Zadatak III. 1. 1.

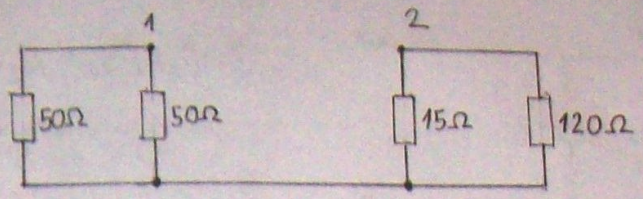
THEVENIN:

a) $I_R = ?$

1° $R_t = ?$

$R_t = 50 // 50 + 15 // 120$

$\underline{R_t = 38,33\ \Omega}$



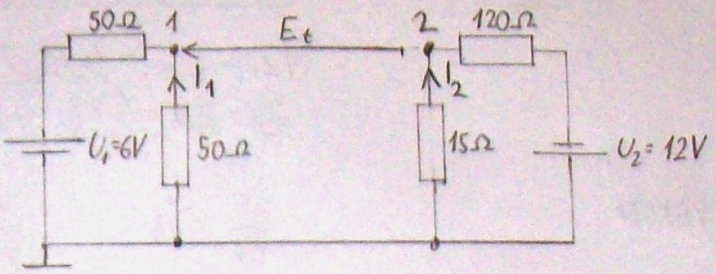
2° $E_t = ?$

$E_t = I_1 \cdot 50 - I_2 \cdot 15$

$E_t = \frac{U_1}{50+50} \cdot 50 - \frac{-U_2}{15+120} \cdot 15$

$E_t = \frac{6}{100} \cdot 50 + \frac{12}{135} \cdot 15$

$\underline{E_t = 4,33V}$



3° $I_R = ?$

$\underline{\underline{I_R = \frac{E_t}{R_t + R} = \frac{4,33}{58,33} = 74,23\ mA}}$

b) $R_{P\,max} = ?$

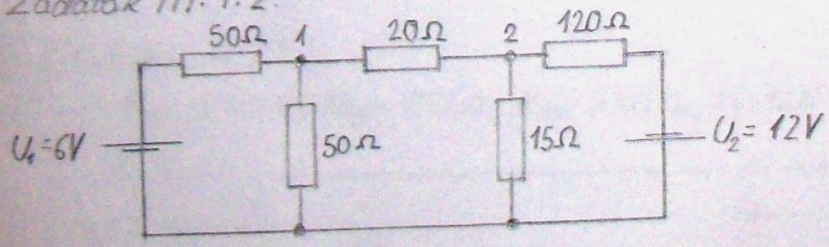
Najveća snaga na R će biti onda kada je R jednak unutarnjem otporu realnog naponskog izvora dobivenog primjenom theveninove metode nadalje, tj. $R = R_T$

$\underline{\underline{R_{P\,max} = 38,33\ \Omega}}$

c) $P_{max} = ?$

$\underline{\underline{P_{max} = I_R^2 \cdot R_{P\,max} = (74,23 \cdot 10^{-3})^2 \cdot 38,33 = 122,29\ mW}}$

Zadatak III. 1. 2.



$\varphi_1 \left(\frac{1}{50} + \frac{1}{50} + \frac{1}{20}\right) - \varphi_2 \frac{1}{20} = \frac{U_1}{50} \Rightarrow 0,09\varphi_1 - 0,05\varphi_2 = 0,12 \Rightarrow \varphi_1 = \frac{0,12 + 0,05\varphi_2}{0,09}$

$-\varphi_1 \cdot \frac{1}{20} + \varphi_2 \left(\frac{1}{20} + \frac{1}{15} + \frac{1}{120}\right) = -\frac{U_2}{120} \Rightarrow -0,05\varphi_1 + 0,125\varphi_2 = -0,1$

$-0,05 \cdot \left(\frac{0,12 + 0,05\varphi_2}{0,09}\right) + 0,125\varphi_2 = -0,1$

$-\frac{1}{15} - \frac{1}{36}\varphi_2 + \frac{1}{8}\varphi_2 = -\frac{1}{10}$

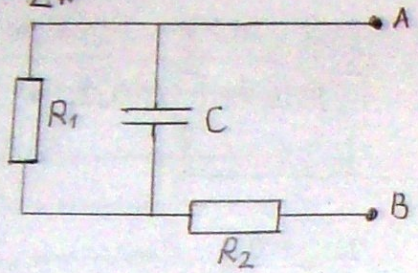
$\frac{7}{72}\varphi_2 = -\frac{1}{30} \Rightarrow \underline{\varphi_2 = -0,343V}$

$\underline{\varphi_1 = \frac{0,12 + 0,05 \cdot (-0,343)}{0,09} = 1,143V}$

Zadatak III.1.3

$R_1 = 470\Omega$; $C = 4,7\mu F$; $\underline{U} = 12\angle 0°\ V$; $F = 50Hz$; $R_2 = 100\Omega$

1° $Z_T = Z_N$



$\underline{Z}_T = \underline{Z}_N = \underline{Z}_{AB} = R_2 + R_1 // (-jX_C)$

$X_C = \frac{1}{100\pi \cdot 4,7 \cdot 10^{-6}} = 677,26\Omega$

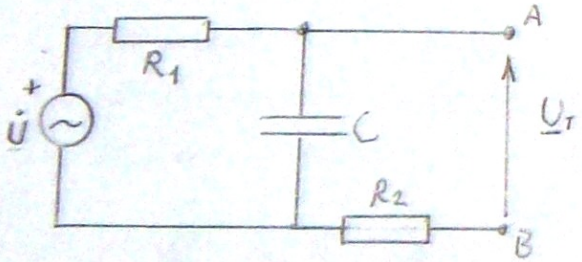
$\underline{Z}_T = \underline{Z}_N = 417,23 - j220,15\ \Omega$

$|Z_T| = |Z_N| = 471,74\Omega$

$\underline{Z}_T = \underline{Z}_N = 471,74\angle -27,82°\ \Omega$

2° THEVENIN:

$\dot{U}_T = ?$



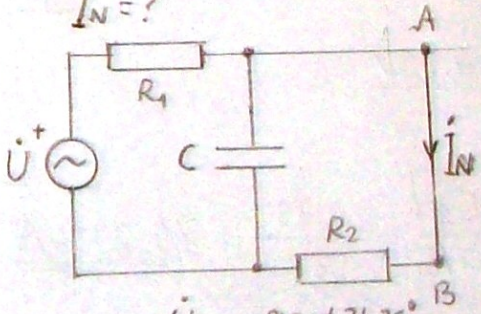
$\dot{U}_T = \dot{U}_{ab} = \dot{U}_C$

$\dot{U}_T = \frac{\underline{U}}{R_1 - jX_C} \cdot (-jX_C) = \frac{12}{470 - j677,23} \cdot (-j677,23)$

$\dot{U}_T = 9,86\angle -34,76°\ V$

NORTON:

$\dot{I}_N = ?$



$\dot{I}_N = \frac{\dot{U}_T}{\underline{Z}_N} = \frac{9,86\angle -34,76°}{471,74\angle -27,82°}$

$\dot{I}_N = 20,9\angle -6,94°\ mA$

$\underline{Z}_{th} = 471,74\angle -27,82°\ \Omega$; $\dot{U}_{th} = 9,86\angle -34,76°\ V$; $\dot{I}_N = 20,9\angle -6,94°\ mA$;

$Z_{th} = 471,74\Omega$; $U_{th} = 9,86V$; $I_N = 20,9\ mA$; $Z_N = 471,74\Omega$