MAASAI MARA UNIVERSITY

**REGULAR UNIVERSITY EXAMINATIONS
2017/2018 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER EXAMINATION**

SCHOOL OF SCIENCE AND INFORMATION SCIENCES

**UNIVERSITY EXAMINATIONS FOR THE DEGREE OF
BACHELOR OF SCIENCE
(COMPUTER SCIENCE)**

**COURSE CODE: PHY 3209
COURSE TITLE: ELECTRONICS I**

DATE : 3RD MAY 2018   TIME:11.00 A.M- 1.00 P.M

INSTRUCTIONS
Answer Questions **ONE** and any other **TWO**

QUESTION ONE   (30 MARKS)

a. Discuss three properties of semiconductors

(3 Marks)

b. Distinguish between insulator, conductor and semi conductor
using band theory   **(6 Marks)**

c. State the factors that should be put into consideration when biasing a
transistor

(3 Marks)

d. i). State three ways of fabricating bibolar junction transistor   **(3 marks)**

   ii). Explain why the depletion layer in a p – n junction diode reduces when
forward biased.   **(2 Marks)**

e. A C-B connected transistor has $\propto=0.96$ and $I_E=2$ mA. Find Ic and IB

(5 Marks)

f. With a well labeled circuit diagram, explain how a bridge rectifier works.
Sketch its output when connected to a C.R.O with and without the capacitor
across the load.

(4 Marks)

g. Briefly explain the principle of Schottky diode diode   **(4 marks)**

QUESTION TWO   (20 MARKS)

a. Define the following terms:
i. Depletion layer   **(2 Marks)**
ii. Load line   **(2 Marks)**
b. Differentiate between ionic and covalent bonding   **(2 Marks)**
c.i. Why does a pure semiconductor behave like an insulator at absolute zero
temperature

(3 Marks)

ii. Briefly explain why junction transistors are called bipolar devices .discuss
some of their characteristics

(5 Marks)

d. Discuss how a transistor can be used as a current amplifier.   **(6 Marks)**

QUESTIONS THREE (20 MARKS)

a) Describe how P – type and N – type semiconductors are formed
(2 Marks)

b) Sketch the circuit diagram showing the p – n junction diode when;
   i. Forward biased
   ii. Reversed biased **(4 Marks)**

c) Describe the following types of diodes and state their applications
   i. Zener diode **(2 Marks)**
   ii.Light emitting diode **(2 Marks)**
   iii. Photo diode **(2 Marks)**

d.i. Prove that

$$\frac{\alpha}{1-\alpha} = \beta$$ where β is the current gain of a BJT **(3 marks)**

ii. A C-E connected transistor has β =100 and I_B=50μA Find α, Ic and I_E
(2 Marks)

QUESTION FOUR   (20 MARKS)

a. Define the following terms:
i. Slew rate **(2 marks)**
ii. Output Impedance **(2 Marks)**

b. Design a circuit showing how an OP-AMP can be used as:
i. Non Inverting Amplifier **(4 Marks)**
ii. Summer **(4 Marks)**
c.i) Explain why transistors are applied in OP-AMPs. **(2 Marks)**
 ii.Sketch the standard symbol of an OP-AMP and label its terminals.**(2 Marks)**

END//