CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

FOURTH YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF EDUCATION (SCIENCE), BACHELOR OF SCIENCE

CHEM 332: ORGANIC CHEMISTRY III

STREAMS: BED (SCI), BSC **TIME: 2 HOURS**

DAY/DATE: MONDAY 11/12/2017 **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

(a) Write the IUPAC name of each of the following organic compounds. [6 marks]

(b) Draw the structures corresponding to the following names. [6 marks]

(i) 5-Hydroxyhexan -3-one

(ii) 5-Oxohexanoic acid

(iii) 2-Methylbutanoyl chloride

(iv) 3-Ethylhexanenitrile

(v) Ethylbutanoate

(vi) N-Ethyl –N-propylpropanamide

(c) Discuss the physical properties of aldehydes and ketones. [3 marks]

(d) Draw the structure of the major organic product for each of the following reactions. [6 marks]

(e) The Aldol reaction is a powerful method of carbon-carbon bond formation, with many synthetic applications. Write the mechanism of the following Aldol condensation reaction. [4 marks]

(f) Starting with benzene and any reagents of your choice, write a stepwise method for synthesis of 1,3,5-tribromo benzene that use a diazonium salt as one of the synthetic intermediates. [5 marks]

QUESTION TWO (20 MARKS)

(a) Write the structures of the products of3-methylbutan-2-one with the following reagents. [6 marks]

(b) Discuss the physical properties of carboxylic acids and their derivatives. [6 marks]

(c) Discuss with the aid of suitable examples, the methods used to synthesize carboxylic acid derivatives (esters, amides, acid anhydrides) from carboxylic acids via acyl chloride intermediates. [8 marks]

QUESTION THREE (20 MARKS)

(a) Write the structure of the major organic product for each of the following reactions.

[6 marks]

(b) Discuss the physical properties of amines. [4 marks]

(c) Write the structure of compounds A, B and C in the following reaction sequence.

[3 marks]

(d) (i) Design a stepwise method for synthesis of the following azo compound. [5 marks]

(ii) Discuss the uses of azo compounds. [2 marks]

QUESTION FOUR (20 MARKS)

(a) Write the stepwise mechanism of the following reaction. [5 marks]

(b) Show how you might use a cyclic acetal to carry out the following transformation. [6 marks]

(c) Design a plausible stepwise method for synthesis of the following compound using a stork enamine reaction. [7 marks]

(d) State four uses of aromatic sulphonic acids. [2 marks]
