

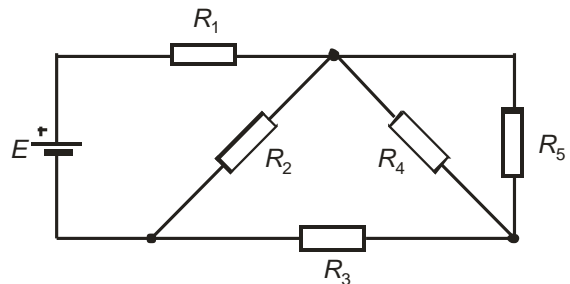
4. domaća zadaća iz Osnova elektrotehnike i elektronike

- Štednjak nazivne snage $P = 2 \text{ kW}$ priključen je na javnu mrežu $230\text{V}/50\text{Hz}$ bakrenim vodom presjeka $S = 1,5 \text{ mm}^2$ i dugim $l = 30 \text{ m}$. Izračunajte napon i snagu štednjaka.
- U krugu na slici izračunajte snagu svakog otpornika i snagu izvora. Poznato je: $E = 24 \text{ V}$, $R_1 = 7 \Omega$, $R_2 = 10 \Omega$, $R_3 = 4 \Omega$, $R_4 = 10 \Omega$, $R_5 = 15 \Omega$.

1.



2.

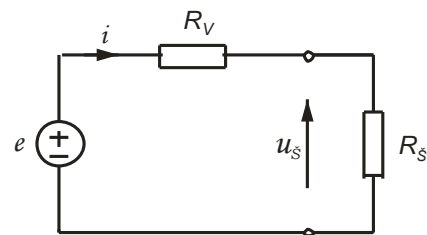


Rješenja

- Budući da u ovom zadatku otpor vodiča nije zanemariv treba ga uzeti u obzir u proračunu. U shemi će se njegov ukupni otpor prikazati kao otpor R_V .

$$R_V = \rho \cdot \frac{2l}{S} = 0,7 \Omega$$

$$R_s = \frac{U^2}{P} = 26,45 \Omega$$



$$U_s = R_s \cdot I = R_s \cdot \frac{E}{R_V + R_s} = 224,1 \text{ V}$$

$$P_s = \frac{U_s^2}{R_s} = 1,898 \text{ kW}$$

Provjera $U_V = R_V \cdot I = R_V \cdot \frac{E}{R_V + R_s} = 5,930 \text{ V}$

$$E = U_V + U_s = 230 \text{ V}$$

$$2. \quad R_{45} = \frac{R_4 \cdot R_5}{R_4 + R_5} = 6 \, \Omega$$

$$R_{345} = R_3 + R_{45} = 10 \, \Omega, \quad R_{2345} = \frac{R_2 \cdot R_{345}}{R_2 + R_{345}} = 5 \, \Omega, \quad R_{uk} = R_1 + R_{2345} = 12 \, \Omega$$

$$I = \frac{E}{R_{uk}} = 2 \, A$$

$$I_1 = I$$

$$P_1 = I_1^2 \cdot R_1 = 28 \, W$$

$$U_1 = R_1 \cdot I_1 = 14 \, V$$

$$U_{2345} = E - U_1 = 10 \, V$$

$$U_2 = U_{345} = U_{2345}$$

$$P_2 = \frac{U_2^2}{R_2} = 10 \, W$$

$$I_3 = \frac{U_{345}}{R_{345}} = 1 \, A$$

$$P_3 = I_3^2 \cdot R_3 = 4 \, W$$

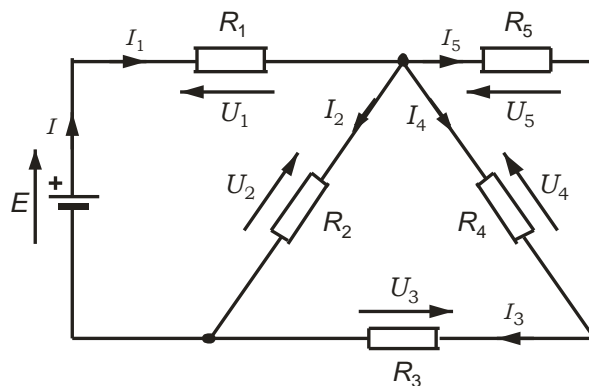
$$U_{45} = R_{45} \cdot I_3 = 6 \, V$$

$$U_4 = U_5 = U_{45}$$

$$P_4 = \frac{U_4^2}{R_4} = 3,6 \, W$$

$$P_5 = \frac{U_5^2}{R_5} = 2,4 \, W$$

$$P_E = E \cdot I = 48 \, W$$



Provjera snaga $P_E = P_1 + P_2 + P_3 + P_4 + P_5 \quad \dots \quad 48 = 28 + 10 + 4 + 3,6 + 2,4$

Provjera struja $I_1 = I_2 + I_3$

$$I_2 = \frac{U_2}{R_2} = 1 \, A, \quad I_1 = I_2 + I_3 \quad \dots \quad 2 = 1 + 1$$