

GARISSA UNIVERSITY

UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR <u>**TWO</u>** <u>**SECOND**</u> SEMESTER EXAMINATION</u>

SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES

FOR THE DEGREE OF BACHELOR OF EDUCATION

COURSE CODE: CHE 203e

COURSE TITLE: ORGANIC CHEMISTRY II

EXAMINATION DURATION: 3 HOURS

DATE: 19/04/18

TIME: .00-.00 PM

INSTRUCTION TO CANDIDATES

- The examination has SIX (6) questions
- Question ONE (1) is COMPULSORY
- Choose any other THREE (3) questions from the remaining FIVE (5) questions
- Use sketch diagrams to illustrate your answer whenever necessary
- Do not carry mobile phones or any other written materials in examination room
- Do not write on this paper

This paper consists of FIVE (5) printed pages

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please turn over

QUESTION ONE (COMPULSORY)

- (a) Briefly describe on how enantiomers can be separated chemically
- (b) Define the following terms
 - Molecular orbital hybridization i.
 - ii. Chiral and Achiral
 - iii. Enantiomers and diastereomers
 - Meso compounds iv.
 - Oxymercuration reduction v.
 - vi. Nucleophile and electrophile
- (c) What are the hybridization of the central carbon in $CH_3C\equiv N$ and the bond angle CCN? [2 marks]
- (d) What is the correct name for this molecule usingCahn-Ingold-Prelog system?



(e) What is the relationship between the two compounds below?



- (f) Compare between S_N1 Vs. S_N2 and E1 Vs. E2in terms of mechanism, rate of reaction, stereochemistry and reactivity order of the R-groups? [4 marks]
- (g) Explain with examples the three proposed mechanism of nucleophilic substitution reactions
- (h) Which of the following organic molecules is achiral



(i) Which of the following compounds react slowest in a SN2 mechanism reaction and why? [2 marks]

QUESTION TWO

- (a) Define what is stereospecifity in addition reactions
- (b) Indicate the relationships between the two molecules as enantiomers (E), diastereomers (D), Meso compound (MS) or same molecule (S). [6 marks]

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[2 marks]

[2 marks]

[3 marks]

[2 marks]

[1 mark]



(c) Explain (Using curved arrows) why in this electrophilic addition reaction, none of product A is generated, and product B is formed exclusively. (8 Marks)



Product A

QUESTION THREE (3)(15 marks)

- (a) Define what asymmetric and symmetric carbon
- (b) Identify and assign R or S to each chiral center in these molecules

[1 mark] [8 marks]



(c) For each of the following reactions state whether the regiochemistry is Markovnikov, Anti-Markovnikov or Neither. [6 marks]

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QUESTION FOUR

(a) Define markovnikov and anti-markovnikov in the addition of radicals (b) Draw using curved arrows to show the mechanism of the following S_N1 reaction				[1 mark] [8 marks]
ОН	H-Cl	\rightarrow \sim		
(c) Rank the following in order of group leaving ability				[2 marks]
NH ₂	H ₂ O	CI-	ŀ	
(d) Which carbonyl compound is more susceptible to Nucleophilic attack				[2 marks]
∧ → H				
(e) Rank the following in order of $S_N 2$ reactivity.				[2 marks]
		\prec		

QUESTION FIVE

(a) Rank in order of nucleophilicity of the organic molecules

L- --



(b) Provide mechanism and major product of the reaction below ignore stereochemistry(use curved arrows) [8 marks]



(c) Which is best solvent for $S_N 2$ reaction from this two solvents

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(d) Rank the following in terms of alkene stability (3 marks)



QUESTION SIX

(a) Predict the major product of the following reaction

 $\begin{array}{c} H_{3}C \xrightarrow{CH_{3}} CH_{2} + HBr \longrightarrow ? \\ H_{3}C \xrightarrow{CH_{3}} CH_{2} + HBr \longrightarrow ? \\ O \\ H_{3}C \xrightarrow{CH_{3}} O \\ H_{3}C \xrightarrow{CH_{2}} + HBr \longrightarrow ? \\ CH_{3} \end{array}$

ii.

i.



iii.



(b) Write a mechanism (i.e. curly arrows) for this E1 elimination







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[7 marks]

[8 marks]

[2 marks]

[2 marks]