

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF MASTER OF SCIENCE IN  
CHEMISTRY

CHEM 831: MODERN METHODS OF ORGANIC SYNTHESIS

STREAMS: M.SC CHEM

TIME: 3 HOURS

DAY/DATE: FRIDAY 06/12/2019

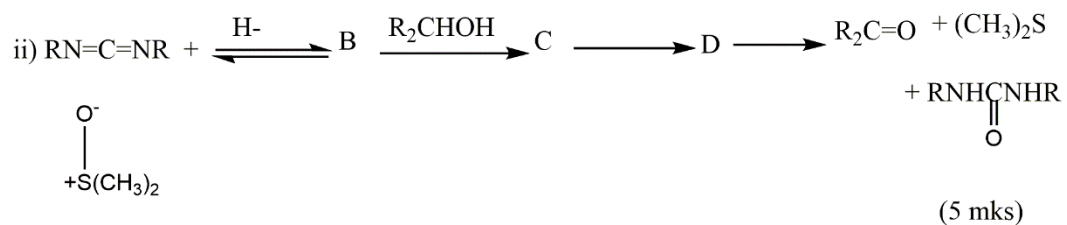
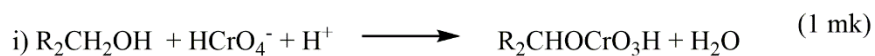
2.30 P.M. – 5.30 P.M.

## INSTRUCTIONS:

- ANSWER ALL QUESTIONS

## QUESTION ONE (20 MARKS)

a) Write the mechanism of the following oxidation reactions.



b) Complete the following reactions. (5marks)

c) Write the mechanism of the Dess-Martin oxidation. (3 marks)

d) Write the mechanism of the following reaction. (3 marks)

e) i) State Bredt's rule. (2 mark)

ii) Using Bredt's rule predict the product of the following reaction. (1mark)

### QUESTION 2 (20 MARKS)

a) Write the mechanism for reduction of amides to amines by  $\text{LiAlH}_4$  shown below. (4 marks)

b) i) Briefly explain a protective group. (2 marks)

ii) Give three considerations that are important in choosing an appropriate protective group (3 marks)

c) Draw the cis and trans isomers of 1,4-dimethylcyclohexane. (2 marks)

d) Indicate the asymmetric carbon in the following compounds. (3 marks)

e) A solution prepared by mixing 10 ml of a 0.10 M solution of the R enantiomer and 30 ml of a 0.1 solution of the S enantiomer was found to have an observed specific rotation of  $+4.8^\circ$ . What is the specific rotation of each of the enantiomer. (4 marks)

f) Write the mechanism for the following reaction. (2 marks)

**QUESTION THREE (20 MARKS)**

a) Briefly explain how to protect and deprotect the following groups. (6 marks)

i) Hydroxyl groups

ii) Amino group

iii) Carbonyl group

b) Indicate whether the following structures has the R or the S configuration explain your answer. (3 marks)

c) Briefly explain the following terms. (3 marks)

i) Regioselective

ii) Stereospecific

d) I) Write the mechanism of the acid catalyzed enolization step of cyclopentanone. (1.5 marks)

iii) Write the mechanism of the following reactions (2.5 marks)

e) Write the mechanism of the following reaction.

(4 marks)

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