JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL, PHYSICAL MATHEMATICS AND ACTUARIAL SCIENCES
FOURTH YEAR FIRST SEMESTER EXAMINATIONS
UNIVERSITY EXAMINATIONS: 2021/2022 ACADEMIC YEAR

SCH 405: SYNTHETIC ORGANIC CHEMISTRY SPECIAL/RESIT EXAMINATIONS

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

ANSWER ALL QUESTIONS

Question 1 (30 Marks)

a) Define the following terms: (10 marks)
   i. Retrosynthesis
   ii. Disconnection approach
   iii. Synthon
   iv. Reactive intermediate
   v. Convergent synthesis

b) What is the significance of "Organic Synthesis." Discuss any **FOUR** counts. (5 marks)

c) Using a chemical equation, briefly explain the term "regioselectivity" (5 marks)

d) Distinguish between the following terms; (6 marks)
   (i) Convergent and divergnent synthesis
   (ii) Carbocation and carbine

e) What are the limitations of organic synthesis? (4 marks)

SECTION B (40 MARKS): ANSWER ANY TWO QUESTIONS FROM THIS SECTION
EACH QUESTION CARRIES 20 MARKS

Question 2 (20 Marks)

a) Dehydration of primary alcohols is a suitable synthesis procedure for symmetrical ethers. The reaction follows SN^2 mechanism.
Illustrate using the following reaction. (5 marks)

b) Which of the alkyl halides given below would you expect to react more rapidly by an SN^2 mechanism? Explain your answer. (6 marks)

(I) $CH_3CH_2CH_2CH_2Br$ vs $CH_3CH_2\underset{\displaystyle Br}{\underset{|}{C}}HCH_3$

(II) $CH_3CH_2CH_2Cl$ vs $CH_3CH_2CH_2Br$

c) With the aid of energy-reaction path diagrams, explain why the energy profile of SN^2 has only one transition state while SN^1 has two transition states. (6 marks)

d) Designing of a synthetic procedure is intellectually challenging. Explain. (3 marks)

Question 3 (20 Marks)

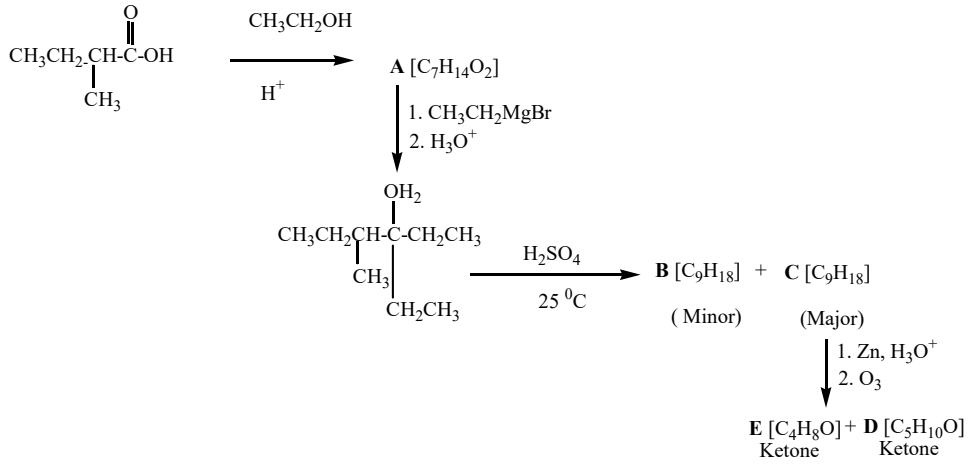
a) Explain each of the following observations: (10 marks)

i. Regiospecificity of hydrogenation of alkenes fails without a peroxide in the reaction matrix
ii. P-2 catalyst is preferred in place of Nickel metal
iii. Acetylene is synthesizable from calcium carbonate
iv. Proton of acetylene is easily replaced by a metal
v. Organic synthesis reactions are based on functional group transformation

b) Outline the synthesis of 1-bromobutane from 1,2-dibromoethane and ethylbromide. Show all the necessary steps and the reaction mechanisms involved . (10 marks)

Question 4 (20 Marks)

a) Give the structures and names for compounds **A-E.** (10 marks)



b) Grignard synthesis is a very versatile reaction route for the synthesis of alcohols. Explain using a chemical reaction. (5 marks)

c) Outline **TWO** methods for preparing isopropyl methyl ether by Willamson synthesis. (5 marks)

Question 5 (20 Marks)

a) Briefly discuss the synthetic pathway of any **TWO** of the following compounds. (20 marks)
(i) Quinines
(ii) Nicotine
(iii) Chloroquine
(iv) Pyrethrins

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