CHUKA UNIVERSITY

UNIVERSITY EXAMINATIONS

RESIT/SPECIAL EXAMINATION

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE

CHEM 103: GENERAL ORGANIC CHEMISTRY

STREAMS: BSC **TIME: 2 HOURS**

DAY/DATE: WEDNESDAY 11/08/2021 **2.30 P.M – 4.30 P.M.**

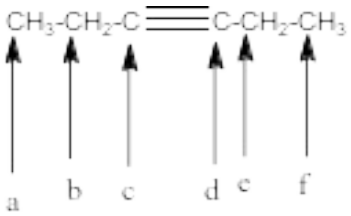
INSTRUCTIONS:

- **ANSWER ALL QUESTIONS**

QUESTION ONE (30 MARKS)

a) Define a) catenation. b) Functional group. (2 marks)

b) Give the hybridization of the carbons in the following molecule. (3 marks)

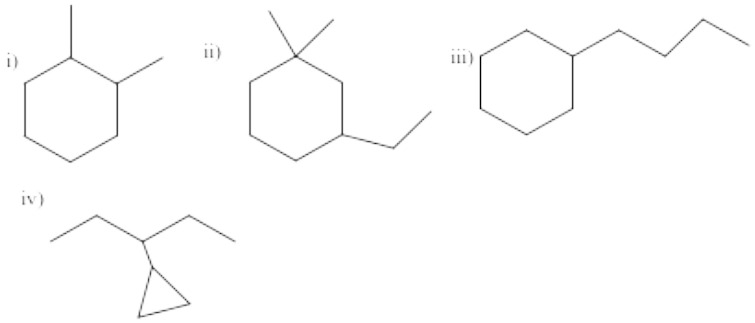


c) Give one method of preparation of a) Alkane b) Alkene. (4 marks)

d) Draw the structures of the following molecules. (5 marks)

a) 2-bromobutane
b) 2,3,5-trimethyl-4-propylheptane
c) 3-ethyl-2,5-dimethylnonane
d) Methylcyclohexane
e) 1-cyclobutylhexane

e) Give the IUPAC names of the following structures. (4 marks)



f) Draw the structural isomers with the molecular formula C_5H_{12} (4 marks)

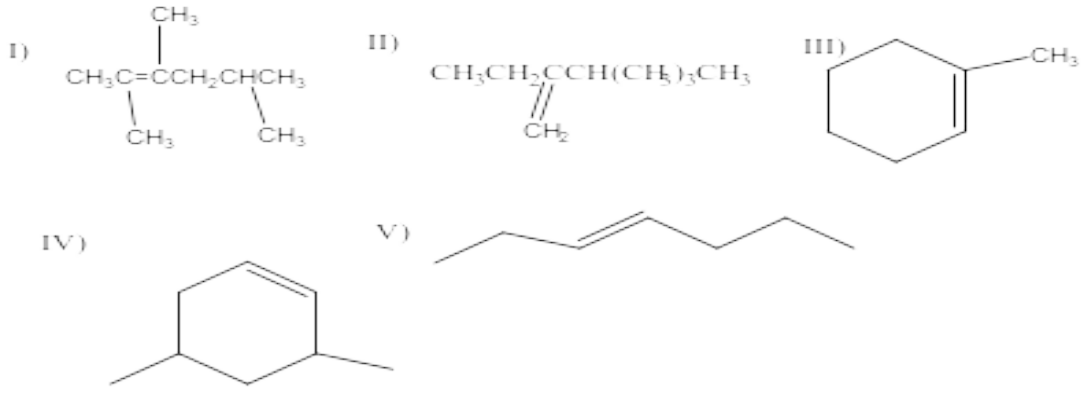
g) Give 3 physical properties of alkanes and 3 physical properties of alkenes (3 marks)

h) Write the mechanism of the following reaction (5 marks)

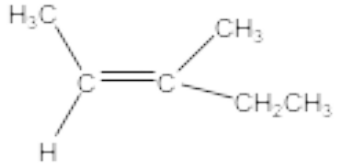
$CH_4 + Cl \longrightarrow CH_3Cl + HCl$

QUESTION TWO (20 MARKS)

a) Give the IUPAC name of the following (5 marks)



b) Name the following alkenes using the E/Z configuration (2 marks)



c) Complete the following reactions. (6 marks)

i) $CH_3CH_2OH \xrightarrow[180\ degrees]{95\%\ H_2SO_4}$ A

ii) $CH_3CH_2CH_2CH_2Cl \xrightarrow{KOH/C_2H_5OH}$ B

iii)

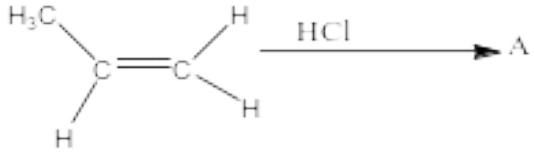
$CH_3CH_2CH{=}CH_2 \xrightarrow{H_2O/H_2SO_4}$ C

(2 marks)

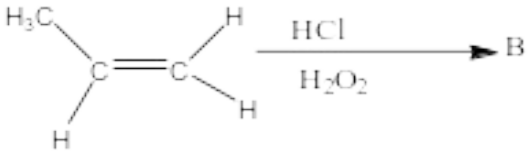
d) A) Define Markonikovs Rule (1 mark)

b) Complete the following reactions.

a)



b)



e) Draw the structures of the following compounds. (4 marks)

i) 2-propyne
ii) 2-methyl-4-hexyne
iii) 2,2-dimethylpentyne
iv) 3-ethyl-5-methylheptan-1-ol

QUESTION THREE (20 MARKS)

a) Give four physical properties of alkynes. (4 marks)

b) Using an equation give one method for preparation of alkynes. (2 marks)

c) Complete the following reactions. (7 Marks)

i) $(CH_3)_2CHCH_2C{\equiv}CH \xrightarrow[2.\ CH_3Br]{1.\ NaNH_2,NH_3}$ **A**

ii) $CH_3CH_2C{\equiv}CCH_2CH_3 \xrightarrow{H_2/Ni_2B}$ **B**

iii) $CH_3CH_2C{\equiv}CCH_2CH_3 \xrightarrow{Na/NH_3}$ **C**

iv) $HC{\equiv}C\text{-}CH_2CH_3 \xrightarrow{HBr}$ **D** $\xrightarrow{HBr}$ **E**

v) $CH_3C{\equiv}CH_2\text{-}CH_3 \xrightarrow[H_2SO_4]{H_2O}$ **F** $\longrightarrow$ **G**

d) Give the IUPAC names of the following compounds. (7 marks)

i) $CH_3OCH_2CH_3$
ii) $(CH_3CH_2CH_2)_2O$
iii) CH_3NH_2
iv) $CH_3CH(CH_3)CH_2NH_2$
v) $(CH_3CH_2)_2NH$
vi) $CH_3CH_2CH(CH_3)CH_2CH_2COOH$
vii)