**CHUKA** 



**UNIVERSITY** 

### SUPPLEMENTARY/ SPECIAL EXAMINATIONS

# EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF EDUCATION SCIENCE, BACHELOR OF SCIENCE

**CHEM 103: GENERAL ORGANIC CHEMISTRY I** 

STREAMS: BSC, BED SCIE TIME: 2 HOURS

DAY/DATE: MONDAY 01/02/2021 8.30 AM – 10.30 AM

### **INSTRUCTIONS:**

### **ANSWER ALL QUESTIONS**

1. Give systematic IUPAC names of the following organic compounds

(6 marks)

$$\uparrow \uparrow \uparrow \uparrow$$

ii)

iii)

iv)

$$\hookrightarrow$$

v)

vi)

$$\begin{array}{cccc} \text{CH}_3 \text{--CH} = \text{C} \text{--CH}_2 \text{--CH}_2 \text{--CH} - \text{CH}_3 \\ & & & & & \\ \text{CH}_3 & & & \text{CH}_3 \end{array}$$

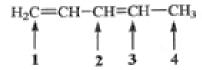
2. Draw the structures of the following compounds

(4 marks)

- i. 6-isopropyl-2,3-dimethylnonane
- ii. Cis-1-ethyl-3-methylcycloheptane
- iii. Trans-1-cyclopropyl-2-methylcyclohexane
- iv. 6-Bromo-3-propylhex-1-ene

3. Give the correct hybridization for the indicated carbon atoms

(2 marks)



4. Give the IUPAC names for each of the following compounds using E/Z designation

(3 marks)

i)

ii)

iii)

5. Write the structural formula for all the five constitutional isomers with the molecular formula  $C_6H_{14}$  and name them by IUPAC system (5 marks)

- 6. Give the mechanism of reaction when methane (CH<sub>4</sub>) reacts with bromine (Br<sub>2</sub>) in presence of light showing initiation, propagation and termination steps. (5 marks)
- 7. Some of the most important organic compounds in biochemistry are the  $\alpha$ -amino acids, represented by the general formula shown (Where R is an alkyl group)



Write structural formulas for the following  $\alpha$ -amino acids,

(3 marks)

- i. Alanine (R = methyl)
- ii. Leucine (R = isobutyl)
- iii. Isoleucine (R = sec-butyl)
- 8 State two uses of alkanes

(2 marks)

#### **QUESTION 2 (20 MARKS)**

- a) Give systematic IUPAC names of the following organic compounds
- (5 marks)

- i) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>C == C-H
- ii)  $CH_3(CH_2)C = C(CH_2)_2CH_3$ 
  - iii) CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>OH
- iv) CH<sub>3</sub>CH(CH<sub>3</sub>)CH<sub>2</sub>CH(CH<sub>2</sub>CH<sub>3</sub>)CH<sub>2</sub>CH<sub>2</sub>OH
- v) OHCH<sub>2</sub>CH<sub>2</sub>OH
- b) Using equations give two methods of preparation of alkynes. (4mks)
- c) Write one way in which you can differentiate between a ketone and an aldehyde in the laboratory. (2mks)
- d) Complete the following reactions giving the major product(s) (5mks)

i) OH + NaOH 
$$\longrightarrow$$
 A + B

ii) 
$$CH_3C^-H + NaBH_4 \xrightarrow{H_2O \text{ or Methanol}} E$$

iii)CH<sub>3</sub>CH<sub>2</sub>'-COOH + CH<sub>3</sub>OH 
$$\stackrel{}{\longleftarrow}$$
 E + F

e) Give the physical properties of alcohols

(4mks)

## **QUESTION THREE (20 MARKS)**

a. Write the IUPAC names of the following

(8mks)

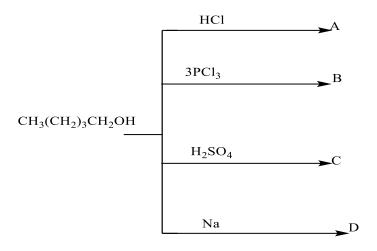
- i) CH<sub>3</sub>CH<sub>2</sub>CH<sub>3</sub>
- ii) CH<sub>3</sub>CH<sub>2</sub>OCH<sub>2</sub>CH<sub>3</sub>
- iii) (CH<sub>3</sub>CH<sub>2</sub>CH<sub>2</sub>)<sub>2</sub>O
- iv) CH<sub>3</sub>NH<sub>2</sub>



$$Vi)H_3C$$
 $CHCH_2NH_2$ 
 $H_3C$ 

- vii) CH<sub>3</sub>NHCH<sub>2</sub>CH<sub>3</sub>
- viii) (CH<sub>3</sub>CH<sub>2</sub>)<sub>3</sub>N
- f) Write the major product(s) of the following reaction

(5mks)



g) Write the IUPAC names of the following

(7 mks)

- i) H<sub>2</sub>NCH<sub>2</sub>CH<sub>2</sub>COOH
- ii) CH<sub>3</sub>CH<sub>2</sub>CH(CH<sub>3</sub>)CH<sub>2</sub>CH<sub>2</sub>COOH

iii)

- iv) CH<sub>3</sub>CH(CH<sub>3</sub>)CH<sub>2</sub>CHO
- v) CH<sub>3</sub>CGH<sub>3</sub>

vi)

