



OFFICE OF THE DEPUTY PRINCIPAL

ACADEMICS, STUDENT AFFAIRS AND RESEARCH

## UNIVERSITY EXAMINATIONS

### 2017 /2018 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER REGULAR EXAMINATION

**FOR THE DEGREE OF BACHELOR OF  
EDUCATION SCIENCE**



COURSE CODE: CHE 104e

COURSE TITLE: ORGANIC CHEMISTRY I

DATE: 19<sup>TH</sup> APRIL, 2018

TIME: 9AM – 12.00 NOON

### INSTRUCTION TO CANDIDATES

- SEE INSIDE

THIS PAPER CONSISTS OF 6 PRINTED PAGES

PLEASE TURN OVER

*A constituent college of Moi University*

## CHE 104e: ORGANIC CHEMISTRY I

STREAM: BED (Science)

DURATION: 3 Hours

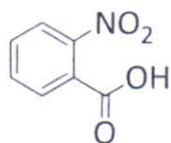
INSTRUCTIONS TO CANDIDATES

- i. Answer *ALL* questions from section A and any *THREE* from section B.

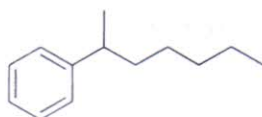
SECTION A (24 MARKS)**Question One**

- a) Draw the structure of a constitutional isomer of propene(1 Mark)  
 b) Discuss the behaviour of carbon in terms of catenation and tetravalency.(3 Marks)  
 c) Give systematic names of the following compounds.(2 Marks)

i.



ii.



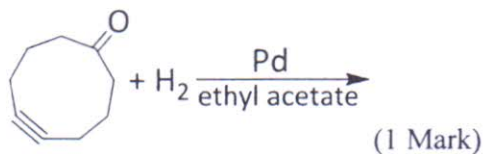
- d) Write the structural formulas for the following compounds(2 Marks)

i) 4-Nitrobenzoic acid(*p*-nitrobenzoic acid)

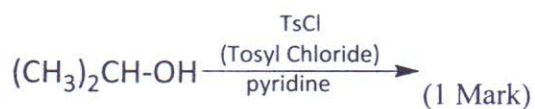
ii) 1-Penten-4-yne

- e) Predict the major products of the following chemical reactions:

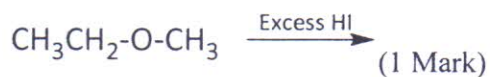
i.



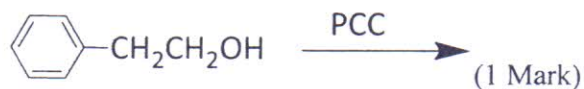
ii.



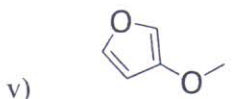
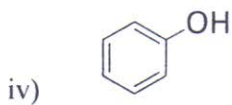
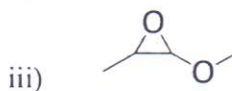
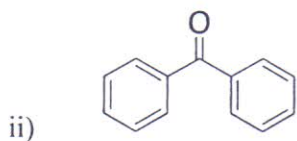
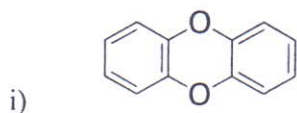
iii.



iv.

**Question Two**

a) Give IUPAC names of the following compounds (1 Mark each)



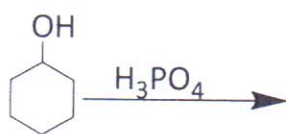
b) With which reagents and how are the 1°, 2° and 3° alcohols tested? (3 Marks)

c) With examples, differentiate the following types of reactions:

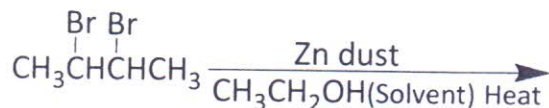
i) S<sub>N</sub>1 and S<sub>N</sub>2 (2 Marks)ii) E<sub>1</sub> and E<sub>2</sub> (2 Marks)**SECTION B****Question Three**

a) Predict the major products of the following chemical reactions

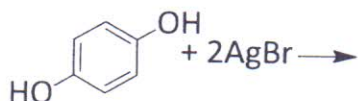
i. (1 Mark)



ii. (1 Mark)

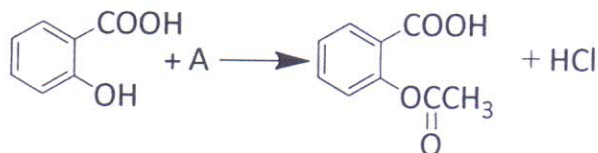


iii. (1 Mark)



b) Provide the missing reactants and reagents for the following transformations. (1 Mark each)

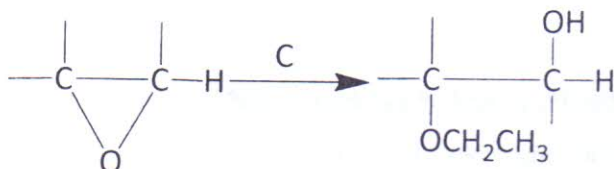
i)



ii)



iii)



c) With relevant examples, give any six functional groups in organic chemistry. (3 Marks)

d) Give an example of the Friedel craft reaction (2 Marks)

e) What is the importance of resonance structures in any molecule (1 Mark)

#### Question Four

a) With relevant examples, discuss the following reactions (2 Marks each)

- Base catalyzed ring opening of alkoxides
- Autooxidation of oxetenes
- Acetylation of phenols

- iv. Oxidation of alcohols
- v. Sulfonation of benzene
- vi. Addition of hydrogen halides to alkenes

**Question Five**

- a) Give the detailed mechanism for dehydration of alcohols (2 Marks)
- b) Define the Markovnikov's rule and give an example of a reaction in which it applies (2.5 Marks)
- c) Why are carboxylic acids soluble in water? (1 Mark)
- d) What kind of reactions does benzene undergo? Justify the reason for your answer (1.5 Marks)
- e) Give four features of a homologue (2 Marks)
- f) Outline the steps involved in structure identification of organic compounds (3 Marks)

**Question Six**

- a) What is isomerism (1 Mark)
- b) Explain why alkanes are generally insoluble in water (2 Marks)
- c) Why does the boiling point of alkanes increase with increasing number of carbons in the chain (1 Mark)
- d) In detail, show the process of halogenation of alkanes via radical reaction (4 Marks)
- e) Give an example of a reaction involving
  - i) Dehalogenation of vicinal dihalides (2 Marks)
  - ii) Polymerization of alkenes (2 Marks)

**Question Seven**

- a) To observe geometrical isomerism, what condition must be fulfilled? (1 Mark)
- b) Give the structures of the following compounds: (1 Mark each)
  - i. 1,4-dimethyl-2-nitrobenzene
  - ii. 4-methylphenol
  - iii. 2,2,4,4-Tetramethylpentane
  - iv. 3-methyl-1-phenyl-1-pentanol
  - v. 2-nitrophenol



- c) Using IUPAC system, name the following compounds:(4 Marks)
- $\text{CH}_3(\text{CH}_2)_5\text{CHO}$
  - $\text{CH}_3\text{CH}_2\text{COCH}_2\text{CH}_2\text{CH}_3$
  - $\text{C}_6\text{H}_5\text{COC}_6\text{H}_5$
  - $\text{CH}_2\text{ClCH}_2\text{CH}(\text{CH}_3)\text{COOH}$
- d) Given alkanes, alkenes and alkynes, arrange them in the order in which the speed of reaction is beginning with the firstest. Explain the reason for your answer.(2 Marks)