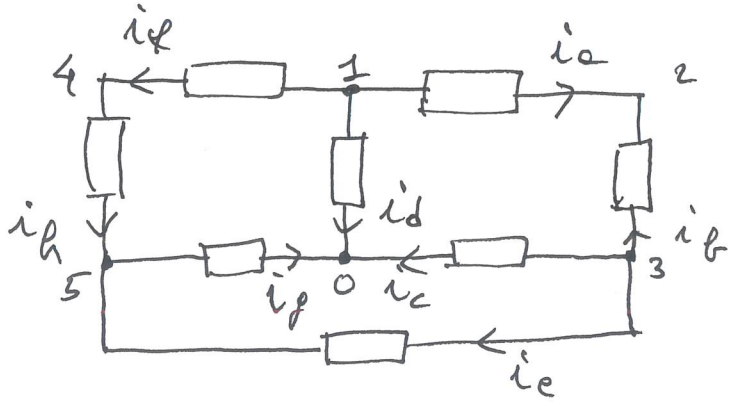
ESERCIZI DA MOODLE

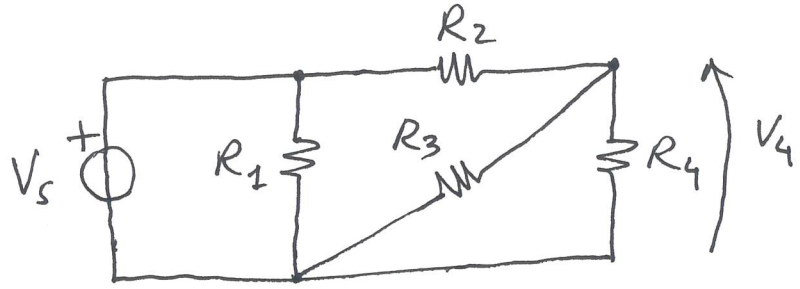
1)



Sapendo che $i_{30} = 3\,A$ e $i_{10} = 9{,}3\,A$ calcolare i_{50}.

$$i_{50} = -(i_{30} + i_{10}) = -12{,}3\,A$$

2)

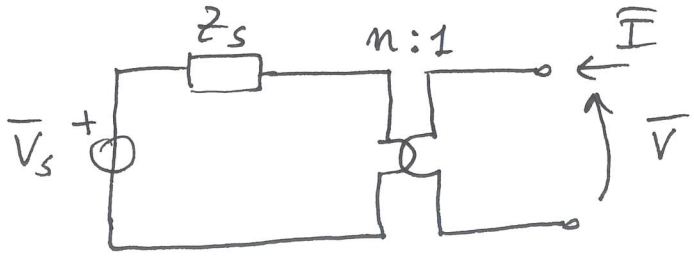


Calcolare V_4 sapendo che:

$V_S = 12\,V$, $R_1 = 15\,\Omega$, $R_2 = 3{,}3\,\Omega$, $R_3 = 8{,}2\,\Omega$, $R_4 = 8{,}2\,\Omega$

$$V_4 = \frac{(R_3 \| R_4)}{(R_3 \| R_4) + R_2} V_S = \frac{4{,}1}{4{,}1 + 3{,}3} 12 = 6{,}65\,V$$

3)



Sapendo che: $\bar{V}_S = 6{,}9 + 1{,}1j\ V$, $n = 2$

$Z_S = 12{,}2 + 1{,}1j\ \Omega$

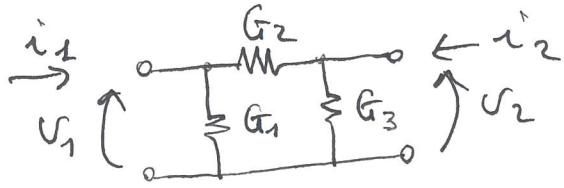
Calcolare $|\bar{I}_{eq}|$ di Norton.

Mettere in corto circuito i terminali del bipolo.
Dalle equazioni del trasformatore:

$$\bar{I}_1 = -\frac{1}{n}\bar{I}_2 \Rightarrow \bar{I}_{eq} = n\bar{I}_1$$

$$|\bar{I}_1| = \frac{|\bar{V}_S|}{|Z_S|} = 0{,}57\ A \Rightarrow |\bar{I}_{eq}| = 1{,}14\ A$$

4)

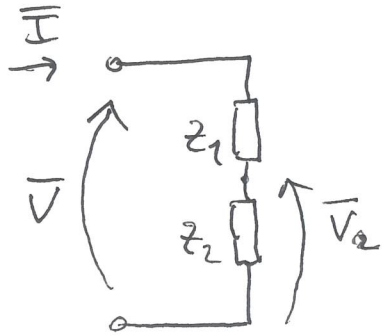


Sapendo che $G_1 = 0{,}1\ \Omega^{-1}$, $G_2 = 0{,}5\ \Omega^{-1}$, $G_3 = 0{,}3\ \Omega^{-1}$
calcolare R_{21} della matrice delle resistenze.

$$\underline{G} = \begin{bmatrix} 0{,}9 & -0{,}5 \\ -0{,}5 & 0{,}8 \end{bmatrix} \qquad \underline{R} = G^{-1}$$

$$R_{21} = \frac{0{,}5}{\det(\underline{R})} = 1{,}064\ \Omega$$

5)



Sapendo che:

$\bar{V} = 100\ V$

$Z_1 = 3 - 5j\ \Omega$

$Z_2 = 3{,}8 + 6{,}8j\ \Omega$

Calcolare P_2.

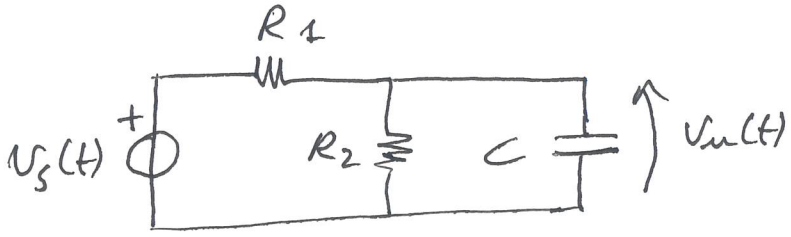
$$P_{C2} = \bar{V}_2 \bar{I}^* = \frac{|\bar{V}_2|^2}{Z_2^*}$$

$$P_2 = Re\{P_{C2}\} = \frac{|\bar{V}_2|^2 R_2}{R_2^2 + X_2^2}$$

$$|\bar{V}_2| = \left|\frac{Z_2}{Z_1 + Z_2}\right| |\bar{V}| = 110{,}7\ V$$

$$P_2 = 767{,}4\ V$$

6)



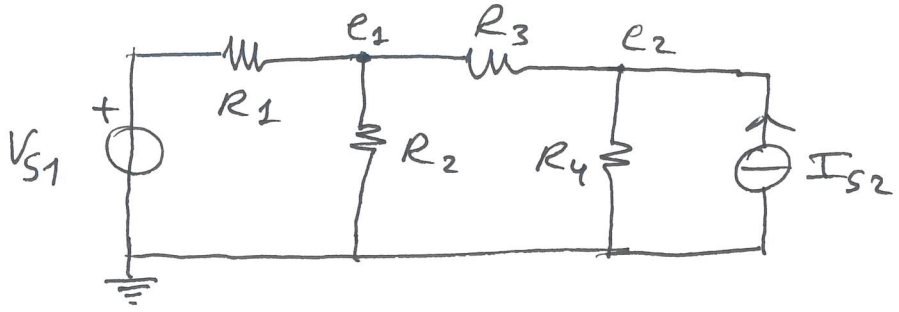
Sapendo che: $R_1 = 4175{,}1\ \Omega$, $R_2 = 6248{,}0\ \Omega$, $C = 6{,}8\ \mu F$

Calcolare il polo della funzione di rete $H(s) = \frac{V_{in}(s)}{V_s(s)}$

$$H(s) = \frac{\frac{1}{R_1}}{\frac{1}{R_1} + \frac{1}{R_2} + sC} = \frac{R_2}{(R_1 + R_2) + sCR_1R_2}$$

$$p = \frac{-(R_1 + R_2)}{CR_1R_2} = -58{,}76\ s^{-1}$$

7)



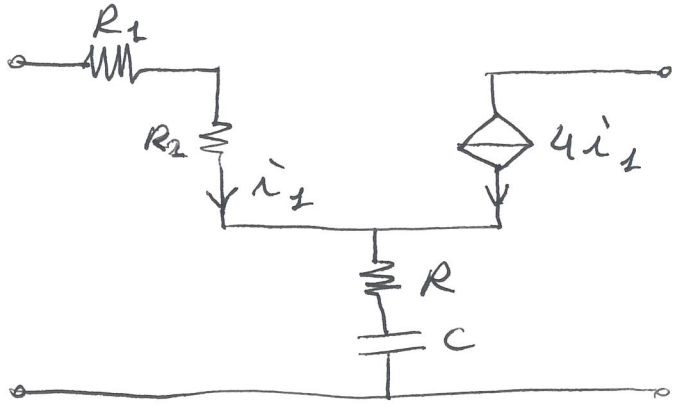
Sapendo che: $V_S = 12\,V$, $I_{S2} = 3\,A$, $R_1 = 1{,}1\,\Omega$

$R_2 = 9{,}50\,\Omega$, $R_3 = 2{,}4\,\Omega$, $R_4 = 1{,}0\,\Omega$

Calcolare l'elemento G_{22}^{mod} della matrice modale.

$$\frac{e_2 - e_1}{R_3} + \frac{e_2}{R_4} = I_{S2} \qquad G_{22}^{mod} = \frac{1}{R_3} + \frac{1}{R_4} = 1{,}42\,\Omega^{-1}$$

8)



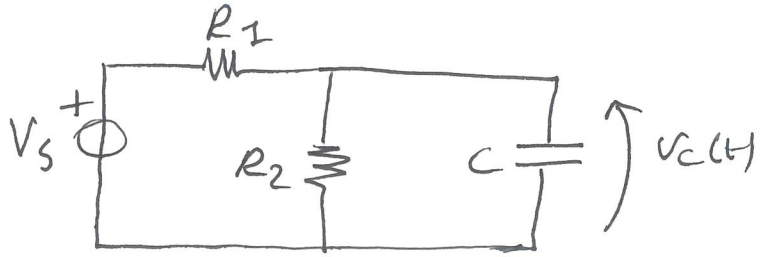
Sapendo che: $R = 6{,}2\,\Omega$ e $C = 221{,}6\,\mu F$, $\omega = 100\,rad/s$

Calcolare il modulo di Z_1 (Miller II)

$$Z_1 = Z(1+\beta) = 5Z \qquad |Z| = \sqrt{R^2 + \frac{1}{\omega^2 C^2}} = 45{,}55\,\Omega$$

$$|Z_1| = 5|Z| = 227{,}75\,\Omega$$

9)



Sapendo che: $V_C(0) = V_0 = 1\,V$, $V_S = 12\,V$, $R_1 = 10\,\Omega$

$R_2 = 5{,}2\,\Omega$, $C = 1{,}9\,mF$

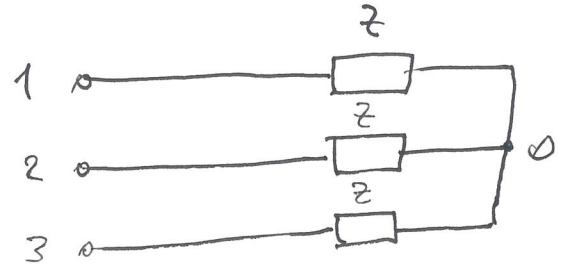
calcolare $V_C(t)$ per $t = 5\,ms$

$$V_C(t) = (1 - V_p)\, e^{-t/\tau_C} + V_p$$

$$V_p = \frac{R_2}{R_1 + R_2} V_S = 4{,}1\,V \qquad \tau_C = (R_1 // R_2)\, C = 6{,}5\,ms$$

$$V_C(5\times10^{-3}) = (1 - 4{,}1)\, e^{\frac{-5\times10^{-3}}{6{,}5\times10^{-3}}} + 4{,}1 = 2{,}67\,V$$

10)



Sapendo che: $V_e = 400\,V$, $\underline{Z} = 41{,}4 + j\,3{,}9\,\Omega$

calcolare Q_u.

$$I_e = \frac{400}{\sqrt{3}} \frac{1}{|\underline{Z}|} = 5{,}55\,A$$

$$Q = \sqrt{3}\, V_e I_e \sin\varphi = 360{,}6\,VAR$$