SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Chemistry - END SEMESTER EXAMINATIONS - NOV' 2024
SEMESTER - I
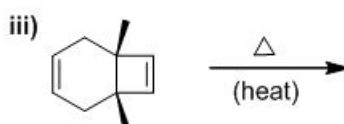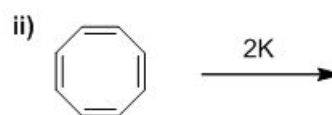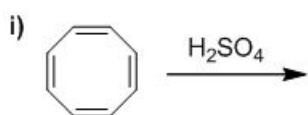**22PCHCT1001 - Basic Principles of Organic Chemistry**

Total Duration : 2 Hrs. 30 Mins.                                    Total Marks : 60

## Section B

Answer any **SIX** questions  $(6 \times 5 = 30$ Marks$)$

1. Predict the products for the following conversions and mention the nature of the products (aromatic/nonromatic/antiaromatic/homoaromatic).            [2+2+1]
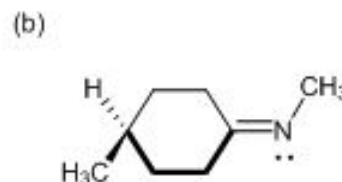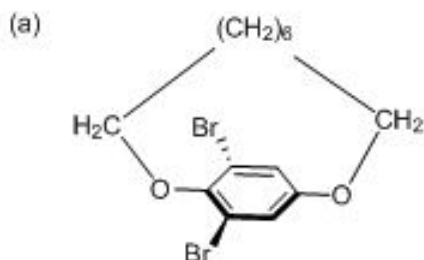
i)



$H_2SO_4$

ii)

2K

iii)

$\triangle$
(heat)

2. Compare 'Intermediate' and 'Transition state' and describe their role in determining the mechanism of a reaction.

3. Assign the appropriate configuration (R/S or Z/E) for the following compounds.[3x1]

a)                          b)                          c)
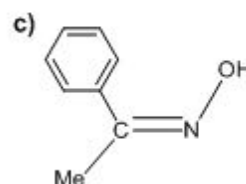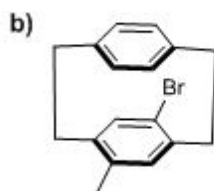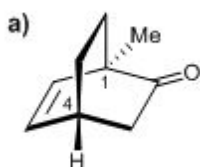


b) Find whether the molecule is chiral or achiral.                    [2 x 1]

(a)                                    (b)



4. Compare the stability and optical activity of all possible isomers of 1,2-dimethylcyclohexane and 1,3-dimethylcyclohexane and 1,4-dimethylcyclohexane.            [5]

5. Illustrate the following reactions with suitable example.            [3+2]
   a) Wagner-Meerwein rearrangement            b) Cope rearrangement

**Contd...**

6. Sketch the Frost circle diagram for the following molecules and explain their aromatic nature. [1+2+2]

   a) Cyclobutadiene          b) Benzene          c) Cyclopentadienyl anion

7. Explain the thermodynamic and kinetic requirements for an organic reaction.

8. Define Cram's rule and illustrate its application in determining the stereochemistry of the major product formed in the following reaction. [2+3]
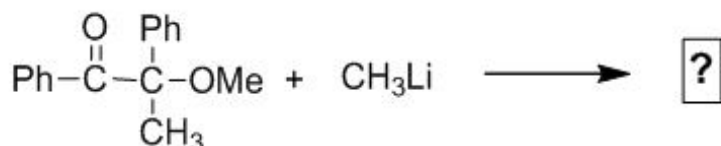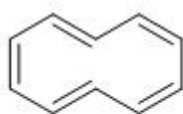


## Section C

I - Answer any **TWO** questions  $(2 \times 10 = 20$ Marks$)$

9. a) Compare and illustrate the concept of aromaticity, anti-aromaticity, non-aromatic and homo-aromaticity taking adequate examples. [7]
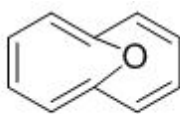
   b) Among the following compounds, A&B are nonaromatic whereas C is aromatic. Justify. [3]



10. a) What are the limitations of Hammet equation and illustrate how it was overcome by Taft equation. [4]

    b) Account for the following statements. [2]

       i) The values of $\sigma_{meta}$ for the -OCH$_3$ is positive, whereas the values for $\sigma_{para}$ is negative.

       ii) The values of $\sigma_{meta}$ for the -Br is +0.393, whereas the values for $\sigma_{para}$ is +0.232.
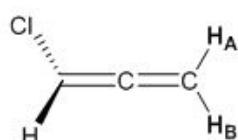
    c) Illustrate how crossover experiments can be applied to determine the mechanism of an organic reaction. [4]

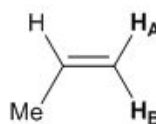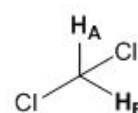11. a) Assign the topicity of the labelled atoms of the below molecules. [4x1]
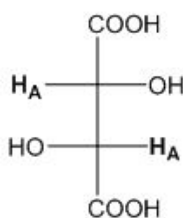


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b) Illustrate the optical activity of allenes, biphenyls and cyclophanes with suitable examples. [6]
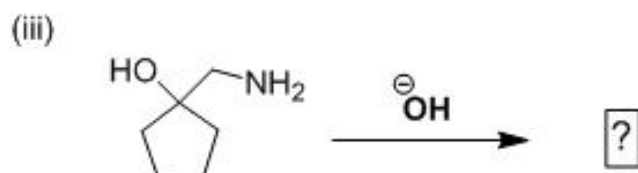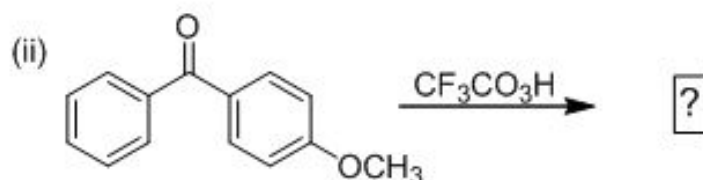
12. a) Predict the major product formed in the following transformations and justify your answers. [3]



b) Perform the conformational analysis of decalins and 9-methyldecalins and illustrate their relative stability and stereochemistry. [7]

II - Compulsory question  $(1 \times 10 = 10$ Marks)

13. a) Ascertain the product for the following rearrangements. [3 x 2]



b) Outline the mechanistic details of following reactions. [2+2]

i) Favorskii rearrangement        ii) Baeyer-Villiger rearrangement

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