THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF PURE & APPLIED SCIENCES
DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY (DSLT10S)

APS 2102: PHYSICS II

END OF SEMESTER EXAMINATION
SERIES: AUGUST/SEPTEMBER 2011
TIME: 2HOURS

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

This paper consists of **FIVE** questions
Answer Question **ONE** (Compulsory) and attempt any other **TWO** questions
This paper consists of **THREE** printed pages

Question One (30 marks)

a) State Kirchoff's law. (2 marks)

b) (i) State the law of electrostatics (2 marks)

   (ii) State the factors that determine electrostatic force (3 marks)

c) Distinguish between resistance and resistivity of an electrical conductor giving units of each.
(4 marks)

d) Distinguish between ohmic and non-ohmic conductors giving examples in each case . (4 marks)

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

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

g) (i) Define capacitance and give its SI units (2 marks)

   (ii) Calculate the combined capacitance of two capacitors in parallel, each of capacitance 4 μ F

   In series with a single 0.5 μ F capacitor. (4 marks)

Question Two (20 marks)

a) Describe with aid of diagrams how an electroscope can be charged positively by induction. (6 marks)

b) Explain what happens when an uncharged body is brought close to the cap of a charged electroscope (4 marks)

c) (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 (2 marks)

d) 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)

Question Three (20 marks)

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a) State Ohm's law. (1 mark)

b) Derive an expression for the resistance of two resistors connected in series

(5marks)

c) Define electromotive force and give its units of measurement (2 marks)

d) A meter has a resistance of 20 Ω and gives full-scale deflection when a current of 50mA passes through it. 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 (5 marks)

(ii) Potential difference up to 100V (4 marks)

Question Four (20 marks)

a) Calculate the change in potential difference between the plates of 470 μ F Capacitor when it losses 9.4×10^{-6} coulombs of charge. (5 marks)

b) Two capacitors of 0.2 μ F are connected in series to a supply of 100V. Calculate the potential difference across each capacitor (5 marks)

c) (i) State Faraday's law of electromagnetic induction (2 marks)

(ii) State Lenz's law of electromagnetic induction

d) Discuss electromagnetic induction (3 marks)

e) What does the strength of induced emf depend upon? (3 marks)

Question Five (20 marks)

a) (i) distinguish between a conductor and a semi-conductor (2 marks)

(ii) Give TWO examples of semi-conductor materials (2 marks)

b) Distinguish between intrinsic semiconductors and extrinsic semiconductors. (4 marks)

c) (i) Explain 'doping' as used in electronics (3 marks)

(ii) Give the full name of LED and its symbol (2 marks)

d) Describe with aid of a circuit diagram how you would determine the resistance of a conductor using the Wheatstone Bridge. (7 marks)