



**RAJARATA UNIVERSITY OF SRI LANKA**  
**FACULTY OF APPLIED SCIENCES**  
**B.Sc. (General) Degree in Applied Sciences**  
**Second Year Semester I Examination – September / October 2019**

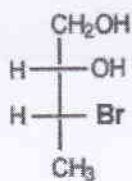
**CHE 2202 – ORGANIC CHEMISTRY II**

**Answer any four questions.**

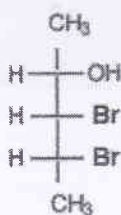
**Time: 02 hours**

1. a). Name the following compounds using RS or EZ nomenclature. Draw all the necessary steps and write IUPAC names of each compound.

i).



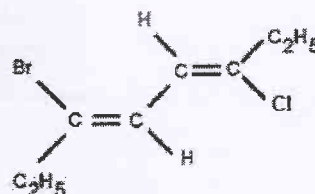
ii).



iii).



iv).



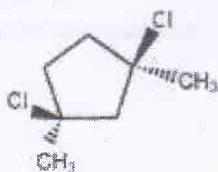
(12 marks)

b).

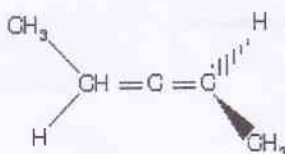
- i) Draw the Fischer projection of (2R,3R,4S)-2,3-Dibromo-4-methylhexane (03 marks)  
ii) Draw the structure of (3Z,5E)-3-Bromo-4,5-dimethyl-3,5-octadiene (03 marks)

- c) Define "Stereoisomers" and state whether the following compounds are optically active or not. Explain your answer.

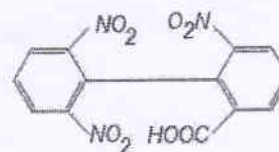
i)



ii)



iii)



(07 marks)

2. a) Define following terms:

- i. "Steric" and "Angle" strains
- ii. "Syn" position

(04 marks)

(02 marks)

b). Draw the conformations of n-Butane using Newman projection formulae and plot the potential energy vs angle of rotation curve for the rotation about C2 – C3 bond through 360°C.

(07 marks)

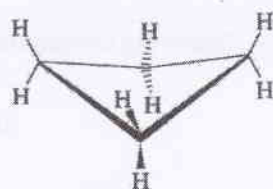
c). Calculate the strain energy of each position in above section (b) using the values given in the following table.

**Energy Costs for Interactions in Alkane Conformers**

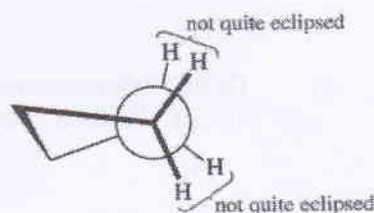
Interaction	Cause	Energy cost (kJ/mol)
H $\leftrightarrow$ H eclipsed	Torsional strain	4.0
H $\leftrightarrow$ CH <sub>3</sub> eclipsed	Mostly torsional strain	6.0
CH <sub>3</sub> $\leftrightarrow$ CH <sub>3</sub> eclipsed	Torsional plus steric strain	11
CH <sub>3</sub> $\leftrightarrow$ CH <sub>3</sub> gauche	Steric strain	3.8

(06 marks)

d). Cyclobutane, cyclopentane and cyclohexane molecules are not planar. Draw the relevant 3D conformations and Newman projections of cyclopentane and chair conformation of cyclohexane to explain the geometry. 3D conformation and Newman projection of cyclobutane is given below.



slightly folded conformation



Newman projection of one bond

Cyclobutane

(06 marks)

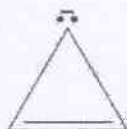
3. a) Chair conformations of *cis* 1,3-Dimethylcyclohexane show two different energy levels, while *trans* 1,3-Dimethylcyclohexane show same energy levels. Draw necessary diagrams of *cis* 1,3-Dimethylcyclohexane and discuss this observation.



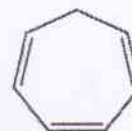
*trans*- 1,3-Dimethylcyclohexane

(07 marks)

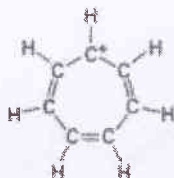
- b). i. Discribe Huckel's rule for Aromaticity (03 marks)
- ii. Determine whether the following compounds show aromaticity accordance with Huckels rule. Explain your answer



(k) cyclopropenyl anion



(l) Cycloheptatriene



(m) Cycloheptatrienyl cation



(n) Pyrimidine

(08 marks)

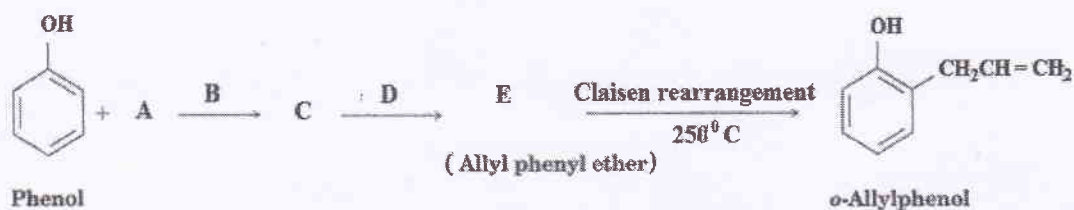
- c). Friedel-Crafts acylation of Benzene can be given as follows. Write down the detailed mechanism for the reaction.



(07 marks)



5. a) Identify A, B, C, D, E and complete the following reactions.



(05 marks)

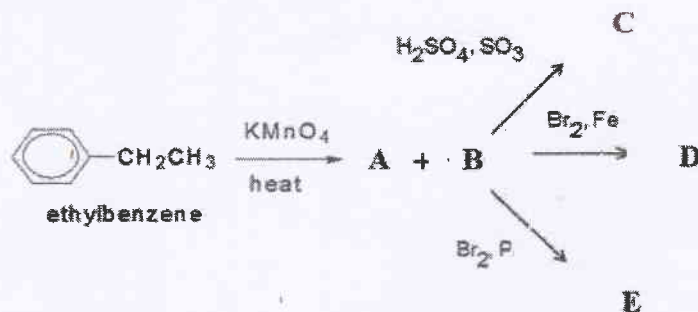
b) i. Identify X, Y and Z, and complete the following reaction.



ii. The Y of the above (i) is an extremely weak base. Explain this by using resonance hybrids.

(06 marks)

c) Identify the products A, B, C, D, and E and discuss the reactions.



(05 marks)

d)

- List out the type of dyes used in the industry.
- Write a short account on "basic dyes" used to color fabrics.

(09 marks)

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