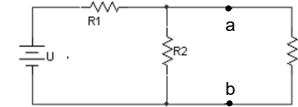


NORTONOV TEOREM ILI METODA KRATKOG SPOJA

- Ova metoda omogućava da se odredi pad napona ili struja samo na nekom određenom mjestu mreže.
- Najprije se element na kojemu proračunavamo U i I , odvoji od mreže, a preostali dio mreže zamijeni nadomjesnim naponskim izvorom, a struja se na tom dijelu mreže računa izravno.
- Novi nadomjesni izvor ima EMS " U_K " i unutrašnji otpor " R_K ".

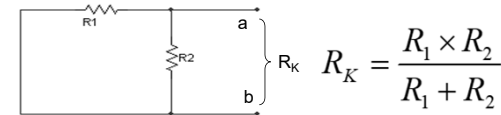
1

Primjer:



Izračunati struju kroz otpor R_3 i pad napona na njemu.

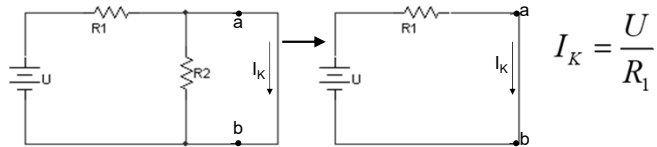
- Na mjestu a-b, odvojimo otpor R_3
- Na ostatku mreže, izvor napona kratko spojimo, a na izvodima a-b računamo otpor R_K



$$R_K = \frac{R_1 \times R_2}{R_1 + R_2}$$

2

- Gledajući zadanu shemu, točke a-b kratko spojimo te računamo struju kratkog spoja I_K .



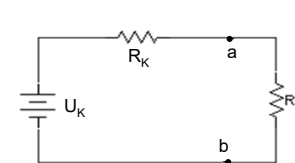
$$I_K = \frac{U}{R_1}$$

- Računamo nadomjesni naponski izvor U_K

$$U_K = I_K \times R_K$$

3

- Cijelu mrežu s lijeve strana točaka a-b zamjenjujemo nadomjesnim otporom R_K i izvorom U_K , te sa desne strane točaka a-b, dodajemo element koji smo odvojili u točki a).



$$I_3 = \frac{U_K}{R_K + R_3}$$

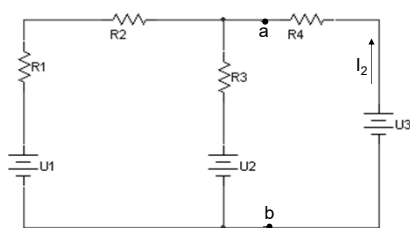
$$U_3 = I_3 \times R_3$$

4

Zadatak 1:

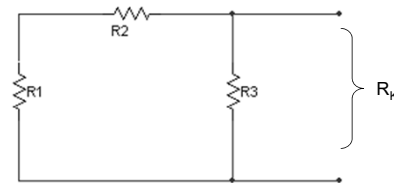
Nortonovom metodom izračunati struju I_2 koja teče otpornikom R_4

$$\begin{aligned} U_1 &= 36 \text{ V} \\ U_2 &= 4 \text{ V} \\ U_3 &= 24 \text{ V} \\ R_1 &= 1 \Omega \\ R_2 &= 3 \Omega \\ R_3 &= 1 \Omega \\ R_4 &= 6 \Omega \\ I_2 &= ? \end{aligned}$$



5

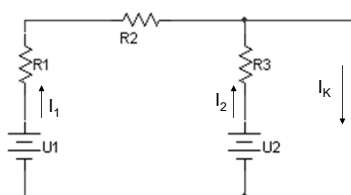
a) $R_K = ?$



$$R_K = \frac{(R_1 + R_2) \times R_3}{R_1 + R_2 + R_3} = 0,8 \Omega$$

6

b) $I_K = ?$



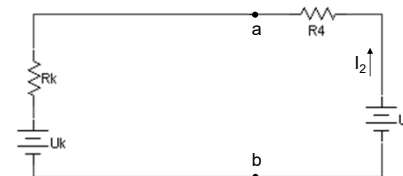
$$\begin{aligned} I_K &= I_1 + I_2 \\ I_K &= \frac{U_1}{R_1 + R_2} + \frac{U_2}{R_3} = 13 \text{ A} \end{aligned}$$

7

c) $U_K = ?$

$$U_K = I_K \times R_K = 10,4 \text{ V}$$

d) $I_2 = ?$

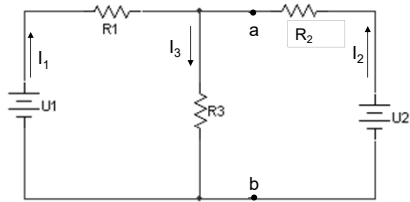


$$I_2 = \frac{U_3 - U_K}{R_K + R_4} = 2 \text{ A}$$

8

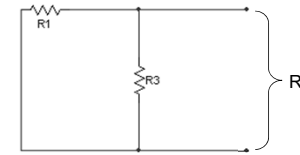
Zadatak:2 (Norton)

$U_1 = 18 \text{ V}$
 $U_2 = 16 \text{ V}$
 $R_1 = 2 \Omega$
 $R_2 = 4 \Omega$
 $R_3 = 6 \Omega$
 $I_2 = ?$



9

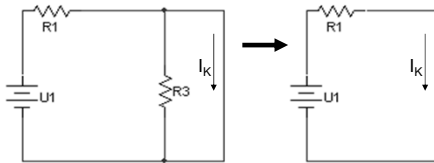
a) $R_K = ?$



$$R_K = \frac{R_1 \times R_3}{R_1 + R_3} = 1,5 \Omega$$

10

b) $I_K = ?$



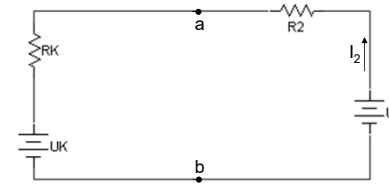
$$I_K = \frac{U_1}{R_1} = 9 \text{ A}$$

11

c) $U_K = ?$

$$U_K = I_K \times R_K = 13,5 \text{ V}$$

d) $I_2 = ?$



$$I_2 = \frac{U_2 - U_K}{R_K + R_2} = 0,45 \text{ A}$$

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