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

Section A

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

Q.1 Multiple choice questions.

Marks level CO

20

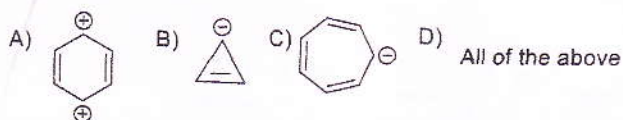
- 1 "Bonding molecular orbital are having less energy than antibonding molecular orbitals"

01 L1 1

- A) The above statement is true.
 B) The above statement is false.
 C) It is can not predictable.
 D) All of the above.

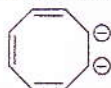
- 2 Which of the following molecule is planer.

01 L2 1



- 3 ... number of the π electron are in the following molecule

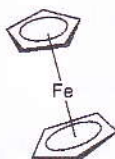
01 L1 1



- A) 10 π electron
 B) 6 π electron
 C) 8 π electron
 D) None of the above

- 4 The following molecule will give ^1H NMR signal

01 L1 2



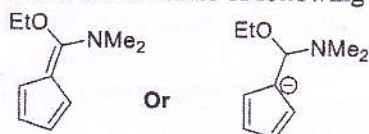
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A) One B) Two C) Five D) Ten

- 5 $^1\text{H-NMR}$ of tropylium cation shows the singlet at 01 L2 2

A) 9.8 ppm
 B) 7.5 ppm
 C) 7.2 ppm
 D) 5.5 ppm

- 6 The common name of following molecule is... 01 L1 2

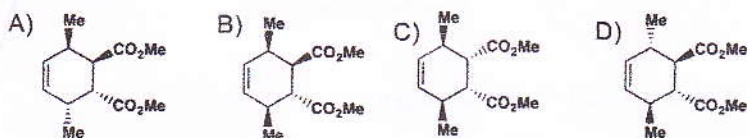
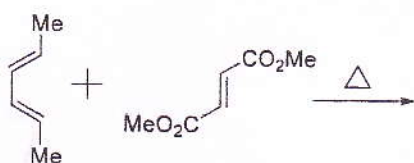


A) Fullerenes
 B) Fulvenes
 C) Tropolone
 D) None of above

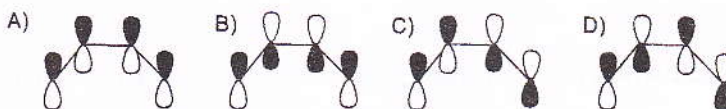
- 7 Which of the following Dienes cannot undergo Diels-Alder reactions? 01 L1 3



- 8 Find suitable adduct is the main product of the following Diels-Alder reaction? 01 L2 3



- 9 Which of the following molecular orbital picture is HOMO for 1,3-Butadiene? 01 L2 3



- 10 Which of the following is correct statement for Pericyclic reactions? 01 L1 3

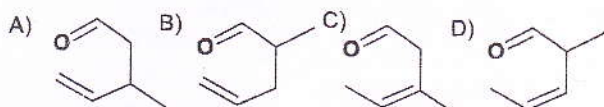
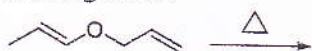
A) Concerted, cyclic transition state, single step
 B) Non- concerted, cyclic transition state, single step

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



- 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 involves in of 1,3-butadiene pericyclic reaction.

01 L1 3

- A) Four
B) Six
C) Eight
D) Zero

- 14 Which wavelength of light uses 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 return 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 absorb light and initiate the photochemical reaction called as

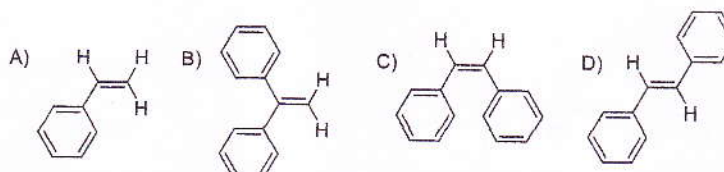
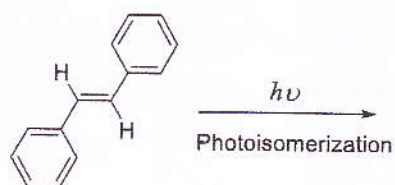
01 L2 4

- A) Photosensitizer
B) Activator
C) Catalyst
D) All of above

- 18 What is the product of following reaction

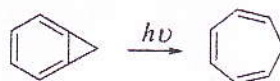
01 L2 4

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

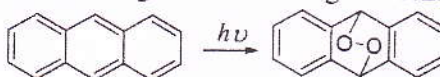
01 L2 4



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


20 Find the reagent for following reaction.

01 L2 4




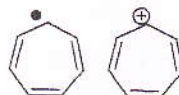
- A) $^1\text{O}_2$
- B) O_2
- C) Singlet oxygen
- D) A, B and C

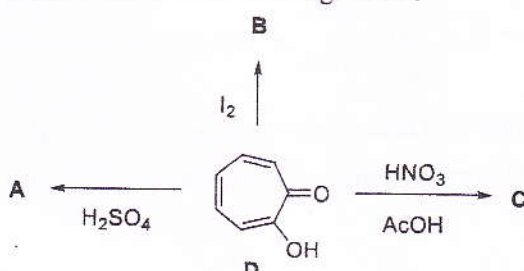
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PRN:	Seat No:	Section B Marks out of 80	

Section B

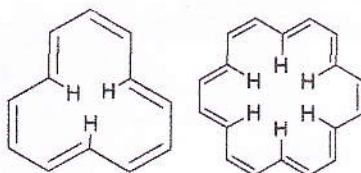
- | | | Marks | level | CO |
|------------|---|-----------|-------|----|
| Q.2 | Attempt the following (any Two) | 12 | | |
| a) | Explain the term aromatic, anti-aromatic and homo-aromatic with example. | 06 | L2 | 1 |
| b) | Comment on stability of following by calculating the energy difference between 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 |



- Q.3** **Attempt the following (any Two)** **12**
- 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

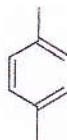


- c) What is mean by annulene and give explanation for formula [14] Annulene and write the δ ppm value for ^1H NMR signal of following non benzenoids? 06 L3 2



Q.4 a) Attempt the following (any Two) 12

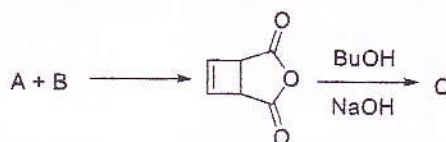
- i) Explain the FMO approach for electrocyclic reaction for following example. 06 L3 3



- 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

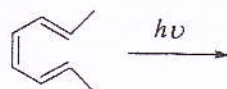
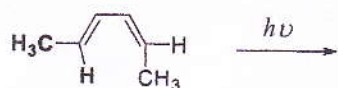
b) Attempt the following (any Four) 16

- 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

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

04 L5 3

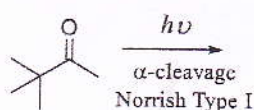
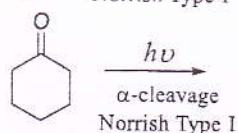
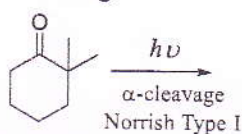
Q.5 a) Attempt the following (any Two)

16

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

08 L4 4

08 L5 4



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

08 L4 4

b) Attempt the following (any Three)

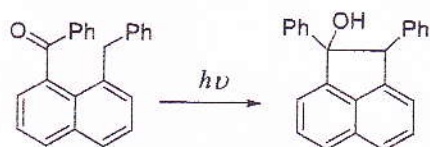
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- i) What is photosensitizer in photochemical reaction, explain with example.
- ii) Explain the Norrish Type I with symmetrical ketone at various temperature condition.
- iii) Draw the plausible mechanism of following reaction.

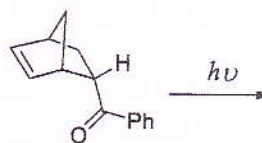
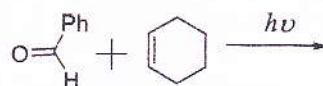
04 L4 4

04 L4 4

04 L6 4



iv) Complete the following reaction with mechanism.



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