# TECHNICAL UNIVERSITY OF MOMBASA

**Faculty of Engineering and Technology**

## Department of Electrical and Electronic engineering

### UNIVERSITY EXAMINATION:

## Diploma in Electrical Power Engineering

# Electric circuit theory I
**EEP 2102**

SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES: SEPTEMBER 2018**

**TIME: 2** HOURS

<u>**Instructions to Candidates**</u>
You should have the following for this examination
*-Answer Booklet, examination pass and student ID*
This paper consists of **five** Questions;. Attempt any THREE Questions.
**Do not write on the question paper.**

Question ONE
(a) State:
    (i)   Three effects of an electric current
    (ii)   Four factors affecting the resistance of a conductor

(7 marks)

(b)  For the series-parallel arrangement shown below.
    Determine
        (i) the supply current,
        (ii) the current flowing through each resistor
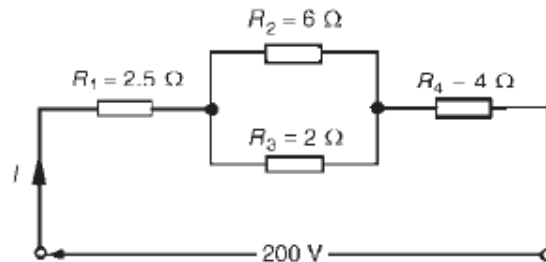        (iii) the p.d. across each resistor.



Fig 1            (6 marks)

(c)  A coil of copper wire has a resistance of 100 when its temperature is $0°C$.
    Determine its resistance at $70°C$ if the temperature coefficient of resistance of
    copper at $0°C$ is $0.0043/°C$

(7 marks)

Question TWO
    (a) By reference to an atom explain
        (i)     Flow of current
        (ii)    Conductors
        (iii)   Insulators

(6 marks)

    (b) Explain the following
        (i)     Electric cell
        (ii)    Polarization
        (iii)   Local action

(6marks)

    (c)  (i)  Distinguish between primary and secondary cells
        (ii)   Four cells, each with an internal resistance of $0.40\Omega$ and an e.m.f.
            of 2.5V are connected in series to a load of $38.40\Omega$.
            (a) Determine the current flowing in the circuit and the p.d. at the
               battery terminals.
           b) If the cells are connected in parallel instead of in series, determine
              the current flowing and the p.d. at the battery terminals.
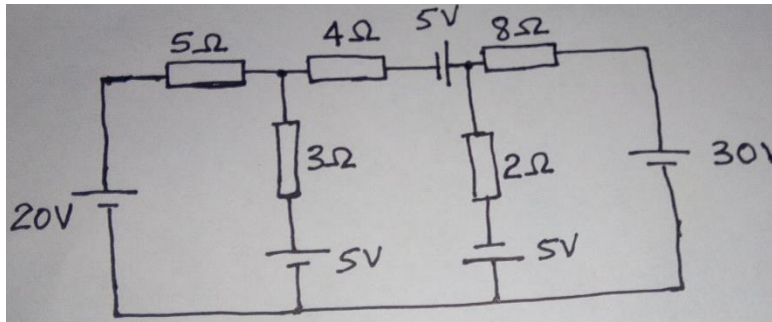
(8 marks)

Question THREE

(a) State:

       (i)   Three effects of an electric current

       (ii)  Four factors affecting the resistance of a

            conductor

(7 marks)

(b) Using kirchoffs laws determine the current flowing inn all parts of the circuit



(13 marks)

Question FOUR

    (a) State

       (i)      Superposition theorem
       (ii)     Thevenin's theorem

(5 marks)

    (b) Determinet the current in the $3\Omega$ resistor using thevenins theorem in
       fig 3



Fig 3                                          (15 marks)
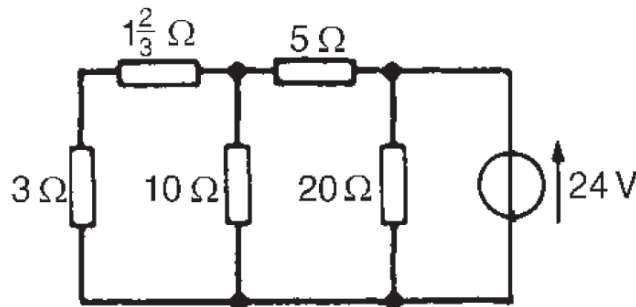
## Question FIVE

    (a) State Norton's theorem                                                     (3 marks)

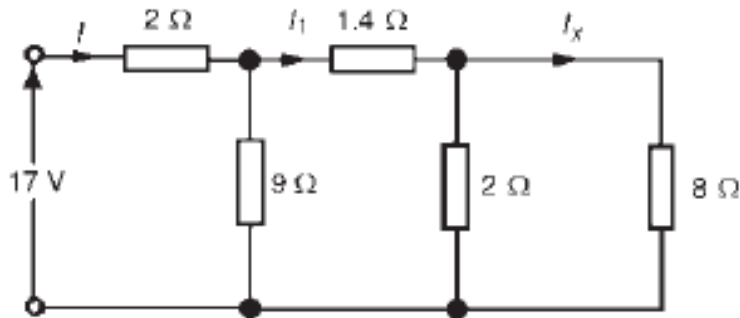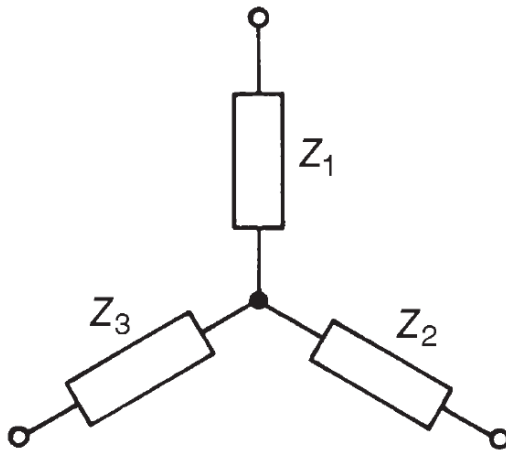    (b) Using Norton's theorem determine the current flowing through the $8\Omega$ resistor of Fig 4



Fig 4                                        (10 marks)

    (c) Convert the circuit network below into an equivalent delta given $Z1= 0.6\Omega$     $Z2= 1.5\Omega$            $Z3=1\Omega$



(7 marks)