

Roll No. ....

**E-306**

**M. Sc. (First Semester)  
EXAMINATION, Dec.-Jan., 2020-21**

**CHEMISTRY**

**Paper Second**

**(Concepts in Organic Chemistry)**

*Time : Three Hours ]*

*[ Maximum Marks : 80*

*[ Minimum Pass Marks : 16*

**Note :** Attempt all Sections as directed.

**Section—A**

**(Objective/Multiple Choice Questions)**

**Note :** You have been given 20 multiple choice questions/objectives, five from each Unit. Write the correct answer. Each question carries 1 mark.

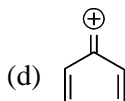
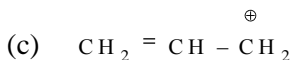
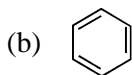
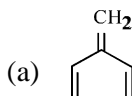
**Unit—I**

1. Choose the correct answer :

- (a) Antiaromatic compound has electrons in antibonding molecular orbitals.

**P. T. O.**

- (b) Antiaromaticity is observed when all bonding molecular orbitals are filled.
- (c) Antiaromatic compound has completely filled non-bonding molecular orbitals.
- (d) None of the above statements are correct.
2. Which of the following compounds is an example of odd alternant hydrocarbon ?



3. In cyclodextrin D-glucose units are joined through .....

- (a) 1, 5  $\beta$  -linkage
- (b) 1, 3  $\alpha$  -linkage
- (c) 1, 4  $\alpha$  -linkage
- (d) 1, 4  $\beta$  -linkage

4. State true *or* false :

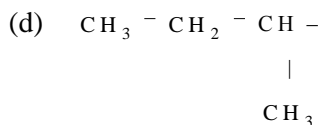
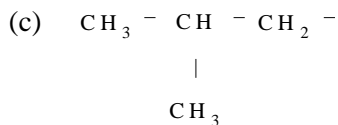
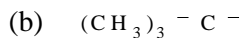
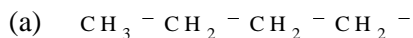
Azulene is more stable than its isomeric compound Naphthalene because Azulene has 49 kcal/mole resonance energy.

5. Fill in the blanks :

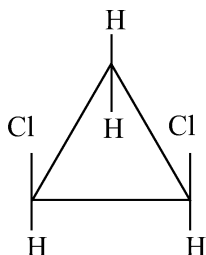
Cross conjugated trienes are known as .....

### Unit—II

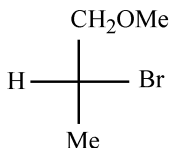
1. Arrange the following isomeric butyl groups in decreasing order of priority :



2. Label the hydrogen atoms in the compound given below as enantiotopic and diastereotopic :



3. Designate the following structure as R or S :



4. State true or false :

The relative population of the products depends only on the relative energy of the transition state of various processes but not on the relative population of the ground state conformation.

5. Which bonds are involved in ring fusion of cis-decalin ?

### Unit—III

1. Dichlorocarbene exists :

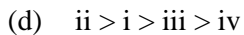
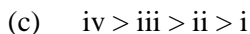
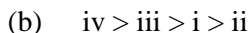
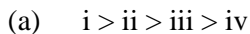
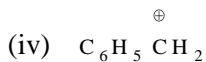
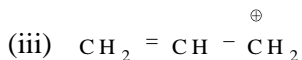
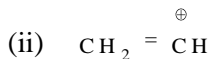
- (a) Only as singlet
- (b) Only as triplet
- (c) May be singlet or triplet
- (d) None of the above

2. The given carbanion  $\text{X} - \overset{\ominus}{\text{C}}\text{H}_2$  will be most stable when X is :

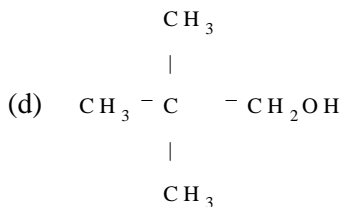
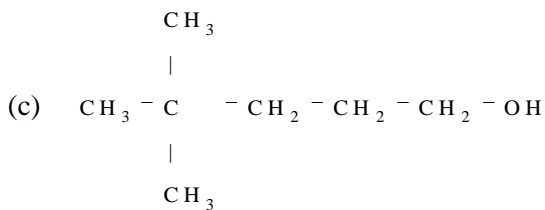
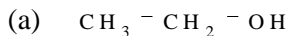
- (a)  $-\text{COCH}_3$
- (b)  $-\text{CN}$
- (c)  $-\text{NO}_2$
- (d)  $-\text{SO}_2\text{Ph}$

3. Consider the following carbocations :

- (i)  $\text{CH}_3 - \overset{\oplus}{\text{C}}\text{H}_2$



4. Which one of the following alcohols will give E1 reaction ?



5. Reaction intermediate of E1 reaction is :

(a) Carbocation

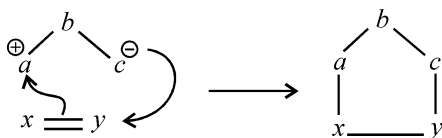
(b) Six membered cyclic TS

(c) Carbanion

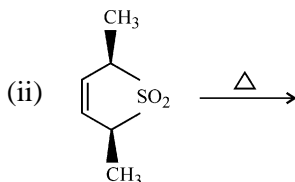
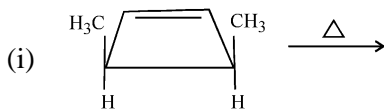
(d) Benzyne

## Unit—IV

- (2E, 4E)-2,4-hexadiene undergo thermal ring closure to give :
  - trans-3, 4 dimethyl cyclobutene
  - cis-3, 4 dimethyl cyclobutene
  - cis and trans-3, 4 dimethyl cyclobutene
  - None of the above
- Diels-Alder cycloaddition is induced by :
  - Thermal energy
  - UV light
  - UV light and thermal energy both
  - None of the above
- State true or false :  
[2 + 2] cycloaddition reaction contains vertical and horizontal plane of symmetry.
- Classify the following reaction :



- Draw the structure of the chief product of each of the following thermal reaction :



**Section—B****(Very Short Answer Type Questions)**

**Note :** Attempt all questions from each Unit. Each question carries 2 marks.

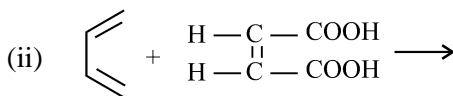
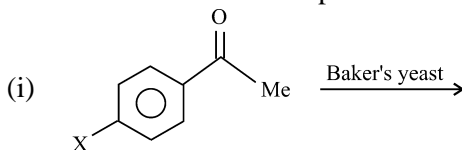
**Unit—I**

1. Give brief account of the following :

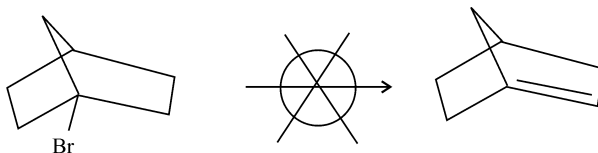
- (a) Homoaromatic compound
- (b) Alternant hydrocarbon

**Unit—II**

1. Complete the following reactions and classify them as stereoselective and stereospecific reactions :

**Unit—III**

1. Bromobicyclo [2, 2, 1] heptane does not undergo E1 elimination when heated with base. Explain this observation :



2. Give *two* reactions of carbon free radicals.

**Unit—IV**

1. Explain classification of pericyclic reactions with suitable examples.
2. Define chelotropic reaction and give *two* examples.

**Section—C****(Short Answer Type Questions)**

**Note :** Attempt all questions from each Unit. Each question carries 3 marks.

**Unit—I**

1. Discuss aromaticity of non-benzenoid compounds.
2. Explain hyperconjugation and its application.

**Unit—II**

1. What is the difference between axial and equatorial-methyl cyclohexane ?
2. Explain stereospecific reactions with examples.

**Unit—III**

1. Write a note on the Saytzeff's rule and give suitable examples.
2. Explain Sandmeyer reaction and write its application also.

**Unit—IV**

1. Explain correlation diagram of (4 + 2) cycloaddition reaction.
2. What is 1, 5-sigmatropic rearrangement reaction ? Explain.



## Section—D

5 each

## (Long Answer Type Questions)

**Note :** Attempt *one* question from each Unit.

**Unit—I**

1. What are catenanes ? Write their synthesis.
2. What are crown ethers ? What is their utility in the study of organic chemistry ?

**Unit—II**

1. Describe asymmetric synthesis with examples.
2. Discuss conformation of cis and trans-decalin.

**Unit—III**

1. Explain pyrolysis of esters.
2. What are non-classical carbocations ? Discuss the stability of non-classical carbocations.

**Unit—IV**

1. Discuss Claisen rearrangement reaction and its stereochemistry.
2. Explain stereochemistry of electrocyclic reaction with suitable examples.