(*University of Choice*)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

(MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2018/2019 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DIPLOMA

IN

CIVIL ENGINEERING, ELECTRICAL AND ELECTRONICS ENGINEERING AND WATER TECHNOLOGY

COURSE CODE: DCE 053
COURSE TITLE: CHEMISTRY
DATE: FRIDAY 8TH FEBRUARY 2019 TIME: 9.00AM –11.00AM

INSTRUCTIONS:

1. Answer **ALL** the Questions in both **SECTIONS**
2. Marks for each question are indicated in the parenthesis.
3. Examination duration is **2 Hours**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over.

SECTION A – (40 MARKS)

Question One

a.) Define the following terms:

i. Alloy (2 Marks)

ii. Metallurgy (2 Marks)

iii. Polymerization (2 Marks)

b). Describe the kinetic theory of gases (4 Marks)

Question Two

a) A voltaic cell is constructed in that one electrode compartment consists of a Cadmium strip placed in a solution of $Cd(NO_3)_2$, and the other has a nickel strip placed in a solution of $NiSO_4$ the overall reaction is ;

$Cd(s) + Ni^{2+}(aq) \longrightarrow Cd^{2+}(aq) + Ni(s)$

i. Write the half reactions that occur in the two electrode compartments. (3 Marks)

ii. Which electrode is the anode and which is the cathode. (2 Marks)

iii. Indicate the signs of the electrodes (2 Marks)

. b) Draw the structural formular of the following compounds

i. 3 methylpent-2-ene (1 Mark)

ii. 2 methylbut-1-ene (1 Mark)

iii. Cyclopentane (1 Mark)

iv. 3,3-dimethylbut-1-ene (1 Mark)

v. Using chemical test, state how you would distinguish between $CH_2=CH_2$ and C_2H_6 (2 Marks)

a) The grid below is part of the periodic table with elements A,B,C,D,E,F,G,H. Use it to answer the questions that follow.

1	II		III	IV	V	VI	VII	VIII
				A		B	C	
D			E	F			G	
		K					H	

i. Which is the most reactive non-metallic element? (1 Mark)

ii. Write down the electronic configuration of elements A, D,G and H (4 Marks)

iii. Write the formular of the compound formed when A reacts with B (1 Mark)

iv. Name the bond type in the compound formed above (1 Mark)

v. What is the name given to the group of compounds where C, G and H belong? (1 Mark)

vi. The melting points of elements F and G are 1410^0c and -110^0c respectively. In terms of structure and bonding, explain this large difference. (3 Marks)

c) A compound of carbon, hydrogen and oxygen contains 40% carbon, 6.67% hydrogen and the rest oxygen. Determine its

i. Simplest molecular formular (3 Marks)
ii. Molecular formular if its relative molecular mass is 180 (3 Marks)

Take; (C=12; H=1; O=16)

SECTION B - (30 MARKS)

Answer all Questions

Question Three

Calculate each of the following quantities for an ideal gas;

a) The volume of the gas in litres if 1.57 mol has a pressure of 0.86 atm at a temperature of -12 ^oC**.** (3 Marks)

b) The absolute temperature of the gas at which $6.79X10^{-2}$ mols occupies 164 ml at 693 torr. (3 Marks)
c) The pressure in atm, if 8.25×10^{-2} mol occupies 255 ml at 115^oC (3 Marks)
d) The quantity of gas in moles, if 5.94L at 35^OC has a pressure of 11.25 Kpa. (3 Marks)
ii).Large amounts of nitrogen gas are used in the manufacture of ammonia principally for use in fertilizers. Suppose 80kg of N_2 is stored in a 1000 L metal cylinder at 300^0C. Calculate the pressure of the gas assuming ideal gas behavior? (3 Marks)

Question Four

a) Describe the extraction process of iron from its ore with the aid of balanced chemical equations (7 Marks)
b) Using a flowchart, describe the treatment process for waste water (8 Marks)