<u>Compito di Elettrotecnica</u>

15 Luglio 2021

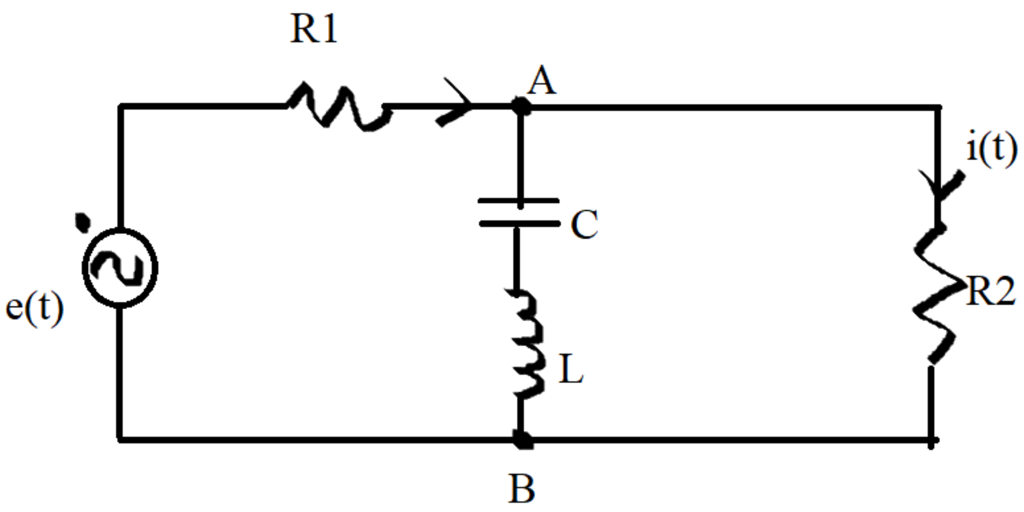
Nome e Cognome ………………………………………………………………………………………………

Matricola……………………………………………………………………………………………………….

Corso di Laurea……………………………………………………………………………………………….

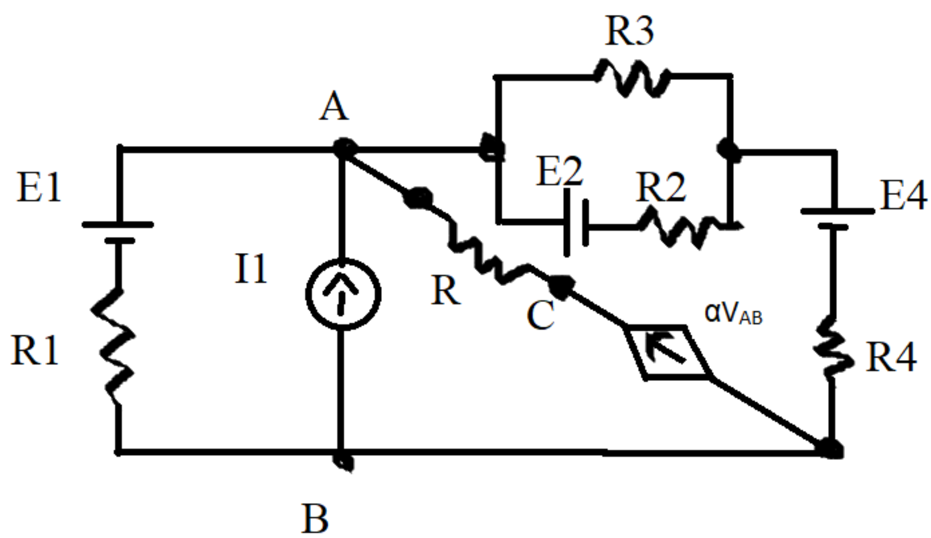
ES.1– Dato il circuito in figura, determinare l'andamento temporale della corrente i(t).

$e(t) = 3\sqrt{2}\ \sin\left(wt + \frac{\pi}{2}\right) V$; f=50Hz; $R_1 = R_2 = 3\ \Omega$; C=1mF; L= 2mH;

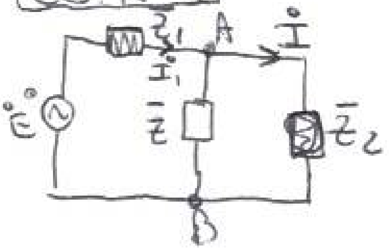


ES.2 –Il sistema si trova a regime. Determinare la potenza dissipata dal resistore R.

E1 = 2V; E2=3V; E4 =1V; $R_1 = R_3 = 2\Omega$; $R_2 = R_4 = 5\ \Omega$; R = 3 Ω; I1=2A ; α=3 Ω^{-1}



ES. N° 1



$$e(t) = 3\sqrt{2}\,\text{sen}\left(\omega t + \frac{\pi}{2}\right) \Rightarrow \dot{E} = 3\left(\cos\frac{\pi}{2} + j\,\text{sen}\frac{\pi}{2}\right)$$

$$\bar{Z} = j\omega L - \frac{j}{\omega C} = -2.5548j$$

Per calcolare la $\dot{I}$ utilizzo il partitore di corrente:

$$\dot{I} = \dot{I}_1 \frac{\bar{Z}}{\bar{Z} + \bar{Z}_2}$$

Applico Millman per calcolare la $\dot{I}_1$:

$$\dot{V}_{AB} = \dot{E}_{TH} = \frac{\frac{\dot{E}}{\bar{Z}_1}}{\frac{1}{\bar{Z}_1} + \frac{1}{\bar{Z}} + \frac{1}{\bar{Z}_2}} = 0{,}6549 + j\,1.1155 \ \text{V}$$

$$\dot{V}_{AB} - \dot{E} = -\dot{I}_1 \cdot \bar{Z}_1 \Rightarrow \dot{I}_1 = \frac{\dot{E} - \dot{V}_{AB}}{\bar{Z}_1} = -0{,}2183 + j\,0.68$$

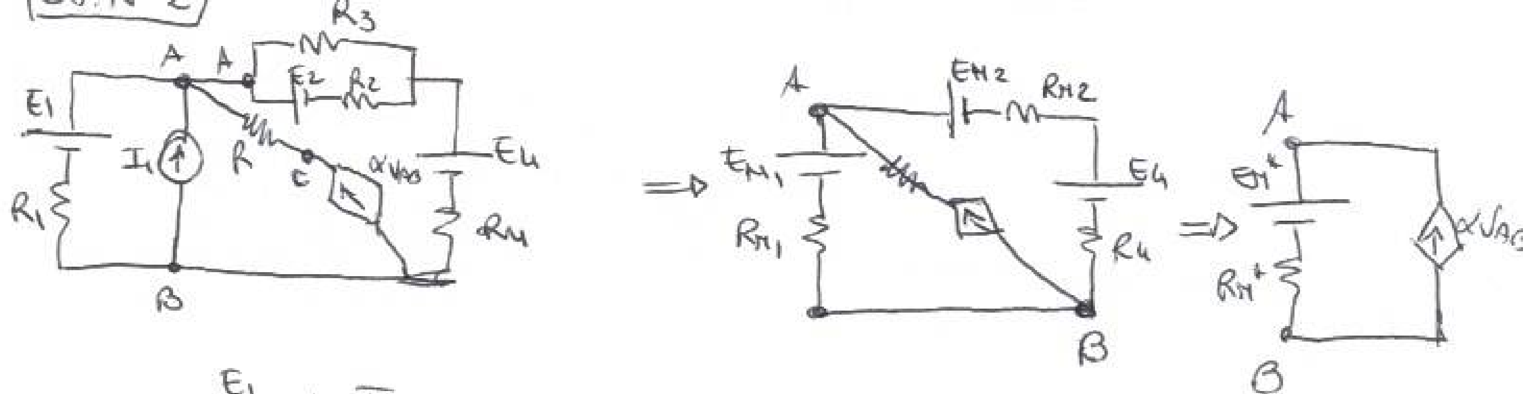
$$\dot{I} \Rightarrow 0{,}2183 + j\,0.3718 \ \text{A}$$

$$i(t) = I_{max} \cdot \text{sen}\left(\omega t + \Phi_I\right) \Rightarrow \begin{cases} I_{max} = \sqrt{2} \cdot |\dot{I}| = 0.4312 \cdot \sqrt{2} \\ \Phi_I = \text{arctg}\left(\frac{\text{Im}\{\dot{I}\}}{\text{Re}\{\dot{I}\}}\right) = 1.04 \end{cases}$$

altrimenti senza applicare il partitore:

$$\dot{I} = \frac{\dot{V}_{AB}}{\bar{Z}_2} = 0{,}2183 + j\,0.3718 \ \text{A}$$

PRB



$$E_{M1} = \frac{\frac{E_1}{R_1} + I}{\frac{1}{R_1}}$$

$$R_{M1} = R_1$$

$$E_{M2} = \frac{E_2/R_2}{1/R_2 + \frac{1}{R_3}}$$

$$R_{M2} = \frac{1}{\frac{1}{R_2} + \frac{1}{R_3}}$$

$$E_M^* = \frac{\frac{E_{M1}}{R_{M1}} + \frac{(E_{M2} + E_4)}{R_{M2} + R_4}}{\frac{1}{R_{M1}} + \frac{1}{(R_{M2} + R_4)}}$$

$$R_M^* = \frac{1}{\frac{1}{R_{M1}} + \frac{1}{(R_{M2} + R_4)}}$$

$$V_{AB} - E_M^* = \alpha V_{AB} R_M^* \Rightarrow V_{AB} = \frac{E_M^*}{1 + \alpha R_M^*}$$

$$P_{diss\text{-}R} = R \cdot (-\alpha V_{AB})^2$$