THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

CERTIFICATE IN BUILDING & CONSTRUCTION

ARH 1125: CHEMISTRY

END OF SEMESTER EXAMINATION

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer booklet*

This paper consists of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

SECTION A (COMPULSORY)

Question 1

a) Describe the structure of an atom   (4 marks)

b) State **FOUR** properties of metals   (4 marks)

c) Outline **FOUR** uses of PVC products in the construction industry   (4 marks)

d) Define the following terms

    (i)   Reducing agent
    (ii)   Oxidizing agent
    (iii)   Oxidation
    (iv)   Reduction

$$Fe_2O3_{(s)} + 3\ CO_{(g)} \longrightarrow 2\ Fe_{(l)} + 3CO2_{(g)}$$

And from the equation above, identify reducing and oxidizing agent and state which compound undergoes reduction and oxidation   (2 marks)

e) Differentiate between weak acid and strong acid with the aid of chemical equations.   (2 marks)

f) Outline any **FOUR** causes of temporary and permanent hardness of water   (4 marks)

g) Define the term:

    (i)   Electrolysis
    (ii)   Conductivity   (6 marks)

SECTION B (Answer *any TWO questions from this section*)

Question 2

a) State **TWO** types of polymers giving **THREE** examples in each case   (5 marks)

b) State **TEN** characteristics of polymers   (10 marks)

c) Explain why the strength of polymers increase with increase of chain length (2 marks)

d) State **THREE** types of Radioactivity   (3 marks)

Question 3

a) State any **SIX** types of chemical bonding   (6 marks)

b) State **SIX** conditions that limit corrosion of aluminum   (6 marks)

c) List **THREE** products that are formed from the general corrosion of iron (3 marks)

d) Explain what happens to a metal during the oxidation step of the oxidation-reduction
(5 marks)

Question 4

a) Describe trend in the following physical properties: (16 marks)

    (i)   Electronegativity
    (ii)   Ionization energy
    (iii)   Melting/boiling point
    (iv)   Atomic radius
    (v)   Across the period
    (vi)   Down the group giving reason for your answer

b) Explain why group 1A elements:

    (i)   Are good conductor of heat
    (ii)   Have lower melting points than group 2A elements

Question 5

a) Define the term half-life (1 mark)

b) A radioactive source contains $5.1 * 10^{15}$ atoms and 5000 nuclei decay per second (3 marks)

c) State **SIX** characteristics of Radioactive materials

d) Describe how the rate of corrosion occurring in the plant is affected by the following:

    (i)   Temperature
    (ii)   Water velocity (6 marks)

e) Using relevant explain the use of radiation in modern world (10 marks)