



**TECHNICAL UNIVERSITY OF MOMBASA**  
**UKUNDA CAMPUS**  
**Faculty of Engineering &**  
**Technology**

**DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY**

**CERTIFICATE IN COMPUTER TECHNOLOGY (CICT 13M)**

**APS 1103: FUNDAMENTALS OF PHYSICS**

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2013**

**TIME ALLOWED: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions

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

### Question One (Compulsory)

- a) Define the following: (3 marks)
- (i) Capacitance
  - (ii) Resistance
  - (iii) Electrical current
- b) Explain any **THREE** factors that affect capacitance of a capacitor (6 marks)
- c) Determine the resistance of a heater which absorbs 3KW from a 240V d.c. supply (3 marks)
- d) Determine the resistance of 100m of 120mm<sup>2</sup> copper wire. The resistivity of copper is  $1.78 \times 10^{-8} \Omega$  (3 marks)
- e) Define the following terms: (3 marks)
- (i) Charge
  - (ii) Electric field
  - (iii) Static electricity
- f) Derive the equations of linear motion (8 marks)
- g) Draw a labeled diagram of a transformer (4 marks)

### Question Two

- a) Define the following: (3 marks)
- (i) Work
  - (ii) Kinetic energy
  - (iii) Potential energy
- b) A body of mass 4kg decreases its kinetic energy by 32J if its initial speed was 5m/s find its final speed. (3 marks)
- c) Calculate the power expended when a 20kg mass is lifted vertically, at 5m/s (2 marks)
- d) (i) An aeroplane lands in the runway with a velocity of 50m/s and decelerates at 10m/s<sup>2</sup> to a velocity of 20m/s. Calculate the distance travelled on the runway. (4 marks)
- (ii) A vehicle starts from rest and accelerates uniformly at 3.6m/s<sup>2</sup>, what is its speed after 30 seconds and how far will it have travelled. (3 marks)

### Question Three

- a) Explain any **THREE** factors that affect resistance of a conductor (6 marks)

b) (i) State Ohm's Law (1 mark)

(ii) Show that when three resistors are arranged in series, the total resistance is given by:

$$R = R_1 + R_2 + R_3$$

(4 marks)

c) Resistors of  $34.7 \Omega$  and  $43.9 \Omega$  are connected in parallel. Determine the value of a third resistor which will reduce the combined resistance to  $19 \Omega$  (4 marks)

#### Question Four

a) State the function of a capacitor (1 mark)

b) Capacitors of  $4 \mu F$ ,  $6 \mu F$  and  $12 \mu F$  are connected in series to a 300 volt d.c. supply. Calculate:  
(i) The charge stored  
(ii) The energy stored (6 marks)

c) Show that when capacitors are connected in parallel, the equivalent capacitance is the sum of individual capacitances. (4 marks)

d) A transformer has a step up ratio of 1:16; it has 32,000 turns on the secondary winding. Calculate:

(i) The number of turns on the primary winding

(ii) The secondary voltage if 50V is supplied to the primary winding (4 marks)

#### Question Five

a) Define the following:

(i) Conductors

(ii) Insulators

(iii) Semi conductors

(iv) Super conductors (4 marks)

b) (i) State the function of a transistor in an electrical circuit (1 mark)

(ii) With an aid of a diagram, describe how a PNP transistor works (8 marks)

c) Briefly explain what is meant by a reverse bias diode (2 marks)