

[Time:  $2\frac{1}{2}$  Hours]

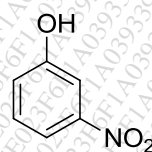
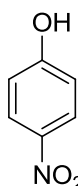
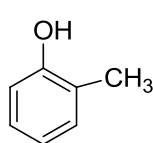
[Total Marks: 60]

Please check whether you have got the right question paper.

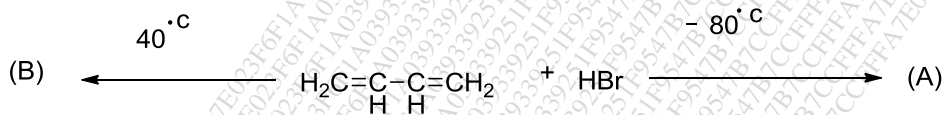
- NB: 1. **All** questions are **compulsory**.  
 2. **Figures** to the **right** indicate **full** marks.

Q.1(A) Attempt any **two** of the following :

- (a) Assign, giving reasons, the correct pK<sub>a</sub> value to the following molecules. (pK<sub>a</sub> values: 9.26, 8.35, 7.14, 10.28) **4**



- (b) Predict the product (A) and (B) and justify their formation. **4**



- (c) How are the following techniques used to determine reaction mechanism? Give examples **4**  
 i) Product analysis  
 ii) Primary kinetic isotope  
 (d) Explain the difference between general and specific acid catalysis with suitable example. **4**

(B) Attempt any **one** of the following:

- (a) Arrange the following in increasing order of basicity and explain : aniline, ethylamine, diphenylamine, diethylamine. **4**  
 (b) Using suitable example distinguish between kinetic and thermodynamically controlled products in reaction. **4**

Q.2(A) Attempt any **two** of the following :

- (a) i) What is the **B<sub>AL</sub>'** mechanism of ester hydrolysis? **4**  
 ii) Discuss the **S<sub>N</sub>2'** mechanism with a suitable example.

- (b) Complete the following reaction and explain the formation of the product. **4**



- (c) Explain the followings. **4**  
 i) Use of <sup>1</sup>H NMR to detect aromaticity  
 ii) Aromaticity of Azulenes

- (d) Complete the following reaction with mechanism. 4  
 (S)- (+)-2-Bromooctane + NaOH  $\rightarrow$  ? + SOCl<sub>2</sub>  $\rightarrow$  ?

(B) Attempt any **one** of the following:

- (a) Write note on 4  
 i) Cine substitutions  
 ii) Nucleophilicity  
 (b) Draw Frost musulin diagram for the cyclopentadienyl cation and cyclopropenyl cation. Show the distribution of electron in their MOs. 4

Q.3(A) Attempt any **two** of the following :

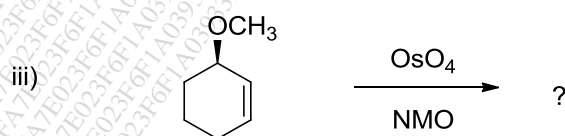
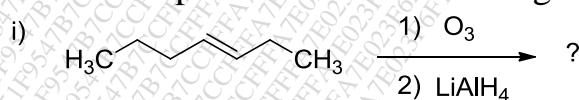
- (a) Explain the erythro-threo and *syn-anti* system of nomenclature with suitable example. 4  
 (b) Explain the chirality of allenes. Write the structure of a pair of enantiomeric allenes with their configurational descriptors. 4  
 (c) Explain enantiomerism in the following with suitable examples. 4  
 i) Quarternary phosphonium compounds ii) Silanes  
 (d) Draw the structure of the four stereoisomers of 2,3,4-trihydroxyglutaric acid. Label one asymmetric and one pseudoasymmetric centre in any of the stereoisomers and assign appropriate configurational descriptors to these centres. 4

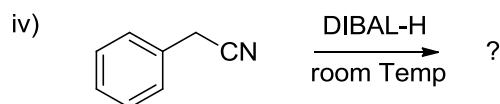
(B) Attempt any **one** of the following:

- (a) Explain with suitable examples. 4  
 i) Optical activity of ansa compounds ii) Atropisomerism  
 (b) Explain the following with one example each. 4  
 i) Homotopic ligand and faces ii) Diastereotopic ligand and faces

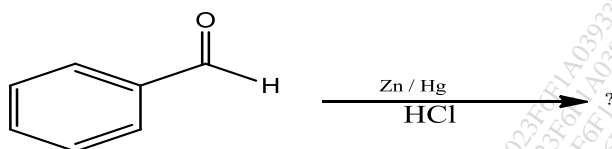
Q.4(A) Attempt any **two** of the following :

- (a) Predict the products in the following reactions: 4

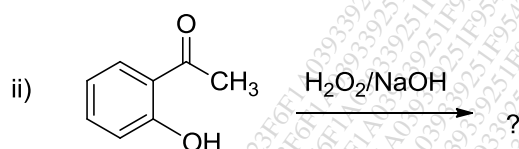
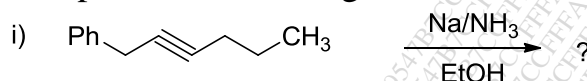




(b) Complete the following reaction, name it and give its mechanism. 4



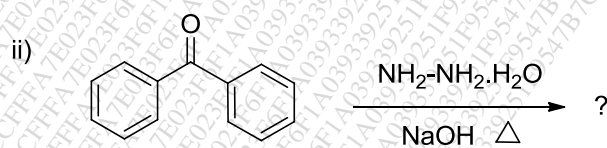
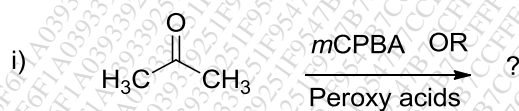
(c) Complete the following reactions and name them: 4



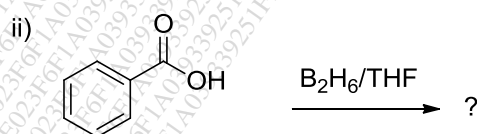
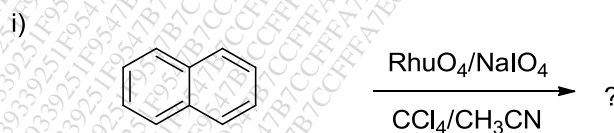
(d) What is Jones reagent? Give two applications. 4

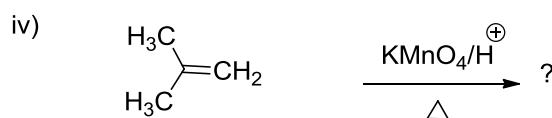
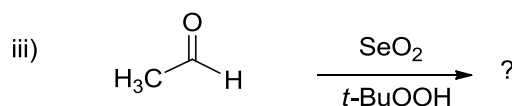
(B) Attempt any **one** of the following:

(a) Complete the following reactions and give the mechanism of **any one**. 4



(b) Complete the following equations. 4





Q.5 Attempt any **four** of the following :

A Explain secondary kinetic isotope effect with suitable example. **3**

B Give a complete equation to represent the pyrolysis of acetate. **3**

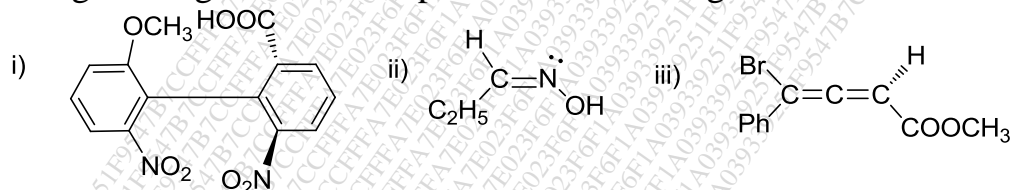
C Which of the following are aromatic and why? **3**

i) Tropylium cation ii) Furan iii) Cyclobutadiene.

D How does the leaving group affect on  $\text{S}_{\text{N}}1$  and  $\text{S}_{\text{N}}2'$  reaction. **3**

E Explain the optical activity of cyclophanes. **3**

F Assign configuration descriptor to the following molecules. **3**



G What is Etard oxidation? Give two applications. **3**

H Explain with examples oxidation reactions using PCC. **3**