07

RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. in Applied Sciences

First Year Semester II Examination – September / October 2020

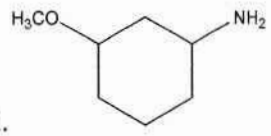
CHE 1203 – ORGANIC CHEMISTRY I

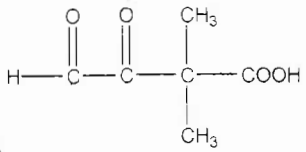
Time: Two (02) hours

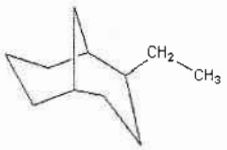
Answer any FOUR questions.

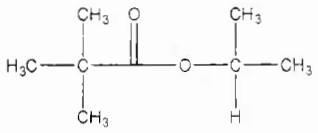
01.

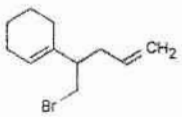
a). Give IUPAC names for the following compounds.

i. 

ii. 

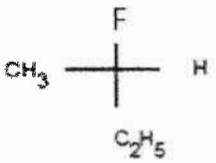
iii. 

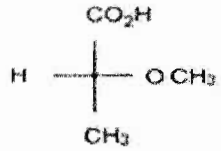
iv. 

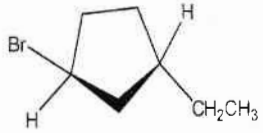
v. 

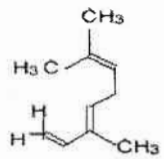
(10 marks)

b). Give IUPAC names for the following compounds with R/S, *cis/trans* or E/Z configurations

i. 

ii. 

iii. 

iv. 

(12 marks)

c). Draw the structure of the compound (2*E*, 4*Z*)-1-Bromo-2,4-heptadiene

(03marks)

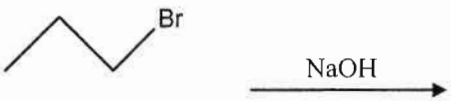
02. 08

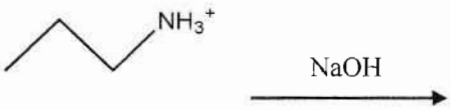
a). Write a short note on effect of solvent with examples.

(05 marks)

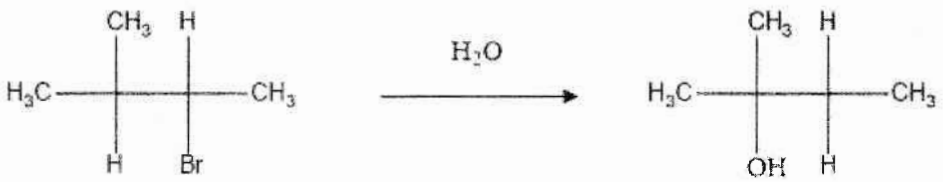
b). Complete the following S_N1 reaction and compare the rates of reaction with each other.

(05 marks)

i. 

ii. 

c). Write all the steps and the mechanism of this reaction



(07 marks)

d). Identify A, B, C, D and give IUPAC names of them.

i). A $\xrightarrow{PBr_3 / \text{ether}}$ 2-bromo-2-methylbutane

ii). Cyclohexene $\xrightarrow[NBS]{UV,\ CCl_4}$ B + C

(04 marks)

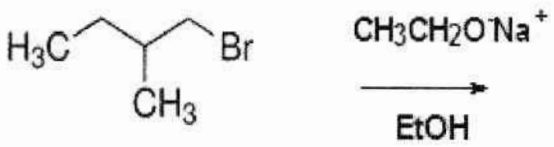
e). Write the equations and compare the rate of reactions when following compounds undergo S_N2 type reaction with HCN.

CH_3Cl, C_2H_5Cl, $CH_3CH(CH_3)Cl$, $(CH_3)_3CCl$

(04 marks)

3. 09

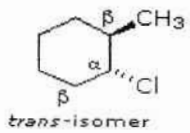
a). Discuss the mechanism of the following elimination reaction according to the Zaitsev's rule.



(06 marks)

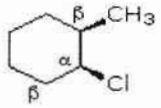
b). *trans*-1-chloro-2-methyl-cyclohexane produced a compound (A) when undergoes E_2 reaction with alcoholic KOH, but *cis* isomer gives off two products (A and B). Identify the products and justify the answer.

1-chloro -2-methyl- cyclohexane



trans-isomer

KOH, alcohol (slow) → A



cis-isomer

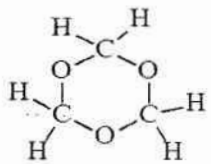
KOH, alcohol (fast) → A (minor) + B (major)

(07 marks)

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

i). $CH_3—C\equiv C—H \xrightarrow{Sia_2\,BH} A \xrightarrow[NaOH]{H_2O_2} B \xrightarrow{C} CH_3—C(H)=C(H)—O^{\ominus}$ (H) $\xrightarrow{H_2O}$ **D**

ii).



trioxane

heat → E → H_2O → F

(06 marks)

d). " $-CH_3$ activates the benzene ring towards electrophilic aromatic substitution reactions and directs substitution to the ortho–para positions", Explain.

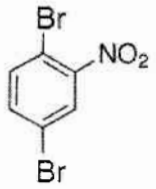
(06 marks)

4. 10

a). Outline all steps of McLafferty rearrangement of Hexanal.

(06 marks)

b). Discuss the synthesis of 1,4-dibromo-2- nitrobenzene from benzene



1,4-Dibromo-2- nitrobenzene

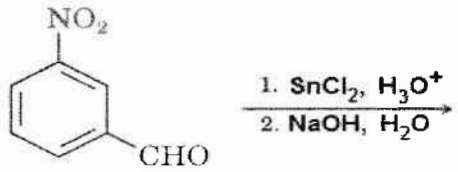
(05 marks)

c). Reaction of NH_3 with CH_3OH in the presence of alumina catalyst produces a mixture of methylated amines. Outline the complete reaction.

(03 marks)

d). Complete the following reactions

i). $CH_3-\overset{O}{\overset{\|}{C}}-Cl + (C_2H_5)_2NH \xrightarrow[\text{solvent}]{\text{Pyridine}}$

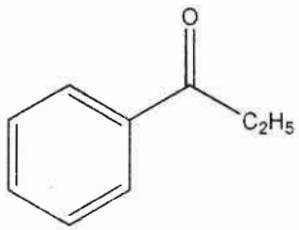
ii). 

***m*-Nitrobenzaldehyde**

(04 marks)

e). Write the chemical reaction taking place when the following compound undergoes Clemmensen reduction

(07 marks)

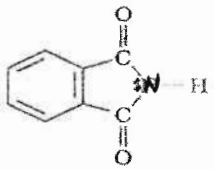


5.

a). Write the chemical reaction taking place when ethanal is treated with Tollen's reagent.

(04 marks)

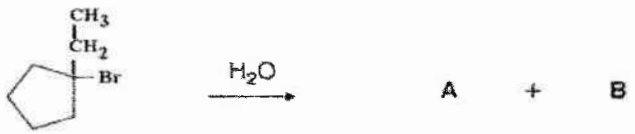
b). Outline all steps of synthesis of ethylamine using Gabriel Synthesis starting from phthalimide



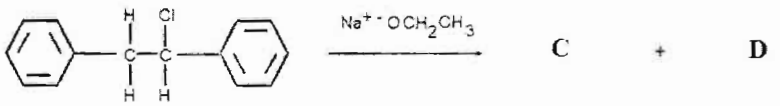
Phthalimide

(06 marks)

c). Identify the products A, B, C, D, I and J and conditions for the following reactions

i. 

1-Bromo-1-ethylcyclopentane

ii. 

1-Chloro-1,2 diphenylethane

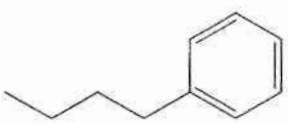
iii. 

(06 marks)

d). *trans*-2-Pentene is more stable than *cis*-2-pentene, but both are more stable than 1-pentene. Explain the statement.

(05 marks)

e). How would you prepare 1-phenylbutane from benzene in two steps.



1-phenylbutane

(04 marks)

-END-