THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Applied & Health Sciences

DEPARTMENT OF PURE & APPLIED SCIENCES
DIPLOMA IN SCIENCE LABORATORY TECHNOLOGY (DSLT09A)

APS 2301: PHYSICS TECHNIQUES III - ELECTRONICS

END OF SEMESTER EXAMINATION
SERIES: AUGUST/SEPTEMBER 2011
TIME: 2HOURS

Instructions to Candidates:
You should have the following for this examination
- Answer booklet

This paper consists of **FIVE** questions
Answer Question **ONE** (Compulsory) and attempt any other **TWO** questions
This paper consists of **THREE** printed pages

Question One (30 marks)

a) (i) Define the term semi-conductor (2marks)

(ii) Give **TWO** examples of semi-conductor materials. (2 marks)

b) Distinguish between intrinsic semiconductors and extrinsic semiconductors (4 marks)

c) (i) Explain 'doping' as used in electronics (3 marks)

(ii) Describe how doping produces the n-type and p-type semiconductors. (6 marks)

d) Give **TWO** applications of a cathode Ray Oscilloscope (2 marks)

e) (i) What is meant by 'donation' in the study of semiconductors? (2 marks)

(ii) With aid of diagrams, explain the formation of a depletion layer (9 marks)

Question Two (20 marks)

a) Using a labeled diagram, explain how a half wave rectifier works (6 marks)

b) Use diagrams and symbols where necessary to describe a:

(i) n-p-n junction transitor (4 marks)

(ii) p-n-p junction transitor (4 marks)

(iii) JUGFET (3 marks)

(iv) MOSFET (3 marks)

Question Three (20 marks)

a) Describe FLIP-FLOPS (2 marks)

b) Distinguish between flip-flops and latches (2 marks)

c) Briefly discuss **FOUR** common types of flip-flops (8 marks)

d) With aid of well labeled diagrams, describe:

i) A reverse-biased junction (4 marks)

ii) A forward-biased junction (4 marks)

Question Four (20 marks)

a) Describe and classify Integrated Circuits (ICs) (4 marks)

b) Briefly describe the following logic gates giving the symbol for each;

i) AND

ii) OR

iii) NAND

iv) NOR (12 marks)

c) Describe the logical operations that the OR and AND logic gates perform (4 marks)

d) Outline any **FOUR** IC Scale of Integration (4 marks)

Question Five (20 marks)

a) (i) Convert the following decimal number system into binary number system;

0,1,2,3,4,5,6,7,8,9,10,11,12,13,14,15 (8 marks)

(i) Convert the following binary system into decimal number system;

10100, 11001, 11110, 101000, 110010, 1100100, 11001000, 111110100

(4 marks)

b) (i) What is a Zener diode (2 marks)

(ii) Draw the symbol for a Zener diode (1 mark)

(iii) State one use of a Zener diode (1 mark)

c) (i) Name the **THREE** leads of a junction or a bipolar transistor (3 marks)

(ii) State **THREE** uses of a transistor (3 marks)

(iii) Give the full name of LED and give its symbol (2 marks)