MURANG'A UNIVERSITY COLLEGE

(A Constituent College of Jomo Kenyatta University of Agriculture and Technology)

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHOLOGY

MAIN EXAMINATION

LEVEL: **DIPLOMA**

CLASS: **DIT14SEPT**

TERM/SEMESTER: **II**

ACADEMIC YEAR: **2014/2015**

UNIT: **BASIC ELECTRONICS**

UNIT CODE: **SCI 1109**

TIME: **2 HOURS**

Instructions to candidates:
This paper contains **FOUR (4)** questions.

Answer **QUESTION ONE** and **ANY OTHER TWO** questions.

You should have the following for this examination;
- Answer booklet
- Scientific calculator

NB: NO MOBILE PHONES ALLOWED IN THE EXAMINATION ROOM.

Section A
QUESTION ONE (compulsory)
(a) Distinguish between conductors and semi-conductors.   **(2 marks)**
(b) Using well labelled diagrams distinguish between the three bipolar transistor
   configurations.   **(6 marks)**
(c) Name two types of MOSFETs.   **(4 marks)**
(d) Calculate the equivalent resistance of four resistors of 4Ω, 6Ω, 8mΩ and 10MΩ
   connected in parallel.   **(4 marks)**
(e) Using biasing circuits, briefly explain the following:
   i.   Forward bias
   ii.   Reverse bias   **(8 marks)**
(f) Using appropriate diagrams, explain the formation of p-type semi-conductor   materials
   through the process of doping.   **(6 marks)**

Section B
QUESTION TWO
(a) Use the energy band theory to distinguish between conductors, semi-conductors and
   insulators   **(12 marks)**
(b) Name the two materials commonly used to make semiconductor materials. **(2 marks)**

(c) Determine the range of values expected for a resistor with colour coding: red-black-

   brown-green-silver.   **(6 marks)**

QUESTION THREE
(a) Capacitances of 2µF, 7µF, 11 µF and 16 µF are connected in series to a direct voltage
   supply of 120 V. Determine:
   i.   The equivalent circuit capacitance
   ii.   The total charge
   iii. The charge on the 2 µF capacitor.   **(7 marks)**
(b) Show that the equivalent resistance for three resistors connected in parallel is given by:
   $C_{eq} = C_1 + C_2 + C_3$ **(5 marks)**
(c) Define the following terms as used in semiconductor theory:
   i.   Hole
   ii.   Diffusion
   iii. Hall effect
   iv.   Carrier lifetime   **(8 marks)**

QUESTION FOUR
(a) Determine the voltage drop across a resistor of 7 MΩ when a current of 3 mA is passed
   through it.   **(4 marks)**
(b) Sketch a well labelled V-I characteristic curve of a PN-junction diode.   **(6 marks)**

(c) Using standard symbols distinguish between NPN and PNP transistors.   **(4 marks)**

(d) Define the following terms:

   i.   Knee voltage
   ii.   Peak-Inverse voltage
   iii. Maximum power rating   **(6 marks)**