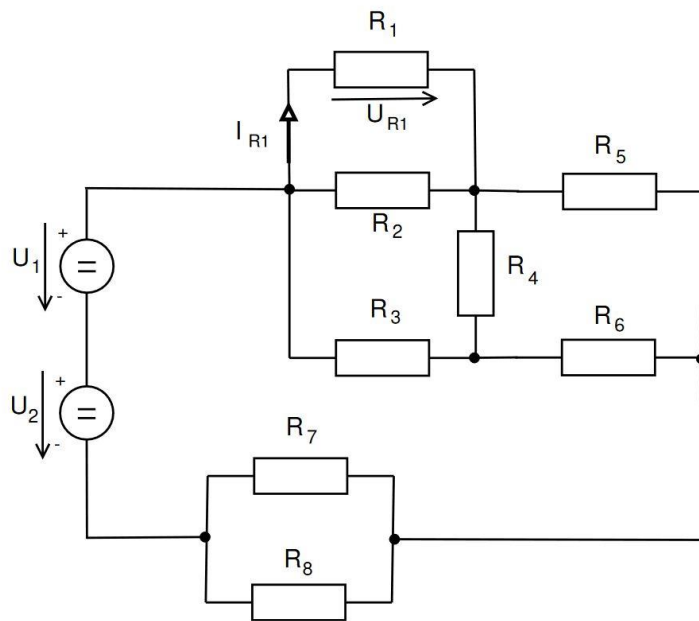




Elektronika pro informační technologie 2017/2018

Semestrální projekt

1 D



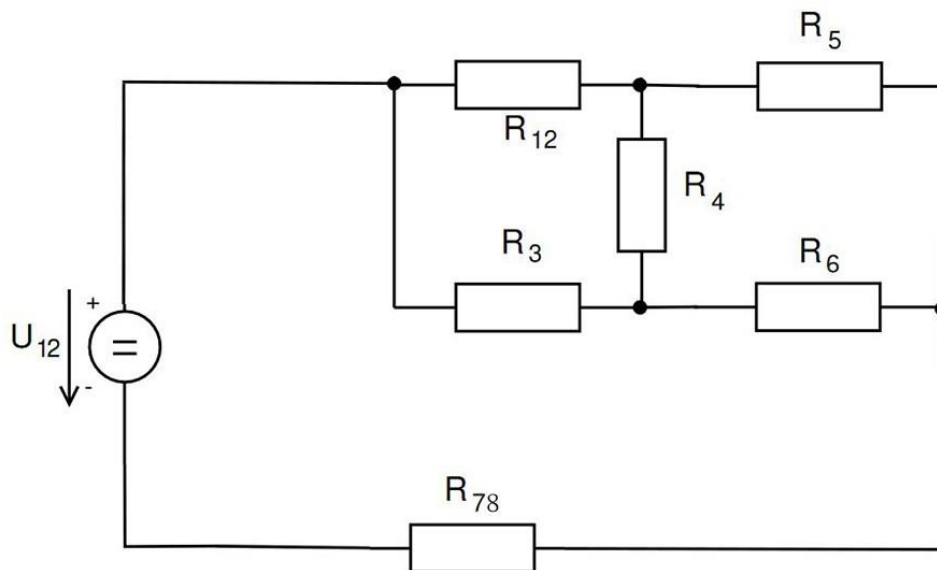
$$U_1 = 105 \text{ V}, U_2 = 85 \text{ V}$$

$$R_1 = 420 \, \Omega, R_2 = 980 \, \Omega$$

$$R_3 = 330 \, \Omega, R_4 = 280 \, \Omega$$

$$R_5 = 310 \, \Omega, R_6 = 710 \, \Omega$$

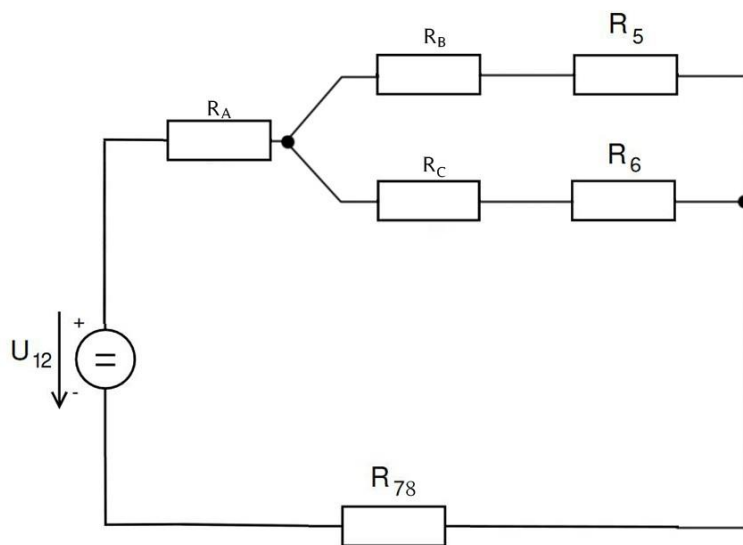
$$R_7 = 240 \, \Omega, R_8 = 200 \, \Omega$$



$$U = U_1 + U_2 = 190 \text{ V}$$

$$R_{12} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{420 \cdot 980}{420 + 980} = 294 \, \Omega$$

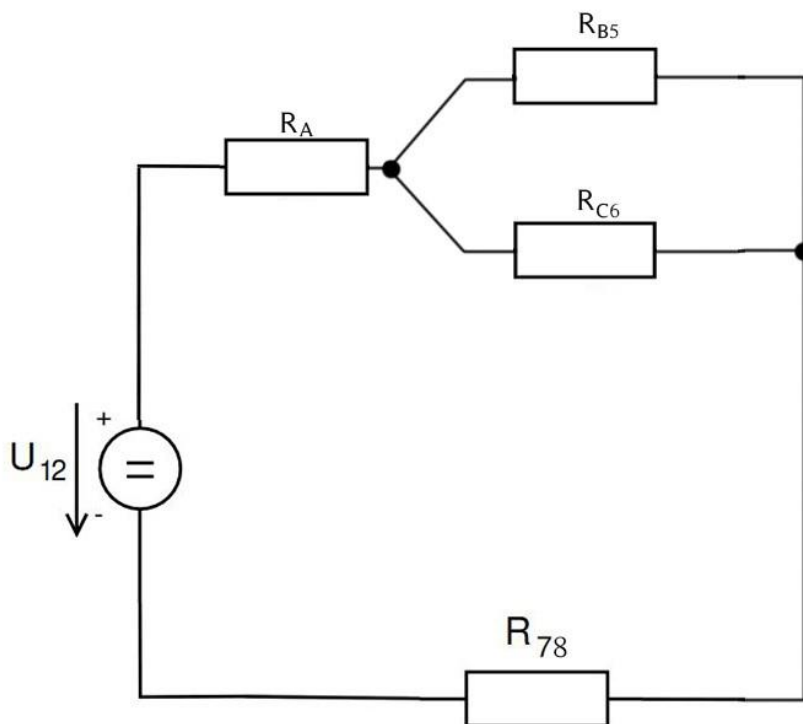
$$R_{78} = \frac{R_7 \cdot R_8}{R_7 + R_8} = \frac{240 \cdot 200}{240 + 200} = 109,0909 \, \Omega$$



$$R_A = \frac{R_{12} \cdot R_3}{R_{12} + R_3 + R_4} = \frac{294 \cdot 330}{294 + 330 + 280} = 107,3230\Omega$$

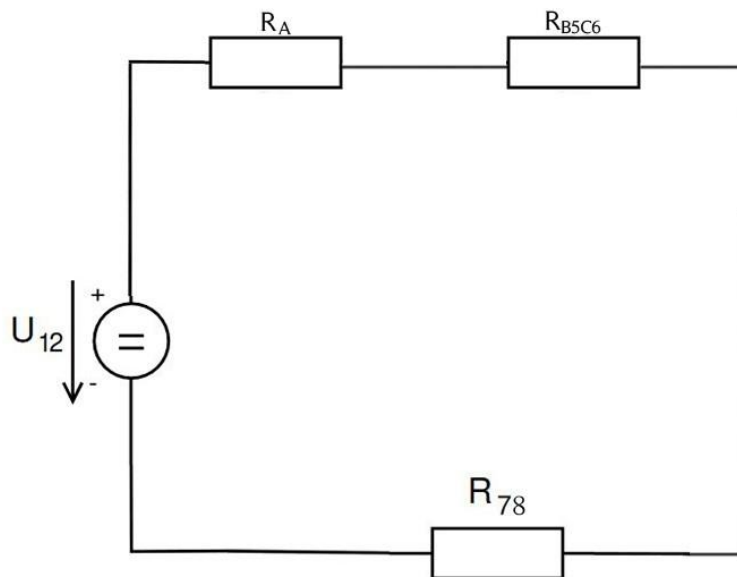
$$R_B = \frac{R_{12} \cdot R_4}{R_{12} + R_3 + R_4} = \frac{294 \cdot 280}{904} = 91,0619\Omega$$

$$R_C = \frac{R_3 \cdot R_4}{R_{12} + R_3 + R_4} = \frac{330 \cdot 280}{904} = 102,2124\Omega$$

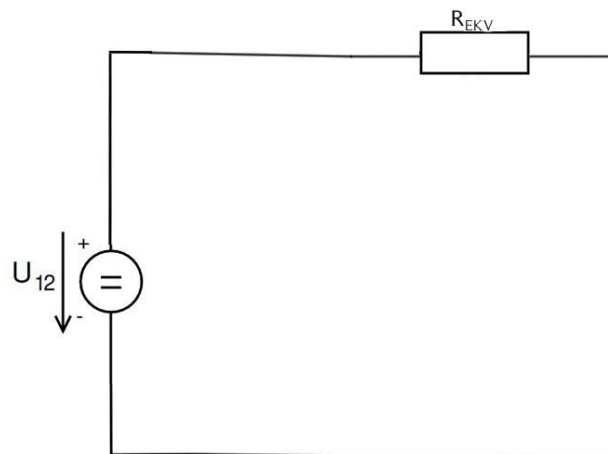


$$R_{B5} = R_B + R_5 = 91,0619 + 310 = 401,0619\Omega$$

$$R_{C6} = R_C + R_6 = 102,2124 + 710 = 812,2124\Omega$$

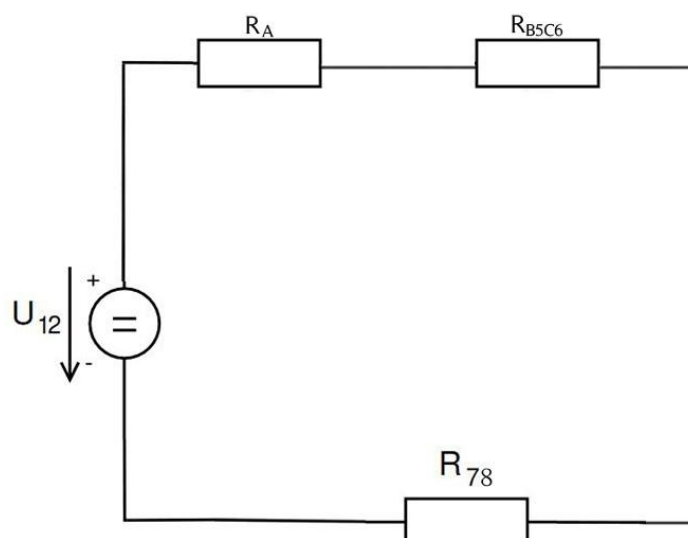


$$R_{B5C6} = \frac{R_{B5} \cdot R_{C6}}{R_{B5} + R_{C6}} = \frac{401,0619 \cdot 812,2124}{401,0619 + 812,2124} = 268,4862\Omega$$



$$R_{EKV} = R_A + R_{B5C6} + R_{78} = 107,3230 + 268,4862 + 109,0909 = 484,9001\Omega$$

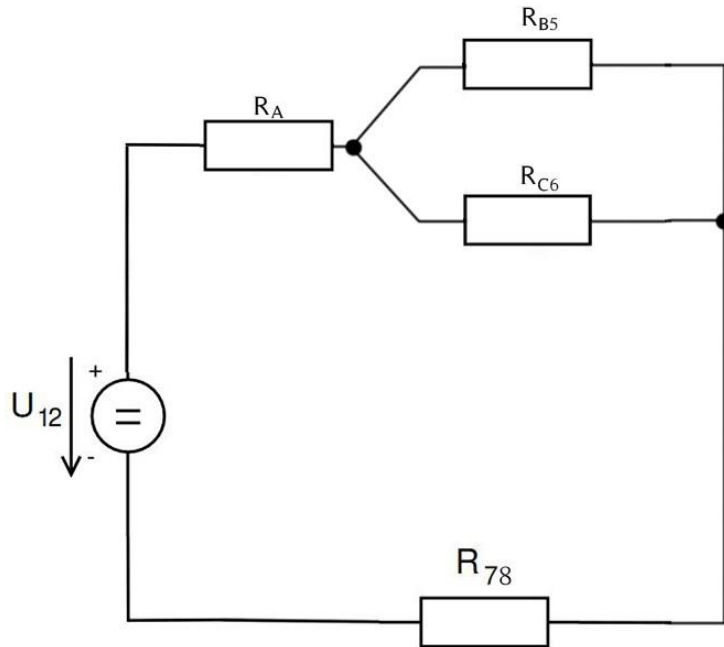
$$I = \frac{U}{R} = \frac{190}{484,9001} = 0,3918A$$



$$U_{R_A} = I \cdot R_A = 0,3918 \cdot 107,3230 = 42,0492V$$

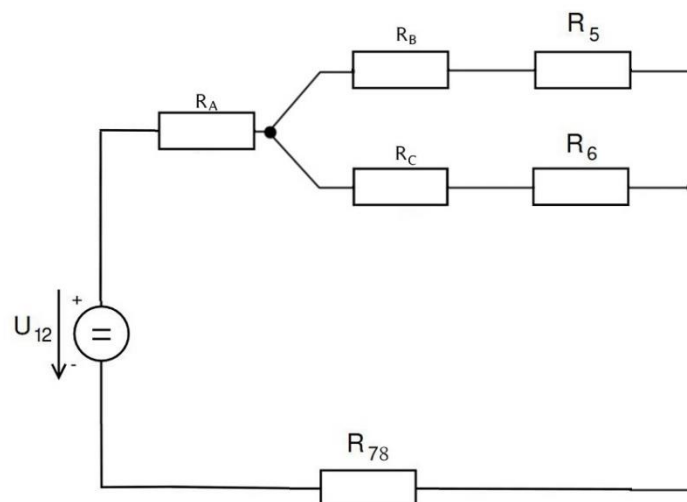
$$U_{R_{B5}C_6} = I \cdot R_{B5C_6} = 0,3918 \cdot 268,4862 = 105,1929V$$

$$U_{R_{78}} = I \cdot R_{78} = 0,3918 \cdot 109,0909 = 42,7418V$$



$$I_{R_{B5}} = \frac{U_{R_{B5}C_6}}{R_{B5}} = \frac{105,1929}{401,0619} = 0,2623A$$

$$I_{R_{C6}} = \frac{U_{R_{B5}C_6}}{R_{C6}} = \frac{105,1929}{812,2124} = 0,1295A$$

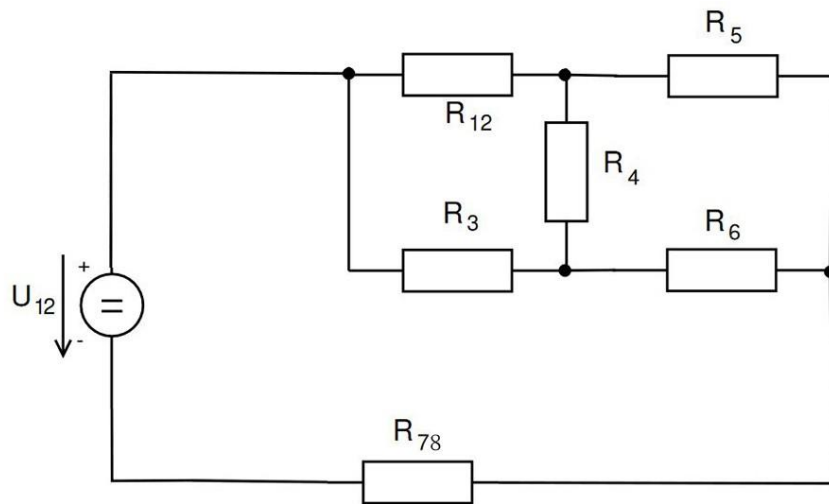


$$U_{R_B} = I_{R_{B5}} \cdot R_B = 0,2623 \cdot 91,0619 = 23,8855V$$

$$U_{R_5} = I_{R_{B5}} \cdot R_5 = 0,2623 \cdot 310 = 81,3130V$$

$$U_{R_C} = I_{R_{C6}} \cdot R_C = 0,1295 \cdot 102,2124 = 13,2365V$$

$$U_{R_6} = I_{R_{C6}} \cdot R_6 = 0,1295 \cdot 710 = 91,9450V$$



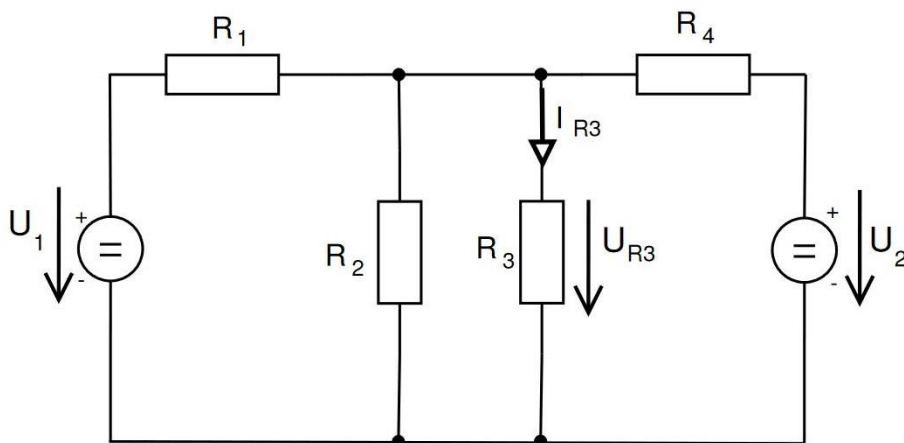
$$U_{R_{12}}: U_{R_{12}} + U_{R_5} + U_{R_{78}} - U = 0$$

$$U_{R_{12}} + 81,3130 + 42,7418 - 190 = 0$$

$$U_{R_{12}} = 65,9452V = U_{R_1}$$

$$I_{R_1} = \frac{U_{R_{12}}}{R_1} = \frac{65,9452}{420} = 0,1570A$$

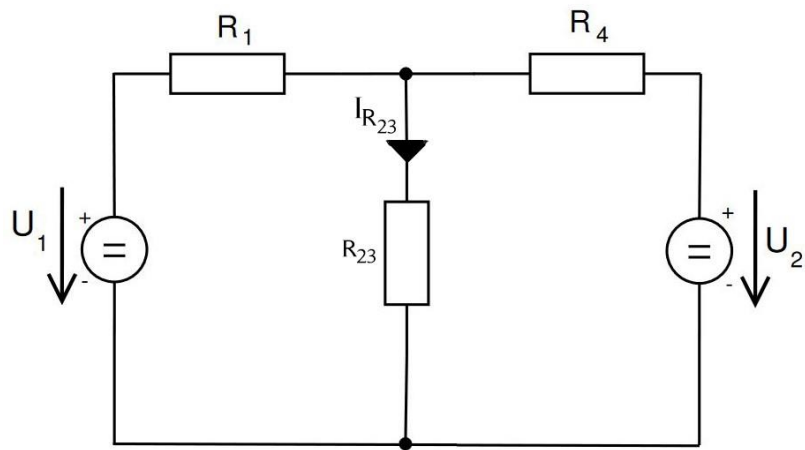
2 C



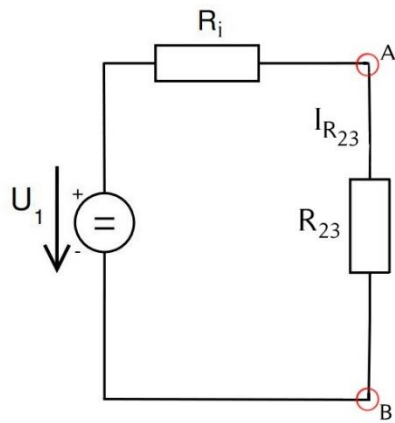
$$U_1 = 200V, U_2 = 70V$$

$$R_1 = 220\Omega, R_2 = 630\Omega$$

$$R_3 = 240\Omega, R_4 = 450\Omega$$

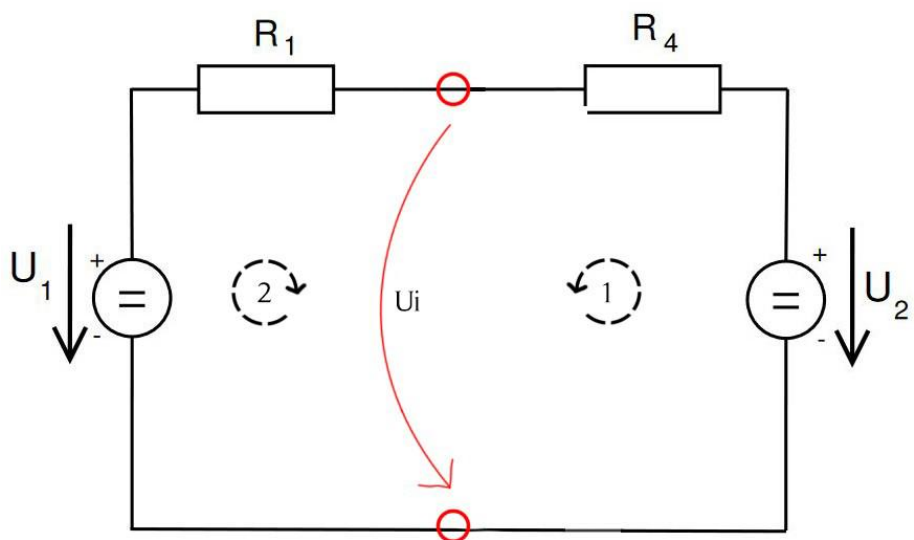


$$R_{23} = \frac{R_2 \cdot R_3}{R_2 + R_3} = \frac{630 \cdot 240}{630 + 240} = 173,7931 \Omega$$



$$\begin{aligned} U_i &= ? \\ R_i &= ? \\ I_{R_{23}} &= ? \end{aligned}$$

$$R_i = \frac{R_1 \cdot R_4}{R_1 + R_4} = \frac{220 \cdot 450}{220 + 450} = 147,7612 \Omega$$



1.

$$\begin{aligned}R_4 \cdot I_x + R_1 \cdot I_x &= U_2 - U_1 \\I_x(R_4 + R_1) &= U_2 - U_1 \\I_x &= \frac{(U_2 - U_1)}{R_4 + R_1} = \frac{70 - 200}{450 + 220} = -0,1940\text{A}\end{aligned}$$

$$\begin{aligned}U_{R_1} &= R_1 \cdot I_x \\U_{R_1} &= R_1 \cdot I_x = 220 \cdot (-0,1940) = -42,6800\text{V}\end{aligned}$$

2.

$$\begin{aligned}U_i &= U_{R_1} + U_1 \\U_i &= 200 - 42,6800 = 157,32\text{V}\end{aligned}$$

$$\begin{aligned}I_{R_{23}} &= \frac{U_i}{R_i + R_{23}} = \frac{157,32}{147,7612 + 173,7931} = 0,4892\text{A} \\U_{R_{23}} &= R_{23} \cdot I_{R_{23}} = 173,7931 \cdot 0,4892 = \mathbf{85,0196\text{V}} = U_{R_3} \\I_{R_3} &= \frac{U_{R_{23}}}{R_3} = \frac{85,0196}{240} = \mathbf{0,3542\text{A}}\end{aligned}$$

1D	2C	3D	4D	5C
$I_{R_1} = 0,1570A$ $U_{R_1} = 65,9452V$	$I_{R_3} = 0,3542A$ $U_{R_3} = 85,0196V$			