Name _____ Index No. _____/_____

1408/315

Candidate's Signature _____

SCIENCE LABORATORY PRACTICE
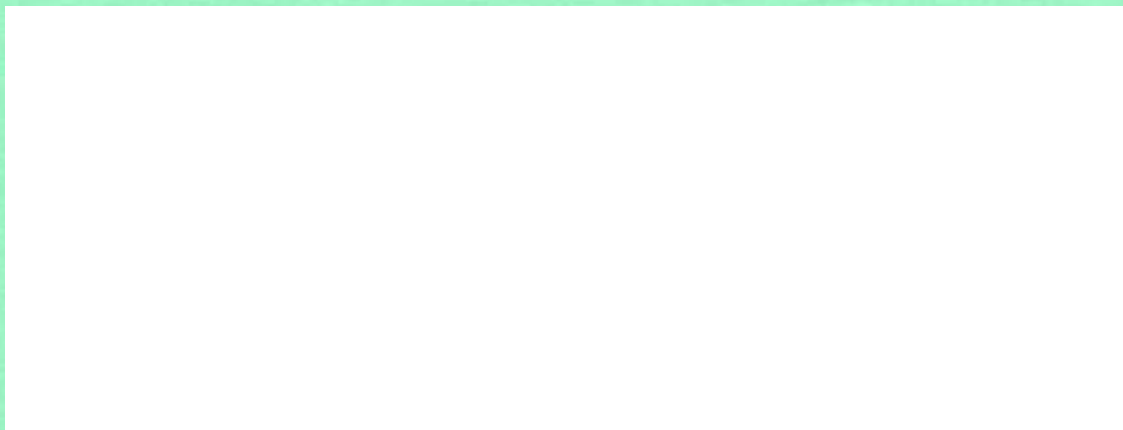PRACTICAL

Date _____

July 2014
Time: 4 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

CRAFT CERTIFICATE IN SCIENCE LABORATORY TECHNOLOGY

SCIENCE LABORATORY PRACTICE
PRACTICAL

4 hours

For Examiner's Use Only

Questions	1	2	3	TOTAL SCORE
Candidates's Score				

This paper consists of 12 printed pages.

Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.

Turn over

1. You are provided with:

   - a standard solution of hydrochloric acid
   - a standard solution of sodium hydroxide
   - methyl orange indicator
   - Phenolpthalein indicator
   - Thermometer (-10° C - 110°C)
   - Plastic beaker 250 cm³
   - Other titration apparatus.

   You are required to determine the standard molar heat of neutralization between sodium hydroxide and hydrochloric acid.

   PROCEDURE

   (i)   Measure 50 cm³ of he sodium hydroxide solution and transfer into a 250 cm³ plastic beaker.

   (ii) Add 5.0 cm³ portions of the dilute hydrochloric acid from the burette, stir and record the highest temperature reached and tabulate the results as shown below.   (10 marks)

Volume HCl added in cm³	5	10	15	20	25	30	35	40	45	50
Temperature in °C										

   (10 marks)

   (iii) Plot a graph of temperature against volume of acid added.   (16 marks)
   (iv) Use the graph to determine the molar heat of neutralization between sodium hydroxide and hydrochloric acid.

   $(C = 4.2 \ Jg^{-1}K^{-1}$, all densities are 1.0 g/cm³)   (8 marks)

2. (a) You are provided with apparatus listed below. Use these apparatus to conduct the experiment.

Three (1.5 volts dry cells)
Nichrome wire mounted on an 80 cm long support.
A resistor (R₁)
Diode(D₁)
Voltmenter
Milliameter
9 pieces of conducting wire
A cell holder
2 crocodile chips

(b) PROCEDURE

(i) Measure the voltage of the battery and record the value in the table below.
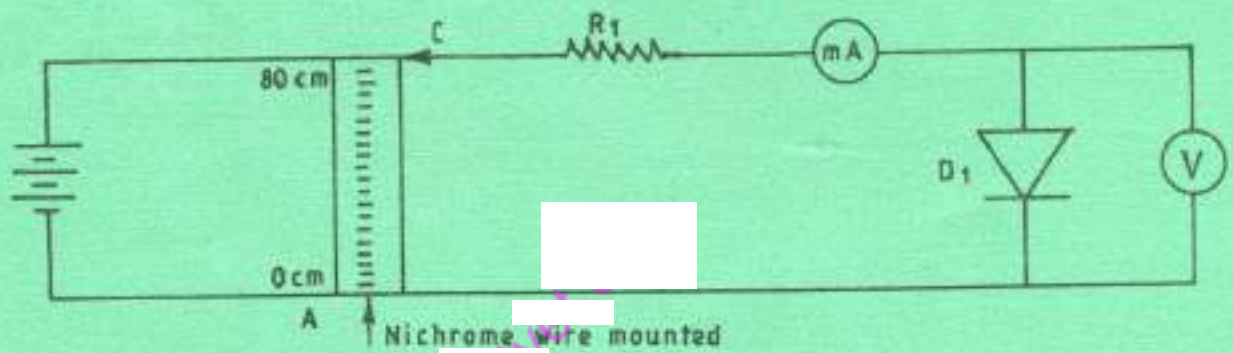(ii) Connect the circuit as shown in figure 1 below.

Figure 1

(iii) Connect the chip C at point A (Zero centimetre mark) and record the milliameter and voltmeter reading in the table below.

(iv) Repeat step (iii) above when the position of chip C along the wire is changed to 5 cm, 10 cm, 15 cm, 25 cm, 40 cm and 80 cm mark.

(c) Voltage of battery = _____ volts   (1 mark)

Position of chip C (cm)	0	5	10	15	25	40	80
Milliameter reading I (mA)							
Voltmeter reading V(volts)							
$G = \dfrac{I}{V}\left(\dfrac{mA}{V}\right)$							

(7 marks)

(d) (i) Plot a graph of current (mA) against potential different in volts. (7 marks)

(ii) Determine the value of G when the chip C is at 10, 15, 25 40 and 80 cm mark. (5 marks)

(iii) State the physical property represented by G. (2 marks)

(iv) Describe the changes in G with regard to the diode. (4 marks)

(v) State the importance of the resistor R_1. (2 mark)
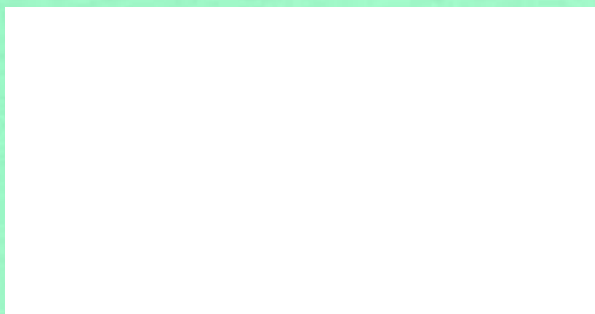
3.   You are provided with the following

    -    Fresh pumpkin stalks
    -    Scarpel blade
    -    3 petri dishes
    -    Microscope
    -    Distilled water
    -    0.25 M sucrose solution
    -    1.5 M sucrose solution
    -    Microscope slide

Procedure:

(a)   Obtain a thin transverse section of the pumpkin stalk. Place it on a slide and observe under the low power magnification.

(b)   Label the three petri-dishes as; distilled water; 0.25 M sucrose solution; and 0.5 M sucrose solution separately.

(c)   Pour the given solutions into the respectively labelled petri-dishes.

(d)   Cut the pumpkin stalk longitudinally into four strips each 3 cm long.

(e)   Place one strip on a tile and observe for one minute.

(f)   Immerse the remaining three pieces, one piece into each of the three-dishes containing the appropriately labelled solution and leave for 20 minutes then observe.

(i)   Draw a labelled diagram of the observed transverse section as seen under low power magnification.   (6 marks)

(ii)   Describe the appearance of the longitudinally cut strip placed on the tile after one minute. Explain your observation.   (7 marks)

(iii)   Draw the pumpkin strips as observed in the respective solution after 20 minutes.
                                                                                            (6 marks)

(iv)   Explain the observations.   (11 marks)

(v)   Define the following terms:

    (a)   Water potential.   (2 marks)

    (b)   Solute potential.   (2 marks)