



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 SCIENCE LABORATORY TECHNOLOGY (DSLTLT 12J)

APS 2102: PHYSICS II

END OF SEMESTER EXAMINATION

SERIES: AUGUST 2012

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist 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 One (30 marks)

$$\rho = \frac{AR}{L}$$

- a) Derive the expression for determining resistivity of a conductor. **(5 marks)**
- b) (i) State the law of electrostatic charges. **(2 marks)**
 (ii) Distinguish between direct current (DC) and alternating current (AC). **(2 marks)**
 (iii) State Coulomb’s law. **(2 marks)**
- c) Write short notes on non-ohmic conductors and state their uses. **(4 marks)**
- d) Define a capacitor and give the SI unit of measuring capacitance. **(3 marks)**
- e) Give the advantages and disadvantages of digital electronics. **(6 marks)**
- f) Explain the factors that determine the strength of induced e.m.f **(6 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two (15 marks)

- a) Distinguish between the terms:
 - (i) Conductors **(1 mark)**
 - (ii) Semi-conductors **(1 mark)**
 - (iii) Insulators **(1 mark)**
- b) Derive an expression for the resistance of **THREE** resistors connected in parallel. **(6 marks)**
- c) Calculate the internal resistance (r) of a cell and electromotive force (E) that passes a current of 1.2A through 1.00hm resistor and a current of 0.4A through a 4.0°hm resistor. **(6 marks)**

Question Three (15 marks)

- a) Calculate the change in potential difference between the plates of a 470 μF capacitor when it stores 9.4×10^{-6} coulombs of charge. **(4 marks)**
- b) Two capacitors of 0.1 μF and 0.2 μF are connected in series to a supply of 100V. Calculate the potential across each capacitor. **(5 marks)**
- c) Compare electrostatic force with gravitational force and give the mathematical equation of each. **(6 marks)**

Question Four (15 marks)

- a) The forces caused by a magnetic field are different in a number of ways from the forces by gravitational and electric field. Explain **FOUR** of these differences. **(8 marks)**
- b) Derive a relationship between the current (I), Voltage (V) and resistance (R) **(2 marks)**
- c) A moving coil metre of resistance $20\ \Omega$ measures a maximum current of 50mA. How can it be adopted to measure a maximum current of 2A? **(5 marks)**

Question Five (15 marks)

- a) Discuss the main difference between analogue and digital electronics basing on the following:
- (i)** Noise **(3 marks)**
 - (ii)** Precision **(3 marks)**
 - (iii)** Design difficulty **(3 marks)**
- b) (i) Define the term semi-conductor. **(2 marks)**
(ii) Give **TWO** examples of semi-conductor materials. **(2 marks)**
(iii) Explain doping in semi-conductivity. **(2 marks)**