



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

**DEPARTMENT OF COMPUTING AND
INFORMATION TECHNOLOGY (MODULE I)**

**DIPLOMA IN INFORMATION &
COMMUNICATION TECHNOLOGY**

END OF SEMESTER EXAMINATIONS

APRIL/MAY 2010 SERIES

PHYSICS

TIME: 2 hours

INSTRUCTIONS TO CANDIDATES

Answer any **THREE** Questions

Question ONE

(a). Define the following terms:

- (i). Resistance
- (ii). Reactance
- (iii). Impedance

[6 marks]

(b). Determine the colour codes of the following resistors:

- (i). $1.9\text{M}\Omega \pm 20\%$
- (ii). $330\text{K}\Omega \pm 10\%$
- (iii). $470\Omega \pm 5\%$
- (iv). $4.7\text{M}\Omega \pm 2\%$

[4 marks]

(c). Calculate the maximum and the minimum values of the following resistors given the colour codes below: (all answers in $\text{K}\Omega$).

- (i). red, green, yellow
- (ii). blue, black, purple, silver
- (iii). yellow, red, yellow, gold

[10 marks]

(d). With the aid of graphs, explain the Ohm's law.

[3 marks]

Question TWO

(a). Define the following terms:

- (i). Capacitance
- (ii). Time constant
- (iii). Energy

[6 marks]

(b). Differentiate between A.C and D.C supply.

[6 marks]

(c). Three capacitors of $30\mu\text{F}$, $20\mu\text{F}$, and $400\mu\text{F}$ are connected in series and then connected to $360\mu\text{F}$ capacitor in parallel. The network is then supplied with 12 V d.c.

- (i). Draw the circuit diagram.
- (ii). Calculate (i). the total capacitance in the circuit.
- (iii). Charge across the $360\mu\text{F}$ capacitor.
- (iv). Energy in the circuit.

[11 Marks]

Question THREE

- (a). Describe the Kirchhoff's laws on:
- (i). Current
 - (ii). Voltage
- [6 marks]**
- (b). Differentiate between step-up and step-down transformers. **[4 Marks]**
- (c). A step-down transformer is supplied with 110v, 60Hz. If the turn's ratio is 4:1 and the output current is measured to be 10A. Calculate:
- (i). input current
 - (ii). output current
 - (iii). output power
- [5 Marks]**
- (d). State **TWO** applications of transformers. **[2 Marks]**
- (e). Explain the following transformer losses:
- (i). Eddy current losses
 - (ii). Hysteresis losses
 - (iii). Power losses
- [6 Marks]**

Question FOUR

- (a). Define the following terms:
- (i). Base
 - (ii). Emitter
 - (iii). Collector
- [8 Marks]**
- (b). With the aid of circuit diagrams explain the **THREE** transistors configuration. **[9 marks]**
- (c). Explain the following:
- (i). Intrinsic semiconductor
 - (ii). Extrinsic semiconductor
 - (iii). Doping
- [6 Marks]**

Question FIVE

(a). Using phasor diagrams show that in a series R-L-C circuit $Z = \sqrt{R^2 + (X_L - X_C)^2}$
[9 Marks]

(b). A series R-L-C circuit has a resistance of 10Ω , inductive reactance of 52Ω , $X_C = 30\Omega$ is supplied with 110v, 60Hz. Calculate:

- (i). Inductance of the coil
- (ii). Capacitance of a capacitor
- (iii). Current in the circuit
- (iv). Phase angle
- (v). Power in the circuit

[10 marks]

(c). Explain the following terms:

- (i). Rectification
- (ii). Voltage regulation

[4 marks]