Experiment No: 6

Title: Verification of Thevenin's theorem

Circuit Diagrams:

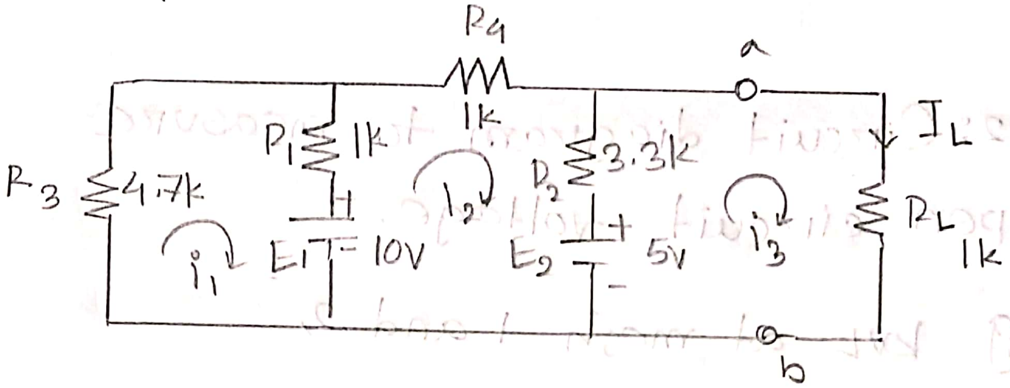


Figure:1. Circuit diagram whose Thevenin's equivalent to be determined

$I_L = i_3$

Applying KVL at mesh 1, 2 and 3 respectively,

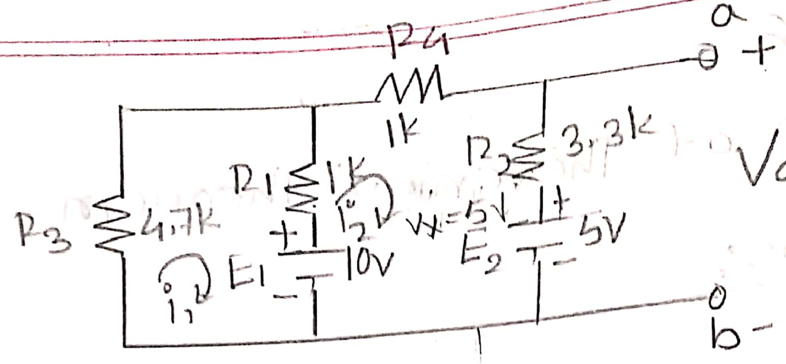
$(5.7k)i_1 - (1k)i_2 = -10$

$-(1k)i_1 + (5.3k)i_2 - (3.3k)i_3 = 10 - 5$

$-(3.3k)i_2 + (4.3k)i_3 = 5$

From these equations, we found,

$i_3 = 3.26$ mA



$V_{oc} = 3.3 i_2 + 5 = V_{Th}$
$= E_{Th}$

Figure 2: Circuit diagram to measure the open circuit voltage.

Applying KVL at mesh 1 and 2,

$(5.7\,k)i_1 - (1k)i_2 = -10$

$-(1k)i_1 + (5.3\,k)i_2 = 5$

Solving these, we got,

$i_2 = 0.633$ mA

$E_{Th} = 3.3k\, i_2 + 5 = 7.089$ V

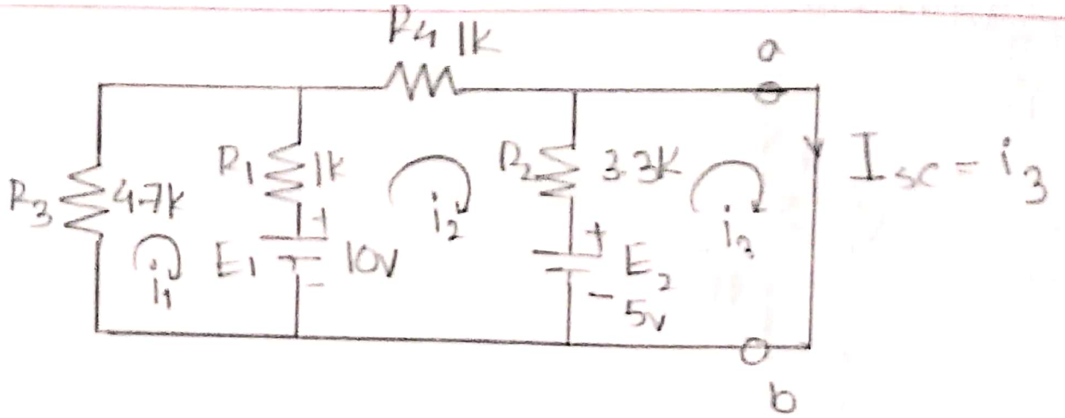


Figure 3. Circuit diagram to measure the short circuit current.

Applying KVL at mesh 1, 2, 3 respectively,

$$(5.7k)\, i_1 - (1k)\, i_2 = -10$$

$$(-1k)\, i_1 + (5.3k)\, i_2 - (3.3k)\, i_3 = 10 - 5$$

$$-(3.3k)\, i_2 + (3.3k)\, i_3 = 5$$

Solving these equation, we got,

$$i_3 = 6.034\ mA$$

$$R_{Th} = \frac{V_{OC}}{I_{SC}} = \frac{7.089}{6.034m} = 1174.843\ \Omega = 1.175\ k\Omega$$

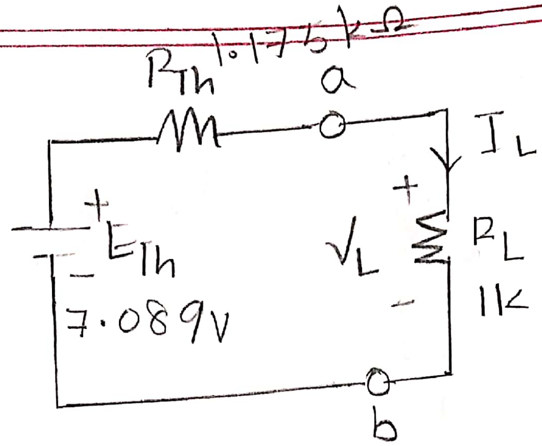


Figure 4. Circuit diagram to verify Thevenin's theorem.

$$I_L = \frac{7.089}{2.175k} \text{ A} = 0.00325 \text{ A} = 3.25 \text{ mA}$$