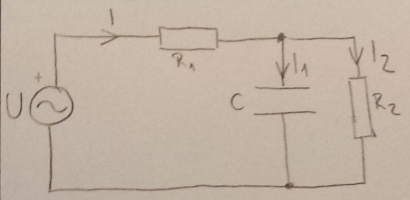
OSNOVE ELEKTROTEHNIKE 2014/15 - PRIPREMA ZA LAB. VJEŽBU 2.1.				
0036485747	Topolovec, Krešimir	LAB01-22	12.11.2014. 15:30-17:00	A309

Zadatak II.1.1.



$R_1 = 470\,\Omega$
$R_2 = 1000\,\Omega$
$U = 12\,V$
$f = 50\,Hz$
$C = 4{,}7\,\mu F$
$I = ?$

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \cdot 50 \cdot 4{,}7 \cdot 10^{-6}} = 677{,}255\,\Omega$$

$$\underline{Z} = \underline{R_1} + \frac{R_2 \cdot X_C}{\underline{R_2} + \underline{X_C}} = 470 + \frac{1000 \cdot (-j677{,}255)}{1000 - j677{,}255}$$

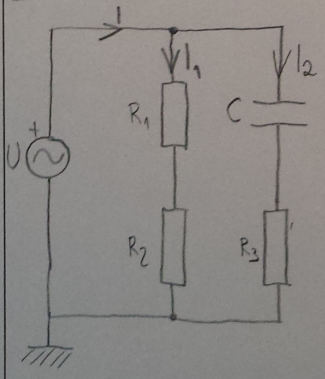
$$= 470 + \frac{-j677255 \cdot (1000 + j677{,}255)}{(1000 - j677{,}255)(1000 + j677{,}255)}$$

$$= 470 + \frac{458674335 - j677255000}{1000000 + 458674{,}335}$$

$$\underline{Z} = 470 + 314{,}446 - 464{,}295j = 784{,}446 - 464{,}295j\ \Omega$$

$$\underline{I} = \frac{\underline{U}}{\underline{Z}} = \frac{12\angle 0^\circ}{784{,}446 - 464{,}295j} = \frac{12\angle 0^\circ}{911{,}55\angle 30^\circ 37' 13''} = 13{,}16\angle -30^\circ 37' 13''\ mA$$

Zadatak II.1.2.



$U = 12\,V$
$f = 50\,Hz$
$R_1 = R_2 = 1000\,\Omega$
$R_3 = 680\,\Omega$
$C = 4{,}7\,\mu F$
$\underline{U} = 12\angle 0^\circ V = (12 + 0j)\,V$
$\underline{I_1}, \underline{I_2}, \underline{I_3}, \underline{U_{R_1}}, \underline{U_{R_2}}, \underline{U_{R_3}}, \underline{U_C} = ?$
↳ polarni i algebarski oblik

$$X_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \cdot 50 \cdot 4{,}7 \cdot 10^{-6}} = 677{,}255\,\Omega$$

$$\underline{I_1} = \frac{\underline{U}}{\underline{R_1} + \underline{R_2}} = \frac{12\angle 0^\circ}{2000\angle 0^\circ} = 6\angle 0^\circ\ mA$$ (polarni oblici)

$$\underline{I_2} = \frac{\underline{U}}{\underline{R_3} + \underline{X_C}} = \frac{12 + 0j}{680 - j677{,}255}$$

$$\underline{I_2} = \frac{12\angle 0^\circ}{959{,}726\angle -44^\circ 53'} = 12{,}5\angle 44^\circ 53'\ mA$$

$\underline{I_1} = 6\,mA$ ← algebarski oblik

$\underline{I_2} = (8{,}857 - 8{,}821j)\,mA$

$$\underline{I} = \underline{I_1} + \underline{I_2} = 6 + 8{,}857 - 8{,}821j = \underbrace{(14{,}857 - 8{,}821j)\,mA}_{\text{algebarski oblik}} = \underbrace{17{,}278\angle 30^\circ 41' 45''\,mA}_{\text{polarni oblik}}$$

$$\underline{U_1} = \underline{I_1} \cdot \underline{R_1} = 6 \cdot 10^{-3} \cdot 1000 = (6 + 0j)\,V = 6\angle 0^\circ\,V$$

$$\underline{U_2} = \underline{I_1} \cdot \underline{R_2} = 6 \cdot 10^{-3} \cdot 1000 = (6 + 0j)\,V = 6\angle 0^\circ\,V$$

$$\underline{U_3} = \underline{I_2} \cdot \underline{R_3} = (8{,}857 - 8{,}821j) \cdot 10^{-3} \cdot 680 = \underbrace{(6{,}023 - 5{,}998j)\,V}_{\text{algebarski oblik}} = \underbrace{8{,}5\angle 44^\circ 52' 53''\,V}_{\text{polarni oblik}}$$

$$\underline{U_C} = \underline{I_2} \cdot \underline{X_C} = (8{,}857 - 8{,}821j) \cdot 10^{-3} \cdot (-j677{,}255) = \underbrace{(5{,}974 - 5{,}998j)\,V}_{\text{algebarski oblik}}$$

$$U_C = \underbrace{8{,}465\angle 45^\circ 6' 54''\,V}_{\text{polarni oblik}}$$