MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

DEPARTMENT: ELECTRICAL ENGINEERING

LEVEL:	**DIPLOMA**
CLASS:	**MRUC EE/P/14DS**
TERM/SEMESTER:	**II**
ACADEMIC YEAR:	**2014/2015**
UNIT:	**ELECTRICAL PRINCIPLES**
UNIT CODE:	**SEE 1103**

23RD APRIL 2015 **TIME: 2 HOURS**

Instructions to candidates

This paper contains FOUR questions

Attempt question 1 and any other two questions

You should have the following for this examination;

- Drawing instruments
- Scientific calculator

Mobile phones are not allowed in examination room.

SECTION A (30 marks)

Question 1

a) Define the following terms giving the units of each
   i. Power
   ii. Electric current
   iii. Resistance (6 marks)

b) Distinguish between primary and secondary cells giving one example in each case (4 marks)

c) Two capacitors with capacitances at 6μF and 4 μF are connected in series across a 100 V supply. If the supply is cut-off and the two capacitors are connected in parallel, determine the final charge of the 4 μF capacitor. (7 marks)

d) A copper wire has a resistance of 200Ω at 20°C.A current is passed through the wire and the temperature rises to 90 °C. Determine the resistance of the wire at 90 °C assuming the temperature coefficient of resistance is $0.004/^0C$ (5 marks)

e) Explain how the following faults occur in a simple cell stating how each can be minimized.

   i. Local Action
   ii. Polarization (6 marks)

f) State the Faraday's laws of electromagnetic induction (2 marks)

SECTION B

Question 2

a) A moving coil instrument having a resistance of 10 Ω,gives a full scale deflection when the current is 8mA.Determine the values of resistance required to enable the instrument to be used

   i. As a 10 A ammeter
   ii. As a 100v voltmeter
   iii. State the mode of resistance connection in each case (7 marks)

b) Sketch a labeled diagram of a Leclanche's dry cell and give the purpose of

   i. Manganese dioxide
   ii. Ammonium chloride (7 marks)

c) A capacitor, consisting of two metal plates each of area 50 cm^2 and spaced 0.2mm apart in air, is connected across a 120V dc supply. Determine the:

   i. Electric flux density
   ii. Potential gradient (6 marks)

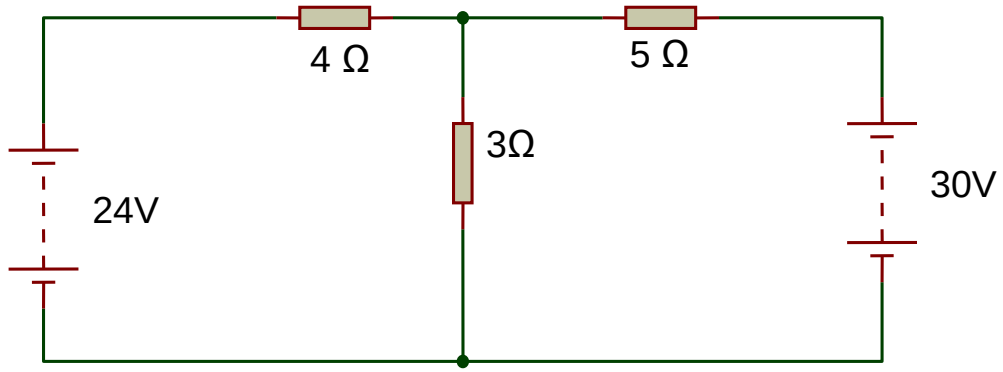
Question 3

a) State

   i. Thevenin's Theorem
   ii. Superposition Theorem (6 marks)

b) Determine the currents in each branch in the following network using

   i. Kirchhoff's laws
   ii. Superposition Theorem (14 marks



Question 4

a) With the help of diagrams describe the operation of permanent magnet moving coil instrument

(6 marks)

b) A mild steel ring has a radius of 50mm and across-sectional area of 400mm^2 .A current of 0.5A flows in a coil wound uniformly around the ring and the flux produced is 0.1mWb.If the relative permeability at this value is 200.Determine

i. The reluctance of the mild steel

ii. The number of turns on the coil (8 marks)

c) Use Thevenin's theorem to determine the current flowing and the power dissipated in the 4Ω resistor shown in the following figure (6 marks)