THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

DIPLOMA IN ANALYTICAL CHEMISTRY (DAC II)

APS 2102: PHYSICS II

END OF SEMESTER EXAMINATION
SERIES: OCTOBER 2012
TIME ALLOWED: 2HOURS

Instructions to Candidates:
You should have the following for this examination

This paper consists of **FIVE** questions
Answer Question **ONE** (**Compulsory**) from **SECTION A** and any other **TWO** questions from **SECTION B**
Maximum marks for each part of a question are clearly shown
This paper consists of **THREE** printed pages

SECTION A (Compulsory)

Question One (30 marks)

a) Explain capacitance and give the SI unit of measuring capacitance **(2 marks)**

b) Explain the law of conservation of charge **(2 marks)**

c) Give the mathematical equation of Coulumbs law and state each component **(3 marks)**

d) State Ohmns law and its mathematical equation **(3 marks)**

e) Distinguish giving examples between ohmic and non-ohmic conductors **(4 marks)**

f) Write short notes on the concept of electromagnetism **(4 marks)**

g) How is emf induced in a conductor? **(3 marks)**

h) (i) State Faraday's Law of electromagnetic induction **(2 marks)**

   (ii) State Lenz's law of electromagnetic induction **(2 marks)**

i) A moving coil meter of resistance 5 Ω measures a maximum current of 50mA. How can it be adopted to measure a maximum current of 5A? **(5 marks)**

SECTION B (Attempt any TWO questions)

Question Two (20 marks)

a) Write short notes on the following giving their units of measurement and mathematical equations
   - (i) Electrical conductivity
   - (ii) Electrical resistivity
   - (iii) Electrical resistance **(6 marks)**

b) A meter has a resistance of 20 Ω and give full-scale deflection when a current of 50mA passes through it. +z Calculate the value of the resistance, stating in each case how it is connected so that the meter may measure .
   - **(i)** Current up to 2A **(4 marks)**
   - **(ii)** Potential difference up to 100V **(4 marks)**

c) A steel wire has a cross-sectional area 25cm^3 and the resistivity of steel is 1.0 x 10^{-7} Ω m. Calculate the resistance of the wire per metre neglecting the effect of joints **(4 marks)**

d) Define electrical resistance and give its units of measurement **(2 marks)**

Question Three (20 marks)

a) With an aid of diagrams, explain how an electroscope can be charged positively by induction
(8 marks)

b) Describe with aid of a circuit diagram how you would determine the resistance of a conductor using theMetre Bridge **(7 marks)**

c) Derive an expression for the resistance of two resistors connected in parallel **(5 marks)**

Question Four (20 marks)

a) Calculate the internal resistance (r) of a cell and electromotive force (E) that passes a current of 1.2A through a 1.0 ohm resistor and a current of 0.4A through a 4ohm resistor. **(5 marks)**

b) (i) Explain why convergence of the leaf on the gold leaf electroscope is not a conclusive test for the nature of charge on a body **(3 marks)**
(ii) State the uses of an electroscope **(3 marks)**

c) Explain the following methods of charging

   (i)   Friction
   (ii)   Contract
   (iii)   Induction **(9 marks)**

Question Five (20 marks)

a) Give the advantages and disadvantages of digital electronics **(8 marks)**
b) Combinational systems and sequential systems are types of digital system which are used to choose

representations. Explain the **TWO** digital systems **(4 marks)**
c) (i) Define the term semi-conductor **(2 marks)**
   (ii) Give **TWO** examples of semi-conductor materials **(2 marks)**
d) Discuss the principle of electromagnetic induction **(4 marks)**