JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL, PHYSICAL MATHEMATICS AND ACTUARIAL SCIENCES
SECOND YEAR SECOND SEMESTER EXAMINATIONS FOR THE DEGREE OF BACHELOR OF EDUCATION WITH IT
UNIVERSITY EXAMINATIONS: 2021/2022 ACADEMIC YEAR

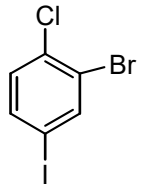
SCH 206/SPB 9210: ORGANIC CHEMISTRY II SPECIAL/RESIT EXAMINATIONS

ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO QUESTIONS IN SECTION B

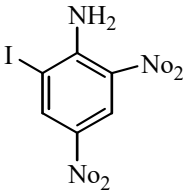
SECTION A: ANSWER ALL QUESTIONS (30 MARKS)

QUESTION 1

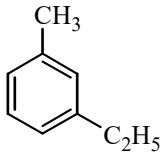
a) Give the IUPAC names of the following compounds; (10 marks)



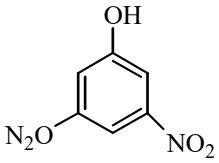
A



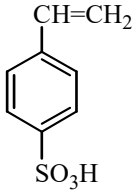
B



C



D



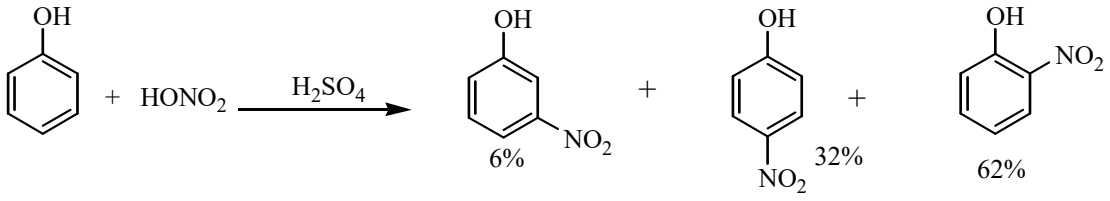
E

b) State and explain any **SIX** distinctive aromatic properties of benzene. (6 marks)

c) i) Define the term bond dissociation energy. (2 marks)

ii) Using examples, describe the conditions under which bond dissociation energies can be used to calculate enthalpy (ΔH) of a reaction. (4 marks)

d) Nitration of phenol gave products of the following percentage yields. Explain (4 marks)



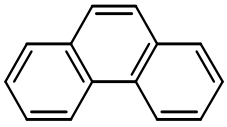
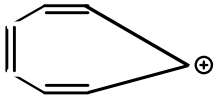
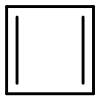
e) Discuss the orbital picture of benzene. (4 marks)

SECTION B (40 MARKS):

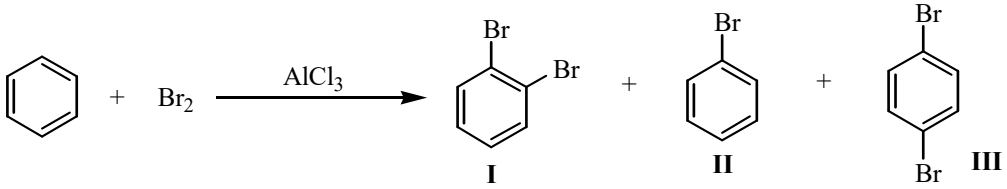
ANSWER ANY TWO QUESTIONS FROM THIS SECTION-EACH QUESTION CARRIES 20 MARKS

QUESTION 2

a) Which of the following compounds/ions are aromatic? Explain your answer. (10 marks)

(i)  (ii)  (iii)  (iv)  (v) 

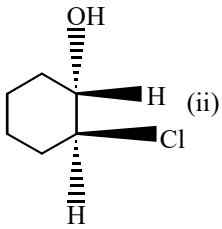
b) Propose a mechanism to account for the following reaction. As usual, you should show the structure(s) of all intermediates and use curly arrows to indicate the flow of electrons in each step. (6 marks)

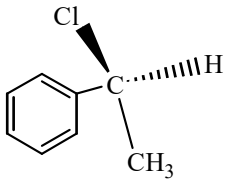


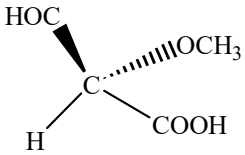
c) Comment on the percentage composition of products; **I**, **II** and **III** (4 marks)

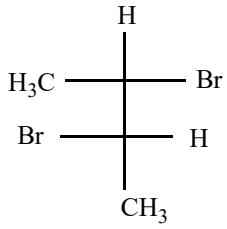
QUESTION 3

a) Assign R and/or S configuration to the sterogenic centres in the molecules below; (6 marks)

(i) 

(ii) 

(iii) 

(iv) 

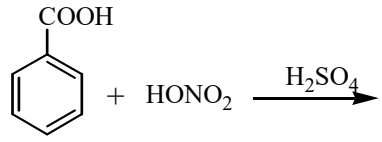
b) Illustrate the mechanisn of bromination reaction of butane, giving all the steps and the necessary conditions (4 marks)

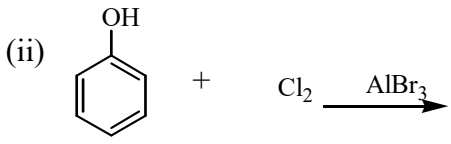
c) Define the following terms; (10 marks)

(i) Racemic modification
(ii) Stereogenic centre
(iii) Meso compound
(iv) Enantiometrically pure substances
(v) Solvolysis reaction

QUESTION 4

a) Outline the mechanism for the following reactions; (10 marks)

(i) 

(ii) 

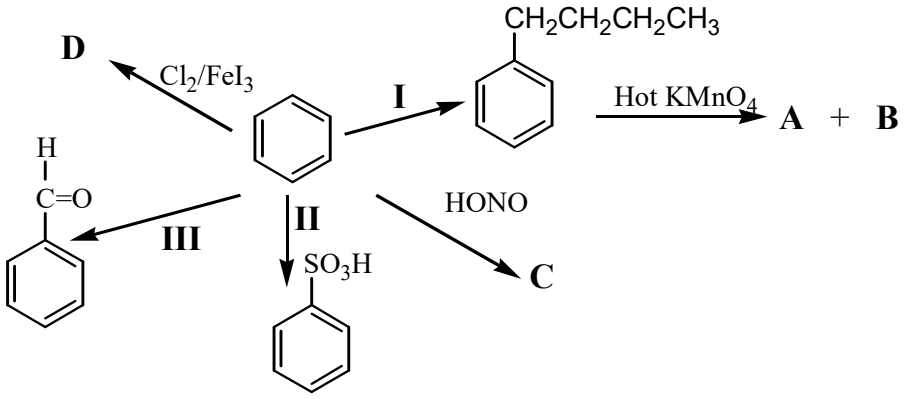
b) 2-butanol is a chiral molecule and therefore has two enantiomers while the very similar molecule 2-propanol is achiral and does not exist as an enantiomeric pair; explain. (4 marks)

c) Account for the following facts; (6 marks)

i) RS^- ions are stronger nucleophiles than RO^- ions.
ii) A racemic mixture shows no optical activity.
iii) Free radicals and carbocations are electrophiles.

QUESTION 5

a) The following is an illustration of some of the major reactions of benzene. Study it carefully and answer the questions that follow:



i. Name the products A, B, C, D (4 marks)

ii. Give the reagents and the conditions for the reaction **I**, **II**, **III**. (3 marks)

iii. Comment on the % yield for the nitration of C. (3 marks)

iv. Outline the mechanism for the reaction that leads to the production of A, B, C, D (10 marks)

E*****N********D***