UNIVERSITY OF EMBU

2017/2018 ACADEMIC YEAR

SECOND SEMESTER EXAMINATIONS

SECOND YEAR EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE

SCH 202: ORGANIC CHEMISTRY II

DATE: APRIL 5, 2018 **TIME: 11:00AM-1:00PM**

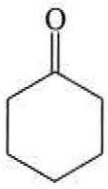
INSTRUCTIONS:

Answer Question ONE and ANY Other TWO Questions

QUESTION ONE (30 MARKS)

a) Using a reaction of water with methyl cyclohexene, describe an electrophilic addition reaction (3 marks)

b) Condensation of two moles of cyclohexanone (**1**) is a typical nucleophilic addition reaction. Show its mechanism (3 marks)



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c) Mannich reaction can be used to prepare lactams (cyclic amides). Illustrare with a specific example. (3 marks)

d) A hydride shift is a key mechanism in carbocation rearrangent. Explain with a specific example (3 marks)

e) Explain the effect of substrate concentration on the rate of substitution unimolecular reaction (3 marks)

f) Using nitration of benzene in sulfuric, describe a meta- director (3 marks)

g) Using a specific example, describe Micheal addition (3 marks)

h) Carbocation formation is the rate determining step in substitution unimolecular reaction. Explain. (3 marks)

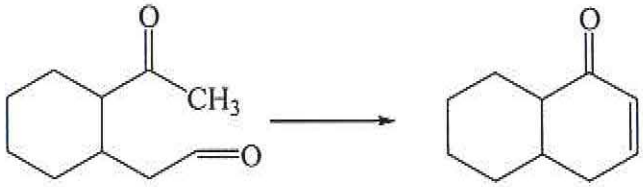
i) Explain two characteristics of nucleophiles (3 marks)

j) Explain the effect of nucleophile concentration on the rate of a substituition bimolecular reaction (3 marks)

QUESTION TWO (20 MARKS)

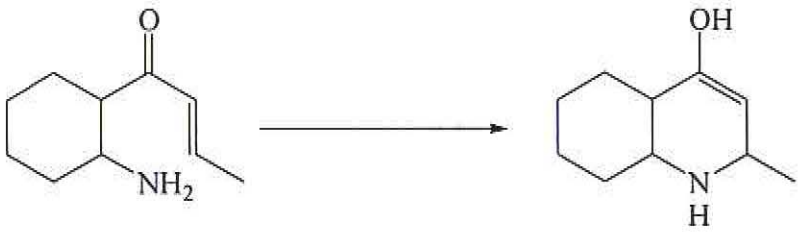
a) Propose a plausible mechanism for the following reaction (5 marks)

b)



c) Explain the effect of substrate structure on the rate of SN^1 and SN^2 reactions (5 marks)

d) Propose a plausible mechanism for the following reaction (5 marks)



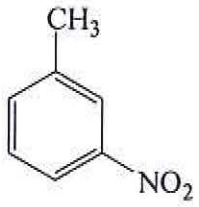
e) Describe the general mechanism of electrophilic aromatic substitution (5 marks)

QUESTION THREE (20 MARKS)

a) Explain why an alkyl substituent (electron donating) activate the *ortho* position while a nitro group (electron withdrawing) activates the meta position during electrophilic aromatic substitution (10 marks)

b) Using polymerization of ethene as an example, describe the free radical addition mechanism (5 marks)

c) Describe how you would synthesize *m*-nitro toluene (**2**) from benzene (5 marks)



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QUESTION FOUR (20 MARKS)

a) With a specific example, describe the mechanism of Claisen condensation (5 marks)

b) Explain why most reactions of benzene are substitution as opposed to addition (5 marks)

c) Illustrate the use of the following reactions in organic synthesis (10 marks)

i) Friedel-crafts acetylation

ii) Aldol condensation

QUESTION FIVE (20 MARKS)

a) Using specific examples, illustrate formation of enols and imines (6 marks)

b) Amide bonds have a double bond "character". Explain (4 marks)

c) Using an example, describe formation of a lactone (5 marks)

d) Describe the mechanism of allylic halogenations (5 marks)

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