THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION & COMMUNICATION TECHNOLOGY – DICT2K11/DICT11M

APS 2103: PHYSICS

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
- *Answer booklet*

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

This paper consists of **THREE** printed pages
Question 1 (Compulsory)

a) State the Kirchhoff Law on
   i)   Current
   ii)   Voltage   (4 marks)

b) Calculate the maximum and the minimum values of the following resistors given the colour
   codes (all answers in KΩ)
   i)   Red, green, yellow
   ii)   Blue, black, purple, silver
   iii)   Yellow, red, yellow, gold   (9 marks)

c) Determine the colour codes for the following resistors:
   i)   1.9M$\Omega \pm$ 20%
   ii)   330K$\Omega \pm$ 10%
   iii)   470$\Omega \pm$ 5%
   iv)   4.7M$\Omega \pm$ 2%   (8 marks)

d) Differentiate between alternating current (A.C) and direct current (D.C) citing application for
   each   (9 marks)

Question 2

a) Three resistors of 2KΩ, 10KΩ and 80KΩ are connected in parallel. They are the
   connected in series to 5KΩ and 7KΩ resistors. The network is then supplied with 12V d.c.
   Calculate:
   i)   Total resistance in the circuit
   ii)   Voltage drop in the parallel circuit
   iii)   Total current in the circuit
   iv)   Current through 2KΩ, 10KΩ and 80KΩ resistors
   v)   Total power in the circuit   (10 marks)

b) Differentiate between step-up and step-down transformers   (4 marks)

c) With the aid of circuit diagrams, explain the following with regard to diodes
   i)   Forward biasing
   ii)   Reverse biasing   (6 marks)

Question 3

a) Define the following terms:

i)   Capacitance
ii)   Time constant
iii)   Transmission ratio
iv)   Self inductance
v)   Mutual inductance   (10 marks)

b) Briefly explain the following
    i)   Intrinsic semiconductor
    ii)   Extrinsic semiconductor
    iii)   Doping   (6 marks)

c) Differentiate between rectification and voltage regulation   (4 marks)

Question 4

a) Three capacitors of 300 μF and 400 μF are connected in series and then connected to 3600 μF capacitor in parallel. The network is then supplied with 12V D.C.
    i)   Draw the circuit diagram
    ii)   Calculate the capacitance in the circuit
    iii)   Charge across the 3600 μF capacitor
    iv)   Energy in the circuit   (10 marks)

b) State **FOUR** applications for transformers   (4 marks)

c) With the aid of graphs explain the ohms law on:
    i)   Current
    ii)   Voltage   (6 marks)

Question 5

a) Using circuit diagram show the following transistors configurations:
    i)   Common base
    ii)   Common collector
    iii)   Common emitter   (9 marks)

b) Explain the following:
    i)   Resistance
    ii)   Reactance
    iii)   Impedance   (6 marks)

$$Z^2 = \sqrt{R^2 + \left(X_L^2 - X_C^2 \right)}$$

c) With the aid of phasor diagram show that   (5 marks)