



**TECHNICAL UNIVERSITY OF MOMBASA**  
**Faculty of Applied & Health**  
**Sciences**

DEPARTMENT OF MATHEMATICS & PHYSICS

**DIPLOMA IN COMPUTER SCIENCE & INFORMATION**  
**(DCIT/MAY13)**

APS 2130: FUNDAMENTALS OF PHYSICS

**SPECIAL/SUPPLEMENTARY EXAMINATION**

**SERIES: OCTOBER 2013**

**TIME: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*
- *Scientific Calculator*
- *Mathematical Tables*

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  
Constant  $g = 10\text{Nkg}/10\text{mg}^2$   
 $k = 9 \times 10^9\text{N/C}^2$

## SECTION A (COMPULSORY)

### Question One

- a) Name SIX basic quantities and their SI units. **(6 marks)**
- b) A car travelling on a straight road at  $2\text{ms}^{-1}$  is uniformly accelerated at  $2\text{ms}^{-2}$  for 8 seconds. Calculate:  
(i) It's displacement **(3 marks)**  
(ii) It's final velocity **(3 marks)**
- c) If you are provided with a battery, two resistors, R1 and R2 and connecting wires, draw a circuit diagram with effective resistance:  
(i) Maximum **(2 marks)**  
(ii) Minimum **(2 marks)**
- d) State the basic functions of the following electronic devices:  
(i) Diode **(2 marks)**  
(ii) Transistors **(2 marks)**
- e) (i) What is the SI unit of Resistance **(1 mark)**  
(ii) Determine the current in a lamp circuit, if 4800 coulombs of electricity flow through the lamp in 25 minutes. **(4 marks)**
- f) What is the speed of a wave motion, frequency 2.5 Hz and wave length 0.60m? **(3 marks)**
- g) Give **TWO** examples of Intrinsic semiconductors. **(2 marks)**

## SECTION B (Answer any TWO questions from this section)

### Question Two

- a) Define Force and state its effects. **(3 marks)**
- b) (i) State the uses of dimensional analysis **(2 marks)**  
(ii) Obtain the dimension of force in terms of base quantities. **(3 marks)**
- c) (i) State Newton's second law of motion **(1 mark)**  
(ii) A body of mass 4kg is resting on a horizontal surface as shown in the diagram below. A force of 100N is applied on it horizontally.  
(I) Indicate on the diagram other forces acting on it. **(2 marks)**

- (II) If the frictional force between it and the surface is 40N, calculate its acceleration (4 marks)
- (III) What would happen to the body if the frictional force is 100N (2 marks)

- d) A bus travels from Mombasa to Nairobi a distance of 480km in 8 hours. Find the average speed of the bus in m/s (3 marks)

### Question Three

- a) Define (i) Electromotive force (1 mark)  
(ii) Electrical resistance (1 mark)
- b) The figure below shows four resistors and a source of voltage of 6V with internal resistance of  $1.0 \Omega$
- (i) Find the effective resistance of the circuit (4 marks)
- (ii) The current through the  $1 \Omega$  resistor (3 marks)
- (iii) The potential difference across the  $4 \Omega$  resistor (3 marks)
- c) (i) What is meant by the term “Alternating current”? (2 marks)  
(ii) State **TWO** ways in which the magnitude of induced emf in a length of a conductor moving in a magnetic field can be increased. (2 marks)
- d) Explain **TWO** characteristics of a wave (4 marks)

### Question Four

- a) State the law of electrostatic force (2 marks)
- b) Explain the following: (i) Electric field (2 marks)  
(ii) Electrostatic potential (2 marks)
- c) Draw the electric field of two point charges of the same positive charge close to each other. (2 marks)
- d) Describe the construction of waxed paper capacitor. (4 marks)
- e) A capacitor is marked  $1000 \mu F$ . What is the charge on it at 20V? (4 marks)
- f) Distinguish between a vector and a scalar quantity (4 marks)

### Question Five

- a) Name and indicate the sources of the radiations in the electromagnetic spectrum in their order of increasing wavelength (7 marks)

- b) The wavelength of the television carries wave from a transmitting station in  $66 \frac{2}{3}$ m. Calculate its frequency. **(3 marks)**
- c) Give **ONE** example of a digital and analogue system **(2 marks)**
- d) Describe **SIX** sources of Energy **(6 marks)**
- e) Explain the term “Band width” **(2 marks)**