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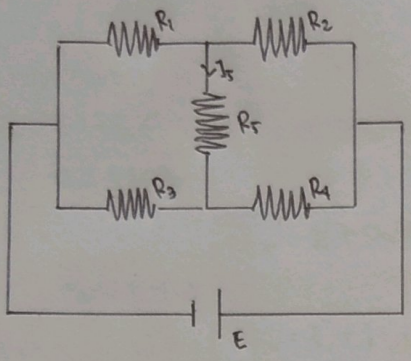
TUGAS PENGGANTI
Percobaan VI - Theorema Thevenin



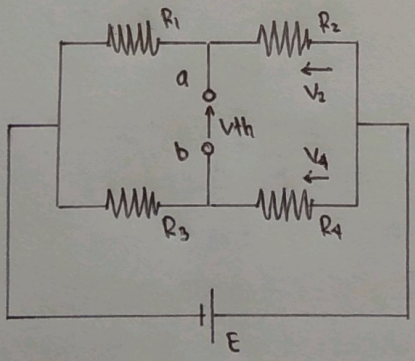
Gambar rangkaian.

Diket : $R_1 = 1k\Omega$
$R_2 = 2k\Omega$
$R_3 = 4k\Omega$
$R_4 = 3k\Omega$
$R_5 = 3k\Omega$

Ditanyakan : I_5, menggunakan T. thevenin.

NO	E (V)	Vth (V)	Io (mA)	Rth (kΩ)	It (mA)
1	5	1,19		2,38	0,397
2	10	2,38		2,38	0,793
3	15	3,57		2,38	1,19
4	20	4,76		2,38	1,59

* Lepas beban R_5, hitung V_{th}.



$V_2 = \frac{R_2}{R_1 + R_2} \times E$

$V_4 = \frac{R_4}{R_3 + R_4} \times E$

$V_{th} = V_2 - V_4$

→ E = 5 volt

$V_2 = \frac{2k\Omega}{1k\Omega + 2k\Omega} \times 5V = 3,33\ V$

$V_4 = \frac{3k\Omega}{4k\Omega + 3k\Omega} \times 5V = 2,14\ V$

$V_{th} = 3,33\ V - 2,14\ V = 1,19$ volt

→ E = 10 volt

$V_2 = \frac{2k\Omega}{1k\Omega + 2k\Omega} \times 10V = 6,67\ V$

$V_4 = \frac{3k\Omega}{4k\Omega + 3k\Omega} \times 10\ V = 4,29\ V$

$V_{th} = 6,67\ V - 4,29\ V = 2,38\ V$

Mencari V_{th}.

→ E = 15 volt

$$V_2 = \frac{2k\Omega}{1k\Omega + 2k\Omega} \times 15\,V = 10 \text{ volt}$$

$$V_4 = \frac{3k\Omega}{4k\Omega + 3k\Omega} \times 15\,V = 6,43 \text{ volt}$$

$V_{th} = 10\,V - 6,43\,V = 3,57$ volt

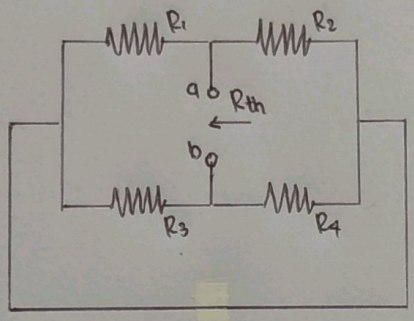
→ E = 20 volt

$$V_2 = \frac{2k\Omega}{1k\Omega + 2k\Omega} \times 20\,V = 13,33 \text{ volt}$$

$$V_4 = \frac{3k\Omega}{4k\Omega + 3k\Omega} \times 20\,V = 8,57 \text{ volt}$$

$V_{th} = 13,33\,V - 8,57\,V = 4,76$ volt.

* Hitung R_{th}, maka E = 0.



$$R_{th} = (R_1 // R_2) + (R_3 // R_4)$$

$$= \frac{R_1 . R_2}{R_1 + R_2} + \frac{R_3 . R_4}{R_3 + R_4}$$

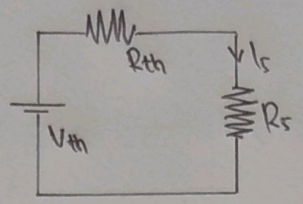
$$= \frac{1k\Omega . 2k\Omega}{1k\Omega + 2k\Omega} + \frac{4k\Omega . 3k\Omega}{4k\Omega + 3k\Omega}$$

$$= 666,67\,\Omega + 1714,3\,\Omega$$

$$= 2380,97\,\Omega = 2,38\,k\Omega$$

Note : Nilai R_{th} utk setiap E adalah sama. karna E tdk mempengaruhi perubahan masing2 nilai R. (E = 0)

* Rangkaian Ekivalen Thevenin.



→ E = 5 volt

$$I_s = \frac{V_{th}}{R_{th} + R_s}$$

$$= \frac{1,19\,V}{2,38k\Omega + 3k\Omega}$$

$$= 3,97 . 10^{-4}\,A$$

$$= 0,397\,mA$$

→ E = 10 volt

$$I_s = \frac{2,38\,V}{2,38k\Omega + 3k\Omega}$$

$$= 7,93 . 10^{-4}\,A$$

$$= 0,793\,mA$$

→ E = 15 volt

$$I_s = \frac{3,57\,V}{2,38k\Omega + 3k\Omega}$$

$$= 11,9 . 10^{-4}\,A$$

$$= 1,19\,mA$$

→ E = 20 volt

$$I_s = \frac{4,76\,V}{2,38k\Omega + 3k\Omega}$$

$$= 15,9 . 10^{-4}\,A$$

$$= 1,59\,mA.$$