



# MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.

Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293,  
+254 789151411

Fax: 064-30321

Website: [www.must.ac.ke](http://www.must.ac.ke) Email: [info@must.ac.ke](mailto:info@must.ac.ke)

---

University Examinations 2013/2014

FIRST YEAR, SECOND SEMESTER EXAMINATIONS FOR DEGREE OF BACHELOR OF  
SCIENCE IN COMPUTER TECHNOLOGY

**BCT 2202: PRINCIPLES OF ELECTRICAL ENGINEERING**

**DATE: APRIL 2014**

**TIME: 2 HOURS**

---

**INSTRUCTIONS:** *Answer question one and any other two questions.*

---

## QUESTION ONE – (30 MARKS)

- (a) State Kirchoff's law. (4 Marks)
- (b) Differentiate between short and open circuit. (4 Marks)
- (c) Two resistors  $4\Omega$  and  $8\Omega$  are connected in parallel. If the total current is 16A, find the current through each resistor. (5 Marks)
- (d) State three essential features of indicating analogue instruments. (3 Marks)
- (e) Define the following terms:
  - (i) Inductance (2 Marks)
  - (ii) Conductance (2 Marks)
- (f) Three capacitors  $3\mu F$ ,  $6\mu F$  and  $12\mu F$  respectively are connected in series to a 220V d.c. supply. Find;
  - (i) Total capacitance (3 Marks)
  - (ii) Charge in each capacitor (2 Marks)
- (g) A coil consists of 1000 turns of copper wire and has a cross-sectional area of  $0.8\text{mm}^2$ . The mean length per turn is 80cm and the resistivity of copper is  $0.02\mu\Omega m$ . Find the resistance of the coil. (5 Marks)

**QUESTION TWO – (20 MARKS)**

- (a) State maximum power transfer theorem. (3 Marks)
- (b) Show that the power transfer, for the source to load is maximum when the resistance  $R$  of the load is equal to the internal resistance ( $r$ ) of the source. (7 Marks)
- (c) A moving – coil instrument gives full-scale deflection with 15mA and has a resistance of  $5\Omega$ . Calculate the resistance required:
  - (i) In parallel to enable the instrument to read up to 1A. (6 Marks)
  - (ii) In series to enable it to read up to 10V. (4 Marks)

**QUESTION THREE – (20 MARKS)**

- (a) Define the following terms:
  - (i) Passive elements (2 Marks)
  - (ii) Active elements (2 Marks)
- (b) Using node voltage method, find the current in the  $3\Omega$  resistor of the network shown in figure 1. (8 Marks)

- (c) A coil having an inductance of  $0.5H$  has its current reduced from  $5A$  to  $2A$  in  $0.05s$ .
  - (i) Calculate the mean value of the e.m.f induced in the coil. (5 Marks)
- (d) What are the causes of transient disturbances? (3 Marks)

**QUESTION FOUR – (20 MARKS)**

(a) With the aid of circuit diagram differentiate between forward and reverse biased diode.

(8 Marks)

(b) Using Kirchoff's network calculate currents through the  $18\Omega$  resistor in the circuit below.

(8 Marks)

(c) State the assumptions made when calculating steady currents in electrical circuits.

(4 Marks)