TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

PRE-CERTIFICATE IN INFORMATION TECHNOLOGY (PCIT 13M)

APS 1003: 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*
- *Mathematical Tables*
- *Scientific Calculator*
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

a) Explain the following terms:
    (i)   Doping   **(1 mark)**
    (ii)   P.N. Junction   **(1 marks)**
    (iii)   Barrier voltage   **(1 marks)**

b) With the aid of a circuit diagram, explain the operation of a full-wave bridge rectifier.
                                                           (5 marks)

c) Calculate the length of steel wire of 0.8mm diameter having resistance of 192 Ω (ρ for steel = 0.13 x 10^{-6} Ω m)   **(4 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) Explain the following giving two (2) examples for each:
    (i)   Intrinsic semiconductor
    (ii)   Extrinsic semiconductor   **(4 marks)**

b) With the aid of circuit diagrams show the following transistors configuration:
    (i)   Common collector   **(2 marks)**
    (ii)   Common emitter   **(2 marks)**
    (iii)   Common base   **(2 marks)**

c) Differentiate between:
    (i)   Polarized and Non-polarized capacitors
    (ii)   Fixed and variable capacitors   **(4 marks)**

Question Three

a) Explain the following terms:
    (i)   Energy
    (ii)   Power
    (iii)   Charge
    (iv)   Capacitance   **(4 marks)**

b) With the aid of diagrams, explain how you would perform the following measurement.
    (i)   Voltage in a circuit
    (ii)   Current in a circuit
    (iii)   Resistance in a circuit   **(9 marks)**

c) Differentiate between A.C and D.C. Energy **(2 marks)**

Question Four

a) With the aid of a circuit diagram, show how a capacitor can be charged and discharged.
(6 marks)
b) Describe the construction of a transformer. Briefly explain its operation. **(5 marks)**

c) Briefly explain how the following can be obtained:
    (i)   P-type semiconductor
    (ii)   N-type semiconductor **(4 marks)**

Question Five

a) Show that for temperature stabilized single stage class A transistor amplifier $V_{CC} = I_C R_C + V_{CE} + I_E R_E$
(5 marks)

b) Explain the three (3) factor that affect the resistance (R) of a wire **(6 marks)**

c) State at least **FOUR** disadvantages of using Zener diode as a voltage regulator. **(4 marks)**