> 21 May, 2019 Tuesday	<b>End Semester Examination</b>	<b>Time:</b> 3 hrs, Max Marks: 100 3:00 to 5:30 PM
<b>PRN:</b>	<b>Seat No:</b>	<b>Section B Marks out of 80</b>

## Section B

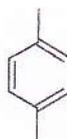
- |            |   | Marks     | level | CO |
|------------|---|-----------|-------|----|
| <b>Q.2</b> | <b>Attempt the following (any Two)</b>  | <b>12</b> |       |    |
| a)         | Explain the term aromatic, anti-aromatic and homo-aromatic with example.                                      | 06        | L2    | 1  |
| b)         | Comment on stability of following by calculating the energy difference between HOMO and LUMO orbitals.        | 06        | L2    | 1  |
|            |                            |           |       |    |
| c)         | Calculate the delocalization energy of following species and compare the stability according to Huckel theory | 06        | L2    | 1  |
|            |                            |           |       |    |
| <b>Q.3</b> | <b>Attempt the following (any Two)</b>  | <b>12</b> |       |    |
| a)         | Write the structure of A, B, C and depict one preparation method for D from following scheme                  | 06        | L2    | 2  |
|            |                            |           |       |    |
| b)         | Give any three methods to prepare following non benzenoid aromatic compounds.                                 | 06        | L2    | 2  |



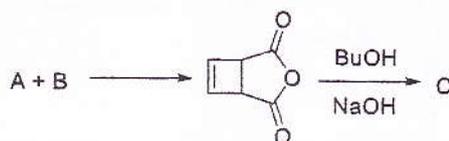
- c) What is mean by annulene and give explanation for formula [14] Annulene and write the  $\delta$  ppm value for  $^1\text{H}$  NMR signal of following non benzenoids? 06 L3 2



- Q.4 a) **Attempt the following (any Two)** 12  
 i) Explain the FMO approach for electrocyclic reaction for following example. 06 L3 3

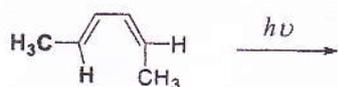


- ii) Explain the following terms 06 L3 3  
 a) Conrotatory and Disrotatory b) HOMO and LUMO  
 iii) Explain with help of FMO approach "Diels-Alder reaction is thermally allowed and photochemically forbidden" with any one example. 06 L3 3  
 b) **Attempt the following (any Four)** 16  
 i) Define Woodward-Hoffmann selection rule for electrocyclic reactions. 04 L4 3  
 ii) Find A, B, C 04 L4 3



- iii) What is the endo-rule as applied to Diels-Alder reaction? 04 L4 3  
 iv) Write the products of the following electrocyclic reaction with their stereochemistry. 04 L5 3

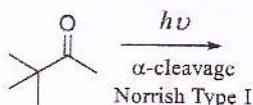
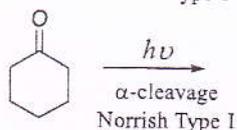
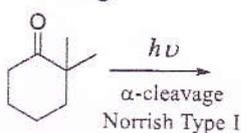
**ESE**



- v) Depict the conrotatory ring closure of 2E, 4E-hexadiene and predict the stereochemistry of product. 04 L5 3

**Q.5 a) Attempt the following (any Two)** 16

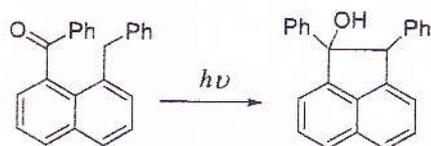
- i) What is photochemistry and explain the term excited state. Explain the Jablonski diagram for photochemical reaction. 08 L4 4
- ii) What is Norrish Type-I reaction. Depict the product for following. 08 L5 4



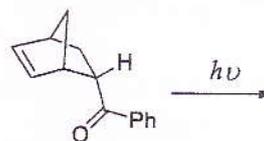
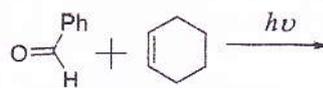
- iii) Explain the Norrish Type II process in photochemistry. 08 L4 4

**b) Attempt the following (any Three)** 12

- i) What is photosensitizer in photochemical reaction, explain with example. 04 L4 4
- ii) Explain the Norrish Type I with symmetrical ketone at various temperature condition. 04 L4 4
- iii) Draw the plausible mechanism of following reaction. 04 L6 4



iv) Complete the following reaction with mechanism.



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**ESE**