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**GARISSA UNIVERSITY**

**UNIVERSITY EXAMINATION 2019/2020 ACADEMIC YEAR TWO**

**SECOND SEMESTER EXAMINATION**

**SCHOOL OF SCHOOL OF PURE AND APPLIED SCIENCES**

**FOR THE DEGREE OF BACHELOR OF EDUCATION**

**COURSE CODE: CHE 203**

**COURSE TITLE: ORGANIC CHEMISTRY II**

**EXAMINATION DURATION: 2 HOURS**

**DATE: 17/12/2020 TIME: 12.00-2.00 PM**

**INSTRUCTION TO CANDIDATES**

* **The examination has FIVE (5) questions**
* **Question ONE (1) is COMPULSORY**
* **Choose any other TWO (2) questions from the remaining FOUR (4) 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 SIX (6) printed pages *please turn over***

**QUESTION ONE (COMPULSORY)**

1. Briefly describe on how enantiomers can be separated chemically **[2 marks]**
2. Define the following terms **[6 marks]**
3. Molecular orbital hybridization;
4. Chiral and Achiral
5. Enantiomers & Diastereomers
6. Meso compounds
7. Oxymercuration reduction
8. Nucleophile and Electrophile
9. Differentiate between substitution and elimination reactions **[2 marks]**
10. Define a carbocation and rank the carbocation in order of increasing stability in a SN2 reaction giving a reason for the order **[4 marks]**
11. What is the relationship between the two compounds below? **[2 marks]**



1. Compare between SN1 Vs. SN2 and E1 Vs. E2 in terms of mechanism, rate of reaction, stereochemistry and reactivity order of the R-groups? **[8 marks]**
2. Explain with examples the three proposed theory mechanism of bond making and bond breaking in nucleophilic substitution reactions **[6 marks]**

**QUESTION TWO**

1. Define what is stereospecifity and stereoselectivity in addition reactions **[2 marks]**
2. Using IUPAC Nomenclature name compounds using the R-S notation (Cahn-Ingold-Prelog system)?  **[10 marks]**







1. Show the reaction mechanism for each of the following reactions clearly indicating the flow of electrons in each case using curly arrows **[8 marks]**
2. 
3. 

**QUESTION THREE**

1. Define what asymmetric and symmetric carbon **[2 marks]**
2. Define constitutional, configurational, and conformational isomers? **[3 marks]**
3. Define what a markovnikov and anti markovnikov is and state whether the regiochemistry is Markovnikov, Anti-Markovnikov or Neither in the following reactions. **[8 marks]**



1. Explain (Using curved arrows) why in this electrophilic addition reaction, none of product A is generated, and product B is formed exclusively. **[7 marks**]

 H CH3  H Cl

 C C + H-Cl H CH3

 H CH3 H CH3

 Product B

 + HCl

 H H

 H CH3

 Cl CH3

**QUESTION FOUR**

1. Determine if the following pairs are Achiral, Chiral or meso compounds **[3 marks]**
2. 
3. 
4. 
5. Define a stereogenic center and Identify the stereogenic centers in the following compounds **[6 marks]**

  



1. State the Zaitsev’s rule **[2 marks]**
2. State 4 problems encountered in organic Chemistry synthesis and reactions **[4 marks]**
3. Rank the following in order of group leaving ability? **[2 marks]**



1. Which carbonyl compound is more susceptible to Nucleophilic attack? **[1 mark]**

  

1. Rank the following in order of SN2 reactivity. **[2 marks]**

 

**QUESTION FIVE**

1. Rank in order of nucleophilicity of the organic molecules **[2 marks]**

   

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



1. Which is best solvent for SN2 reaction from these two solvents **[2 marks]**

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1. Predict the major product of the following reaction? **[8 marks]**
2. 
3. 
4. 