JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF BIOLOGICAL & PHYSICAL SCIENCES

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION SCIENCE WITH IT

2nd YEAR 2nd SEMESTER 2015/2016 ACADEMIC YEAR

MAIN CAMPUS REGULAR - RESIT

COURSE CODE: SCH 203

COURSE TITLE: ORGANIC CHEMISTRY 1

EXAM VENUE: LAB 1 **STREAM: (BEd. Science)**

DATE: 5/05/2016 **EXAM SESSION: 2.00 – 4.00pm**

TIME: 2HOURS

Instructions:

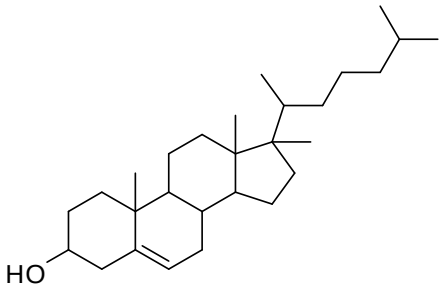
1. **Answer question 1 (Compulsory) in Section A and ANY other 2 questions in Section B.**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Section A Question 1 COMPULSORY (30 marks)

A. Compound A which is optically active was found to have lost its optical activity after standing in water containing acid a few drops of acid. Explain. (4 marks)

A. $CH_3CH_2CH(OH)CH_3$

B. Circle all the chiral carbon atoms in cholesterol (below) and state its possible number of optical isomer: (4 marks)



C. In thermodynamics of bonding, what does bond dissociation energy (BDE) mean and when is it positive or negative? (3 marks)

D. Separate the following species into electrophiles and nucleophiles: (2 marks)

CH_3OH, SO_3, NO_2^+, RSH, H_2S, NH_3, OH^-, H_3O^+, Br^+

E. Does 2-bromopentane have a chirality center? If so, write three-dimensional structures for each enantiomer. (3 marks)

F. Describe four properties of diastereomers (4marks)

G. By drawing Newman projection, show how the potential energy changes occur in propane when the molecule is rotated around one of the C-C bond through a complete cycle. (6 marks)

H. Explain four major properties of enantiomers. (4 marks)

Section B: This section contains FOUR questions. Answer ONLY TWO questions.

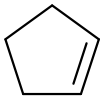
QUESTION 2 (20 marks)

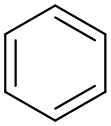
A. Name the four major classes of organic reactions giving an example for each

(8 marks)

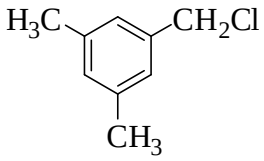
B. How is benzene obtained from coal tar? (4 marks)

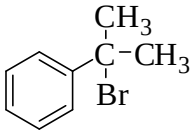
C. Complete the following reactions: (4 marks)

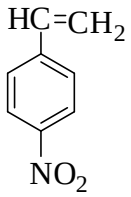
i  + C_6H_6 $\xrightarrow{HF}$

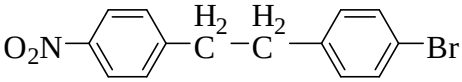
ii  + $(CH_3)_2CHCCl$ (with O) $\xrightarrow{AlCl_3}$

D. Suggest a name for each of the following compounds: (4 marks)

i 

ii 

iii 

iv 

QUESTION 3 (20 marks)

A. Define the Huckel rule and anti-aromatic compounds. (6 marks)

B. Name and define three intermediates encountered in chemical reactions. (6 marks)

C. Illustrate the difference between hemolytic and heterolytic bond cleavage in a chemical reaction. (4 marks)

D. Define the term Chirality and give an example of a chiral center. (4 marks)

QUESTION 4 (20 marks)

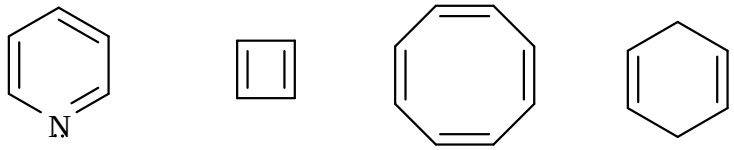
A. Describe the necessary conditions and reagents required to convert benzene into each of the following: (8 marks)

i. Nitrobenzene
ii. Cyclohexane
iii. Benzaldehyde
iv. Chlorobenzene

B. Offer an explanation for the following observations: (4 marks)
   i. Toluene requires lower temperature (30°) than benzene (55°) for nitration.
   ii. Chlorobenzene is less reactive than benzene.

C. With an example explain what conformational isomers are? (2 marks)

D. Indicate whether and why the following compounds are aromatic, non-aromatic or anti-aromatic: (6 marks)



i ii iii iv

QUESTION 5 (20 marks)

A. Illustrate the three major steps in photo chlorination of methane. (6 marks)

B. Briefly describe the working principles of a polarimeter. (8 marks)

C. What is specific rotation as used in chemistry? (2 marks)

D. Differentiate between Resolution and Racemization as applied in stereochemistry. (4 marks)