UNIVERSITY OF SWAZILAND

MAIN EXAMINATION

2019, MAY

TITLE OF PAPER	:	Functional Group Chemistry and Stereochemistry
COURSE NUMBER	:	CHE232
TIME	:	Three Hours
INSTRUCTIONS	:	Answer **ALL QUESTIONS IN SECTION A** and **ANY OTHER 2 QUESTIONS** from Section B. Each question carries **25** marks

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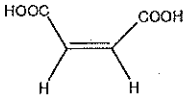
This Examination Paper Contains **FIVE** Printed Pages Including This Page

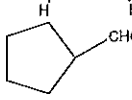
You are not supposed to open the paper until permission to do so has been granted by the Chief Invigilator.

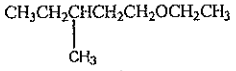
Section A (Compulsory)

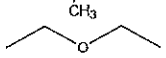
Question 1

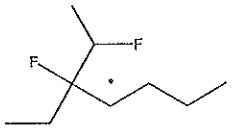
a. Name the following compounds: (10)

i. 

ii. 

iii. 

iv. 

v. 

b. Draw the structures of the following compounds: (15)

i. 5-chloro-6-hydroxy-3-hexanone
ii. Cyclopentane-1,3-dione
iii. 5-methoxy-2-pentanol
iv. 4,4-dimethyl-2-cyclohexen-1-ol
v. 2-chloro-2-methylbutane

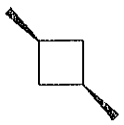
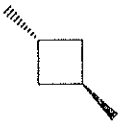
Question 2

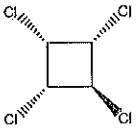
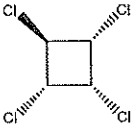
a) Draw the following molecules whose names are shown below.

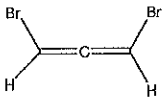
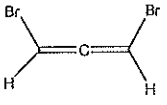
i. R-2-butanol (2)
ii. S-3-chloro-3-methyl-1-pentene (2)
iii. (2R, 3R)-2,3-dibromopentane (3)
iv. S-3-chloro-4-ethylhexane (3)
v. (3R)-3-methyl-5-hexen-3-ol (2)
vi. (1R)-1-bromo-1,3,3-trimethylhexane (2)
vii. (1R,3R)-1,3-dibromo-1,3-dimethylhexane (3)
viii. (1S,3R)-1-ethyl-1,3-dimethylpentane (3)

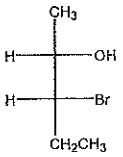
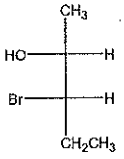
b) Indicate whether each pair of compounds is enantiomer (E), diastereomeric (D), constitutional isomers (C) or the same (S). (5)

i.  and 

ii.  and 

iii.  and 

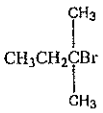
iv.  and 

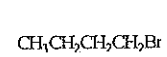
v.  and 

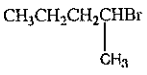
Section B (Choose any 2 Questions)

Question 3

a. Consider the following alkyl halides and their reaction with sodium methoxide, $CH_3CH_2O^-Na^+$?



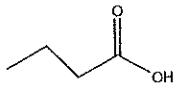


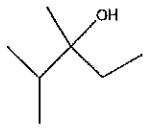


i. Which alkyl halide would you expect to give the highest yield of substitution product by SN2 mechanism? Explain your answer. (4)

ii. Show the SN2 mechanism for the reaction with the highest yield (6)

b. Show how you can prepare the following compounds using alkyl halides of two or more carbons

i.  (7)

ii.  (8)

Question 4

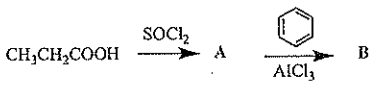
a. Show the mechanism and the structural formulas for the alkenes formed from the reaction of 3-bromo-2,3-dimethylpentane and alcoholic KOH. Show the major and minor products. (10)

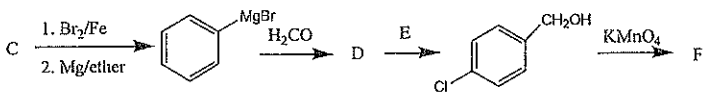
b. Show the products for the mixed aldol condensation reaction between ethanal and propanone. (10)

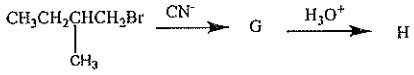
c. Three compounds have the following boiling points -7°C, 82°C and 57°C. The compounds are 2-propanol, propanone and 2-methylpropene. Assign each compound with as suitable boiling point and justify your answer. Use diagrams to illustrate your answer. (5)

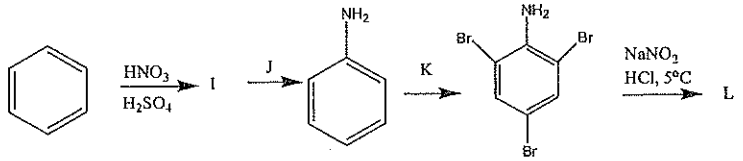
Question 5

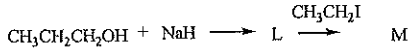
a) Fill in the missing reagents of products.

i. 

ii. 

iii. 

iv. 

v. 

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