MURANG'A UNIVERSITY COLLEGE

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

DEPARTMENT: **MECHANICAL ENGINEERING**

LEVEL: **DIPLOMA**

CLASS: **DME/P/A/14D**

ACADEMIC YEAR: **2015**

UNIT: **ANALOGUE ELECTRONICS**

UNIT CODE: **SME 1205**

TIME: **2 HOURS**

DATE: **7TH AUGUST 2015**

SPECIAL

Instructions to candidates

This paper contains FOUR Questions

Question ONE is Compulsory

ATTEMPT any **2 Other Questions FROM Section B**

You should have the following for this examination;

- Drawing instruments
- Scientific calculator

Mobile phones not allowed in exam rooms

1. a) i) Sketch the Schematic symbols of the PNP and NPN transistors and label the three terminals.

ii) With the aid of sketches explain how an NPN transistor works.
iii) With the aid of sketches name THREE methods of transistor configurations.
iv) From first principles show that
$\beta=\alpha/1-\alpha$ and $\alpha=\beta/1+\beta$ (8mks)

b) With the aid of a diagram explain the Volt Ampere characteristics of a forward biased PN Junction of a common base transistor configuration. (12mks)

c) Define the following terms
I) Nucleus (2mks)
II) Valence electrons (2mks)

d.) Define the following terms
I) Nucleus (2mks)
II) Valence electrons (2mks)

e) Define the following terms with respect to the P-N junction
I) Breakdown voltage. (1mks)
II) Knee voltage. (1mks)

SECTION B

2. a) i) Sketch a well labeled V-I Characteristics curve of a Zener diode.

ii) Explain the difference between Valence band and conduction band.

iii) With the aid of a diagram explain the transistor stabilizer circuit. (10mks)

b) i) Define the term depletion layer.
ii) With the aid of a diagram explain the Operation of JFET

iii) Explain five diode parameters (10mks)

3. a) Explain the following terms:

i) Doping.

ii) Pentavalent atoms

iii) Depletion region (6mks)

b) Differentiate between intrinsic and extrinsic semi-conductor materials. (4mks)

c) Explain the effect of temperature on intrinsic semi conductors. (4mks)

d) Explain how a p-type semiconductor material is formed. (6mks)

4. a) Explain the meaning of potential barrier for a PN junction. (3mks)

b) With the aid of circuit or block diagrams, explain the following terms as used in PN semiconductors diodes

i) Forward bias

ii) Reverse bias (6mks)

c) With the aid of characteristic curves, describe the biasing of a PN junction diode. (4mks)

d) Define the term ***rectification*** as used in power supplies. (2mks)