TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSISCS

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY (DICT 15J)

APS 2103: PHYSICS

END OF SEMESTER EXAMINATION
SERIES: APRIL 2015
TIME ALLOWED: 2 HOURS

<u>**Instructions to Candidates:**</u>
You should have the following for this examination
  - *Answer Booklet*
  - *Mathematical Table*
This paper consist of **FIVE** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages
Question One (Compulsory)

a) Define the following terms:
    (i) Time constant
    (ii) Transmission ratio
    (iii) Mutual inductance   **(10 marks)**

b) With the aid of a graph explain the Ohm's Law   **(2 marks)**

c) Using symbols differentiate between step-up and step-down transformers   **(2 marks)**

d) Calculate the maximum and minimum values of the resistors given the colour codes below:
    (i) Red, Green, Yellow
    (ii) Blue, Black, Purple, Silver
    (iii) Yellow, Red, Yellow, Gold   **(6 marks)**

e) Three capacitors of 30µF, 20µF and 360µF are connected in parallel, the network is then supplied with 30V d.c
    (i) Draw the circuit diagram
    (ii) Calculate the total capacitance in the circuit
    (iii) Charge across 360µF capacitor
    (iv) Energy in the circuit   **(10 marks)**

Question Two

a) Define the following terms:
    (i) Intrinsic semiconductor
    (ii) Extrinsic semiconductor
    (iii) Doping   **(6 marks)**

b) With the aid of circuit, diagrams, explain the following terms:
    (i) Forward biasing
    (ii) Reverse biasing   **(9 marks)**

Question Three

a) Using circuit diagrams, explain the operation of a full wave bridge rectifier   **(5 marks)**

b) Three resistors of 200KΩ, 100KΩ and 80KΩ are connected in parallel, they are then connected in series to 50KΩ and 75KΩ resistor. The network is supplied with 50V d.c. Calculate:
    (i) Total resistance in the circuit
    (ii) Total current in the circuit
    (iii) Current through 200K, 100K and 80K resistors.
    (iv) Total power dissipated in the circuit   **(10 marks)**

Question Four

a) With the aid of a circuit diagrams, explain the THREE bipolar transistor configuration
(5 marks)

b) Using graph, sketches explain the following transistors configurations:
    (i) Input characteristics
    (ii) Output characteristics
    (iii)   Transfer characteristics   **(10 marks)**

Question Five

a) Determine the colour codes of the following resistors:
    $1.9M\Omega \pm 20\%$
(i)
    $330K\Omega \pm 10\%$
(ii)
    $470M\Omega \pm 5\%$
(iii)
    $4.7M\Omega \pm 2\%$
(iv)
    $M\Omega \pm 20\%$
(v) 37700   **(5 marks)**

b) A capacitor is connected in series to a resistor of $100K\Omega$ for charging. It took 0.05µS to charge the capacitor to its time constant. Calculate the value of that capacitor   **(4 marks)**

c) A transformer with the turns ratio of 8:1 is supplied with 110V, 60Hz. If the secondary current is 10A, calculate:
    (i) Primary current
    (ii) Secondary voltage
    (iii)   Input power   **(6 marks)**