**RAJARATA UNIVERSITY OF SRI LANKA**

**FACULTY OF APPLIED SCIENCES**

**B.Sc. in Applied Sciences**
**Second Year - Semester I Examination – July / August 2023**

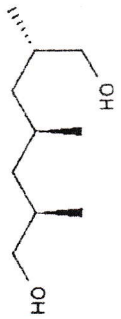
**CHE 2202 – ORGANIC CHEMISTRY II**

**Time: Two (02) hours**

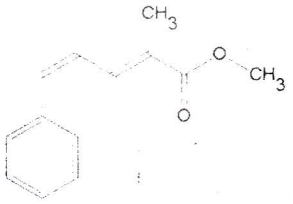
**Answer All Questions**

1.

a) Name the following compounds using R/S or E/Z nomenclature. Draw necessary steps and write IUPAC names of the compounds.




i.

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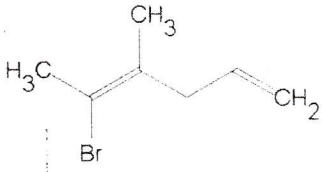


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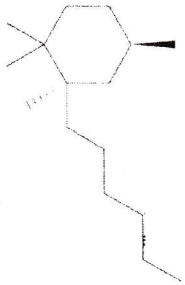


iv.

(08 marks)

b) Draw the Fischer projection of (2R,4R)-2,4-dibromopentane.

(06 marks)

c) Using the Newman projection formulas, depict the various conformations of 1,2-dibromoethane and plot the potential energy vs. angle of rotation curve for the rotation of the C1 - C2 bond through 360°C.

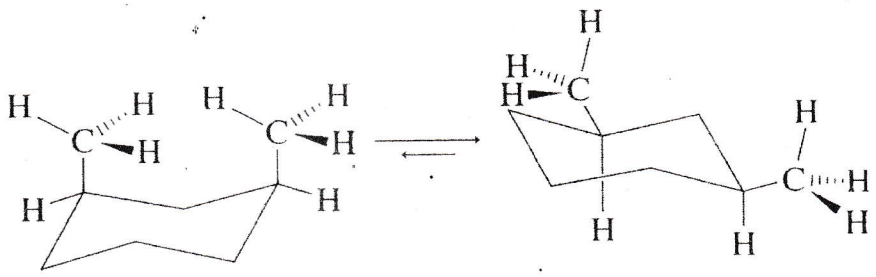
(07 marks)

d) The addition of $H_2$ to C=C gives off about 118 kJ $mol^{-1}$. Two conjugated double bonds in cyclohexadiene add $2H_2$ to give off 230 kJ $mol^{-1}$. Discuss this claim in relation to benzene.

(04 marks)

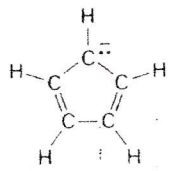
2.

a) "The chair conformations of cis 1,3-dimethylcyclohexane have two distinct energy levels, whereas trans 1,3-dimethylcyclohexane exhibits the same energy levels. Explain this statement using the necessary diagrams.

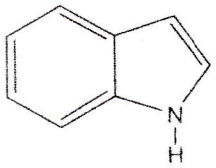


(05 marks)

b) Explain the aromaticity of the following compounds using Huckel's rule.



i.



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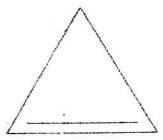
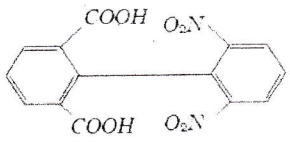


iii.

(06 marks)

c) Comment on the optical activity of the following compounds.



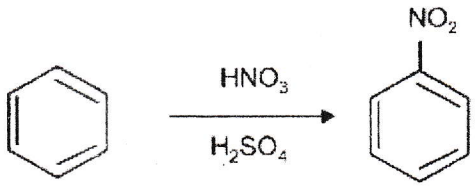

i.

ii.

iii.

(06 marks)

d) "The nitration reaction of benzene take place via nitronium ion mechanism". Explain this statement by giving suitable evidence. Figure out the mechanism of nitration of benzene.



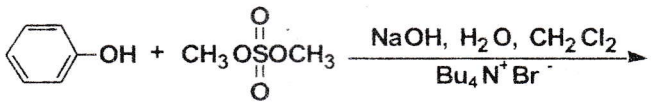

(08 marks)

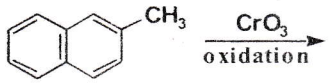
3.

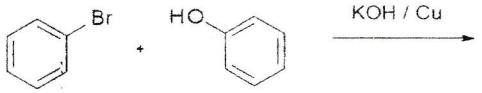
a) "Phenols ($pK_a$ ~10) are much more acidic than alcohols ($pK_a$ ~ 16) due to resonance stabilization of the phenoxide ion". Discuss this statement by giving a suitable reaction mechanism.

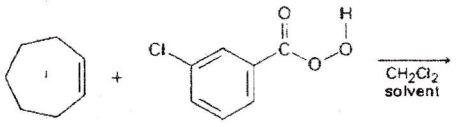
(06 marks)

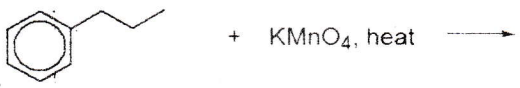
b) Complete the following reactions.

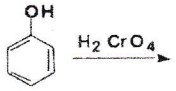
i. 


ii. 


iii. 


iv. 

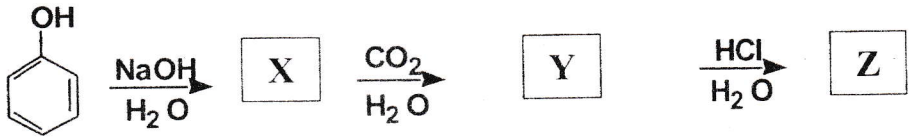

v. 


vi. 


vii. 


(10 marks)

c) Identify X, Y, Z and complete the following reaction




(04 marks)

d) Write the Grignard reaction mechanism to prepare phenyl acetic acid from toluene.

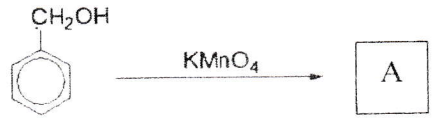
(05 marks)

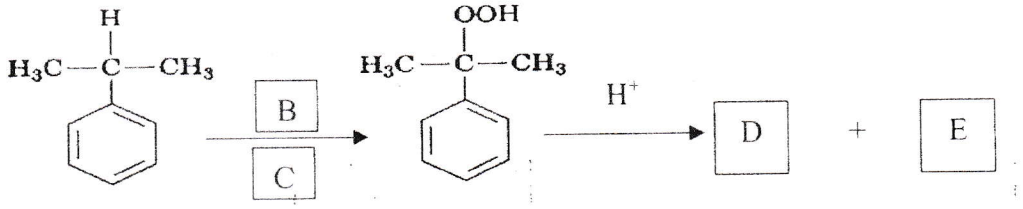
4.

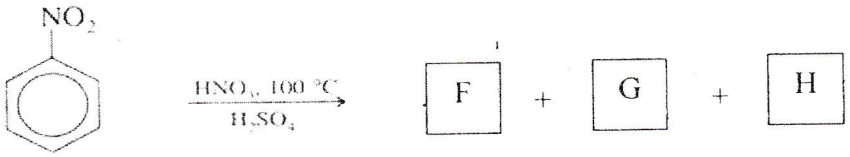
a) Elaborate a method for the synthesis of epoxides
   i. Using Halohydrin, starting from cyclohexene.
   ii. Cycloheptene treated with peroxy acid.

(06 marks)

b) Complete the following reactions.

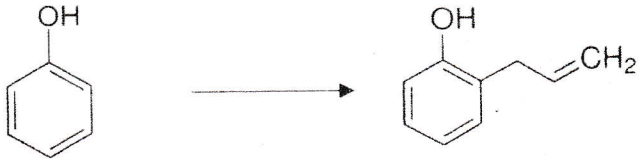
i. 


ii. 


iii. 


(08 marks)

c) Write all chemical reactions in the conversion of phenol to allyl phenol. Write the name of the rearrangement.




(05 marks)

d) Write a short account on "acid dyes" used to colour fabrics.

(06 marks)