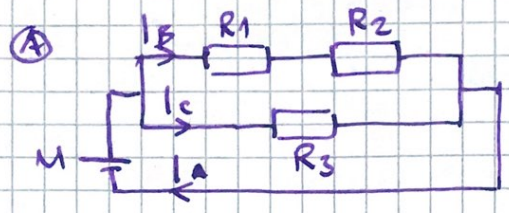
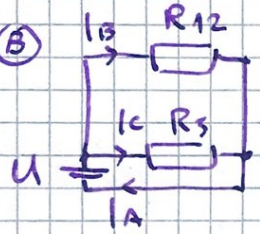
3.10.2018.

Ⓐ 

$R_1 = 25\,\Omega$
$R_2 = 5\,\Omega$
$R_3 = 60\,\Omega$
$U = 100\,V$

Traži se:
struje u svim granama: I_A, I_B, I_C
naponi na svim otpornicima: U_{R1}, U_{R2}, U_{R3}
snage na svim otpornicima: P_{R1}, P_{R2}, P_{R3}
ukupni otpor, ukupna vodljivost: R_{UK}, G_{UK}
ukupna snaga: P_{UK}

1. uočavamo: $U_{R3} = U$ $\quad U_{R3} = 100\,V$
2. uočavamo serijski spoj R_1 i R_2

Ⓑ 

$\Rightarrow R_{12} = R_1 + R_2 = 25 + 5 = 30\,\Omega$

$\Rightarrow$ Ohmov zakon: $I_C = \frac{U_{R3}}{R_3} = \frac{100}{60} = 1.\dot{6}\,A$

$\Rightarrow$ uočavamo $U_{R12} = U$

$\Rightarrow$ Ohmov zakon: $I_B = \frac{U_{R12}}{R_{12}} = \frac{100}{30} = 3.\dot{3}\,A$

$\Rightarrow$ Kirchhofov 1. za struje: $I_A = I_B + I_C$
$I_A = 1.\dot{6} + 3.\dot{3} = 5\,A$

uočavamo paralelni spoj R_3 i R_{12}

Ⓒ 

$R_{UK} = \left(\frac{1}{R_3} + \frac{1}{R_{12}}\right)^{-1} = \left(\frac{1}{60} + \frac{1}{30}\right)^{-1} = 20\,\Omega$

$\Rightarrow$ kontrola da demo dobiti već izračunatu struju I_A:

$I_A = \frac{U}{R_{UK}} = \frac{100}{5} = I_A$ ✓

3. s poznatom strujom I_B se vraćamo u shemu Ⓐ, gdje je:
$\Rightarrow$ Ohmov zakon: $U_{R1} = I_B \cdot R_1 = 3.\dot{3} \cdot 25 = 83.\dot{3}\,V$

$U_{R2} = I_B \cdot R_2 = 3.\dot{3} \cdot 5 = 16.\dot{6}\,V$

kontrola: Kirchhoffov zakon za napone:
$U_{R1} + U_{R2} = U \quad 83.\dot{3} + 16.\dot{6} = 100$ ✓

4. $G_{UK} = \frac{1}{R_{UK}} = \frac{1}{20} = 0.05\,S$

5. Snage:

$P_{R1} = U_{R1} I_B = \frac{U_{R1}^2}{R_1} = I_B^2 \cdot R_1 = 277.\dot{7}\,W$

$P_{R2} = U_{R2} I_B = \frac{U_{R2}^2}{R_2} = I_B^2 R_2 = 55.\dot{5}\,W$

$P_{R3} = U_{R3} I_C = \frac{U_{R3}^2}{R_3} = I_C^2 R_3 = 166.\dot{6}\,W$

$P_{UK} = I_A \cdot U = 500\,W$

kontrola:
$P_{UK} = P_{R1} + P_{R2} + P_{R3}$
✓