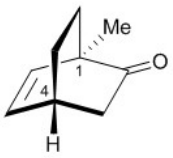
SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai - 600 044.
M.Sc.Chemistry - END SEMESTER EXAMINATIONS - APRIL 2025
SEMESTER - I
22PCHCT1001- Basic Principles of Organic Chemistry

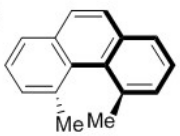
Total Duration : 2 Hrs. 30 Mins. Total Marks : 60

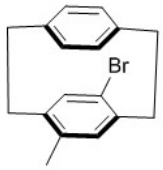
Section B

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

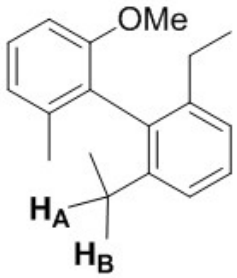
1. Illustrate the aromaticity of the following molecules using Huckel's rule.[2.5+2.5]
   a) annulene b) Ferrocene
2. Illustrate how the following methods can be useful in determining the mechanism of organic reactions. [2.5 + 2.5]
   a) Isotopic labelling b) Cross-over experiment
3. a) Assign the appropriate configuration (R/S or P/M) for the following compounds. [3 x 1]

i) 

ii) 

iii) 

   b) Identify the stereochemical relationship (topicity) between the highlighted atoms/faces. [1+1]

i) 

ii) 

4. Draw and justify the most stable conformation for the following compounds.[5x1]
   (i) cis-1,3-Dimethylcyclohexane
   (ii) 1-methyl-1-phenylcyclohexane
   (iii) cis-Cyclohexane-1,3-diol
   (iv) Trans-1,3-ditert-butylcyclohexane
   (v) Trans-1-chlorocyclohexane-2-ol

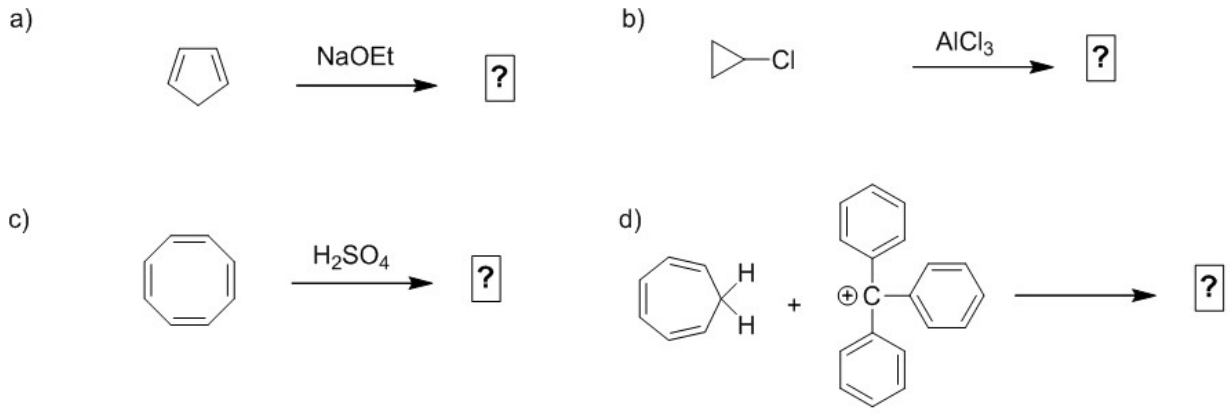
Contd...

5. Describe the following rearrangements with appropriate examples [2.5 + 2.5]
   a) Sommelet Hauser rearrangement b)Wagner-Meerwin rearrangement
6. Draw the frost circle diagram of the following molecules and illustrate their aromaticity. [2.5 + 2.5]
   a) Benzene b) Cycloheptatrienyl cation
7. Justify the following statements with suitable examples. [2+2+1]
   i) "Cumulenes with odd number of double bonds can never exhibit enantiomerism irrespective of the nature of the substituents at the terminal carbons".
   ii) "Unlike the enantiomerism of allenes with chiral axis, enantiomerism of substituted biphenyls with chirl axis is temperature dependent".
   iii) "Meso-tartaric acid is optically inactive despite having two chiral centres".
8. Discuss the stability and optical activity of all possible isomers of 1,2-dimethylcyclohexane and 1,3-dimethylcyclohexane and 1,4-dimethylcyclohexane.

Section C

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

9. a) Explain the terms aromaticity, antiaromaticity and homoaromaticity giving appropriate examples. [6]
   b) Predict the products for the following conversions and identify whether the products are aromatic / antiaromatic / nonaromatic / homoaromatic. [4 x 1]



10. a) Explain the significance of the signs and magnitude of Hammet Substituent constant (σ) and reaction constants (ρ) for a set of reactions. [4]

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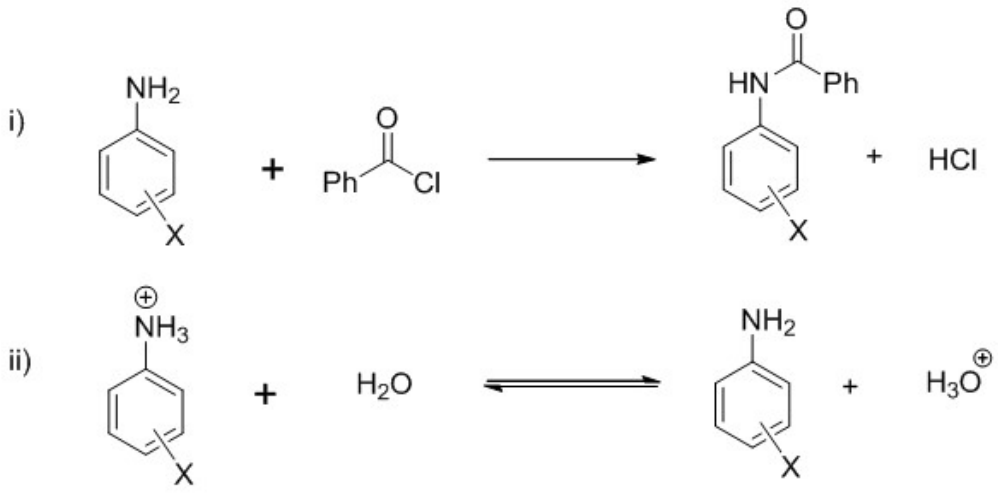
b) Predict the sign of Hammet ρ values for the following reactions and explain your observation. [2]



c) What are the disadvantages of Hammet equation and how it is overcome by Taft equation? [4]

11. a) Predict the major product for the following stereoselective reaction using appropriate model (Cram's rule/Cram's chelation/dipolar model/ Felkin-Anh model). [2 x 2.5]

b) Illustrate stereospecific and stereoselective reactions with suitable examples.[5]

12. a) Compare the stability and optical activity of cis-decalin and trans-decalin long with their 9-methyl derivative using conformational analysis. [7]

b) Compare the rate of chromic oxide oxidation of cis and trans 4-t-butylcuclohexanol.[3]

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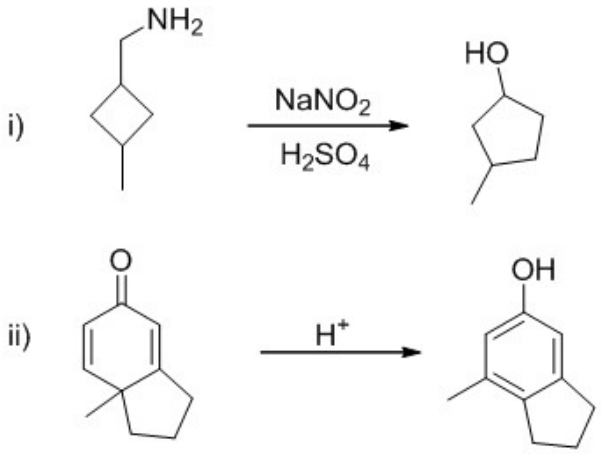
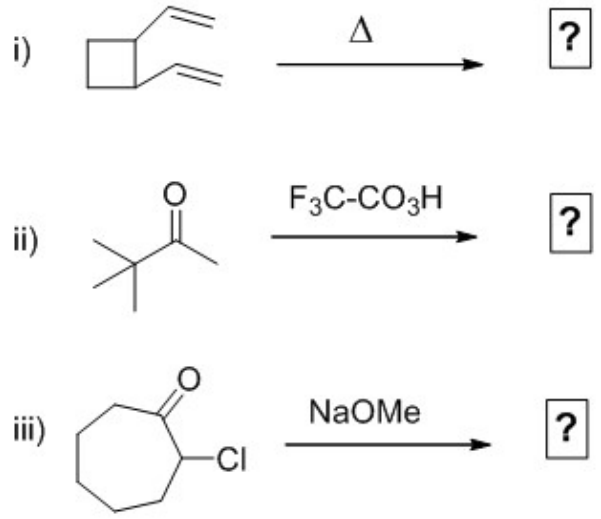
II - Compulsory question $(1 \times 10 = 10$ Marks)

13. a) Justify the product formation in the following transformations by providing stepwise mechanism. [2 x 2]



b) Predict the product and identify the name of the following reactions. [3 x 2]



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