



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

DEPARTMENT OF MATHEMATICS & PHYSICS

**DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY (DICT 14S)**

APS 2103: PHYSICS

**END OF SEMESTER EXAMINATION**

**SERIES: DECEMBER 2014**

**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) Explain the following terms:
- (i) Doping (2 marks)
  - (ii) Intrinsic Semi conductors (2 marks)
  - (iii) Extrinsic semi conductors (2 marks)
  - (iv) N type and P type semiconductors (2 marks)
- b) Define the following terms:
- (i) Change
  - (ii) Field
  - (iii) Electronic lines of force (3 marks)
- c) Explain any THREE factors that affect capacitance of a capacitor. (6 marks)
- d) Explain the term “Band Width” (2 marks)
- e) Derive the equations of linear motion. (7 marks)
- f) Draw a labeled diagram of a transformer. (3 marks)

### Question Two

- a) Define the following terms:
- (i) Work
  - (ii) Kinetic energy
  - (iii) Potential energy (3 marks)
- 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 5mls. (2 marks)
- d) An aeroplane lands in the runway with a velocity of 50m/s and decelerates at  $10\text{m/s}^2$  to a velocity of 20mls calculate the distance travelled on the runway. (4 marks)
- e) A vehicle starts from rest and accelerates uniformly at  $3.6\text{m/s}^2$ , 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 parallel, the total resistance is given by:

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

**(4 marks)**

- c) An electric heating element to dissipate 480W on 240V mains is to be made from Nichrome ribbon 1mm wide and thickness 0.05mm. Calculate the length of ribbon required if the resistivity of Nichrome is  $1.1 \times 10^{-6} \Omega\text{m}$

**(4 marks)**

**Question Four**

- a) State the function of a capacitor. **(1 mark)**
- b) Capacitors  $4\mu\text{F}$ ,  $6\mu\text{F}$ , and  $12\mu\text{F}$  are connected in series to a 300V d.c. supply. Calculate:  
(i) The charge stored  
(ii) The energy stored **(6 marks)**
- c) 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 windings  
(ii) The secondary voltage if 50V is supplied to the primary winding. **(2 marks)**
- d) State any THREE advantages of a zener diode. **(3 marks)**

**Question Five**

- a) Explain the following concepts:  
(i) Rectification **(2 marks)**  
(ii) Voltage regulation **(2 marks)**
- b) Sketch the diagram of a Zener diode. **(1 mark)**
- c) With the aid of a circuit diagram and wave form diagrams, explain the operation of a full wave bridge rectifier. **(10 marks)**