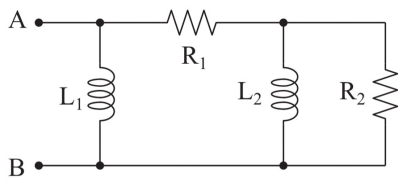


## Esercizio n. 1



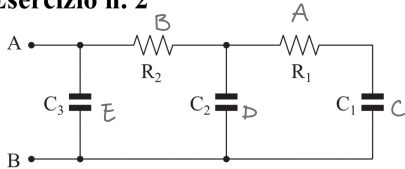
- A  $R_1 = 4 \Omega$   
 B  $R_2 = 8 \Omega$   
 C  $L_1 = 20 \text{ mH}$   
 D  $L_2 = 8 \text{ mH}$   
 $\omega = 1000 \text{ rad/s}$

Determinare l'impedenza e l'ammettenza del bipolo A-B.

$$\dot{Z}_{AB} = \left[ (\dot{Z}_{R_2} \parallel \dot{Z}_{L_2}) + \dot{Z}_{R_1} \right] \parallel \dot{Z}_{L_1} = 5 + 5j$$

Ammettenza  $Y = \dot{Z}_{AB}^{-1} = 0.1 - 0.1j$

## Esercizio n. 2



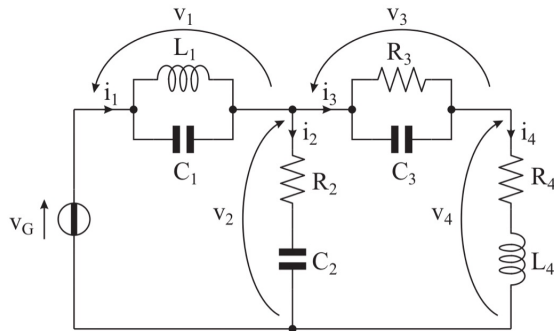
- A  $R_1 = 40 \Omega$   
 B  $R_2 = 25 \Omega$   
 C  $C_1 = 50 \mu\text{F}$   
 D  $C_2 = 10 \mu\text{F}$   
 E  $C_3 = 4 \mu\text{F}$   
 $\omega = 1000 \text{ rad/s}$

Determinare l'impedenza e l'ammettenza del bipolo A-B.

$$\dot{Z}_{AB} = \left\{ \left[ (A + C) \parallel D \right] + B \right\} \parallel E = 40 - 30j$$

$$Y = 0.016 + 0.012j$$

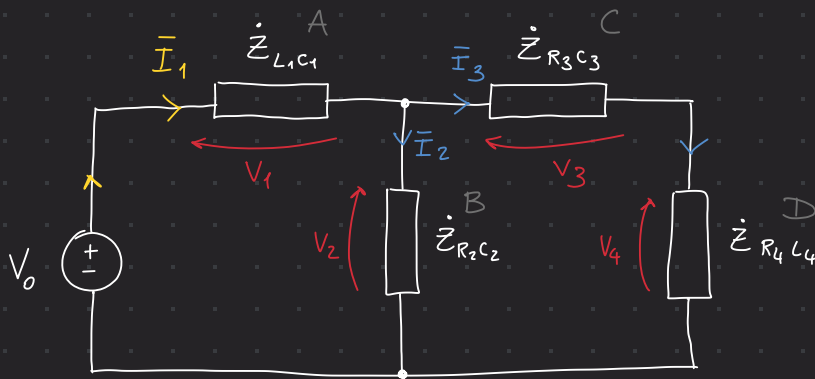
## Esercizio n. 6



- $L_1 = 10 \text{ mH}$   
 $C_1 = 200 \mu\text{F}$   
 $R_2 = 10 \Omega$   
 $C_2 = 200 \mu\text{F}$   
 $R_3 = 20 \Omega$   
 $C_3 = 100 \mu\text{F}$   
 $R_4 = 10 \Omega$   
 $L_4 = 60 \text{ mH}$

$$v_G(t) = 60\sqrt{2} \cos(500t + \frac{\pi}{4}) \text{ V}$$

Determinare le tensioni e le correnti indicate in figura.



A  $\dot{Z}_{L_1 C_1} = 10j$

B  $\dot{Z}_{R_2 C_2} = 10 - 10j$

C  $\dot{Z}_{R_3 C_3} = 10 - 10j$

D  $\dot{Z}_{R_4 L_4} = 10 + 30j$

$$\bar{V}_0 = 60 e^{j\frac{\pi}{4}} = 60\sqrt{2} [\cos(\frac{\pi}{4}) + j\sin(\frac{\pi}{4})] = 30 \cdot 2 + 30 \cdot 2j = 60 + 60j$$

$$\bar{I}_0 = \frac{\bar{V}_0}{\bar{Z}_{eq}} = \frac{V_0}{[C + D] \parallel B + A} = 6 + 2j$$

$$\bar{I}_0 = \bar{I}_1 \Rightarrow \bar{I}_2 = \bar{I}_1 \cdot \frac{\dot{Z}_{R_3 C_3}}{\dot{Z}_{R_3 C_3} + (\dot{Z}_{R_2 C_2} + \dot{Z}_{R_4 L_4})} = 2 - 2j \text{ A}$$

$$\bar{I}_3 = \bar{I}_1 - \bar{I}_2 = 4 + 4j \text{ A}$$

$$\bar{I}_4 = 4 + 4j \text{ A}$$

$$\cos(\theta) = \sin(\theta - \frac{\pi}{2})$$

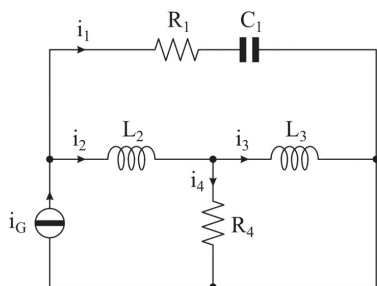
$$v_1(t) = 20\sqrt{2} \cos(500t + 1.89)$$

$$\Rightarrow \bar{V}_1 = \bar{I}_1 \cdot \bar{Z}_{L_1 C_1} = -20 + 60j \quad \bar{V}_2 = -40j \Rightarrow v_2(t) = 40 \cos(500t - \frac{\pi}{2})$$

$$\bar{V}_3 = 80 \text{ V} \Rightarrow v_3(t) = 80 \cos(500t)$$

$$\bar{V}_4 = -80 + 160j \text{ V} \Rightarrow v_4(t) = 100 \cos(500t + 2.498)$$

### Esercizio n. 7



$$R1 = 1 \Omega$$

$$C1 = 100 \mu\text{F}$$

$$L2 = 200 \mu\text{H}$$

$$L3 = 400 \mu\text{H}$$

$$R4 = 2 \Omega$$

$$i_G(t) = 10\sqrt{2} \cos(5000t - \frac{3}{4}\pi) \text{ A}$$

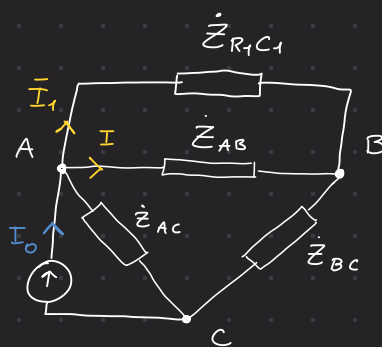
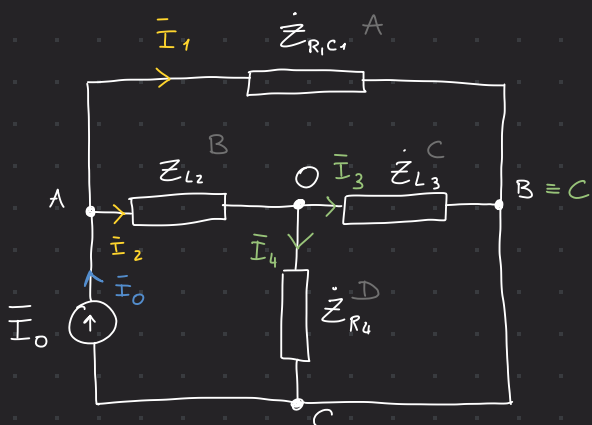
$$A \bar{Z}_{R_1 C_1} = 1 - 2j \Omega$$

$$B \bar{Z}_{L_2} = 1 \Omega$$

$$C \bar{Z}_{L_3} = 2 \Omega$$

$$D \bar{Z}_{L_4} = 2 \Omega$$

Determinare le correnti indicate in figura e la potenza attiva e reattiva erogata dal generatore.



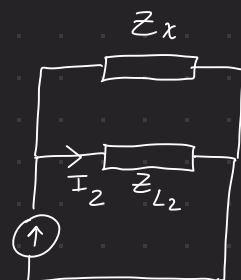
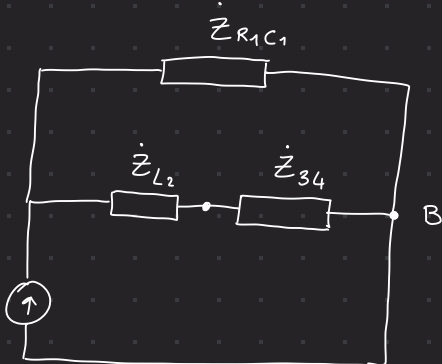
NON  
SERVE!

$$-\frac{3}{4}\pi j$$

$$I_0 = 10\sqrt{2} e^{-j\frac{3}{4}\pi} = 10\sqrt{2} \left[ \cos(\frac{3}{4}\pi) - j \sin(\frac{3}{4}\pi) \right] = 10\sqrt{2} \left[ -\frac{\sqrt{2}}{2} - j\frac{\sqrt{2}}{2} \right] = -10 - 10j$$

$$\bar{I}_2 = I_0 \cdot \frac{A}{A + B + (D \parallel C)} = -8.46 - 2.31j \text{ A}$$

$$\Rightarrow \bar{I}_1 = \bar{I}_0 \bar{I}_2 = 7.69 - 1.54j \text{ A}$$



$$\bar{Z}_X = \bar{Z}_{R_1 C_1} + (\bar{Z}_{L_3} \parallel \bar{Z}_{R_4}) = 2 - 2j$$

$$\Rightarrow I_2 = \bar{I}_0 \frac{\bar{Z}_X}{\bar{Z}_X + \bar{Z}_{L_2}} =$$

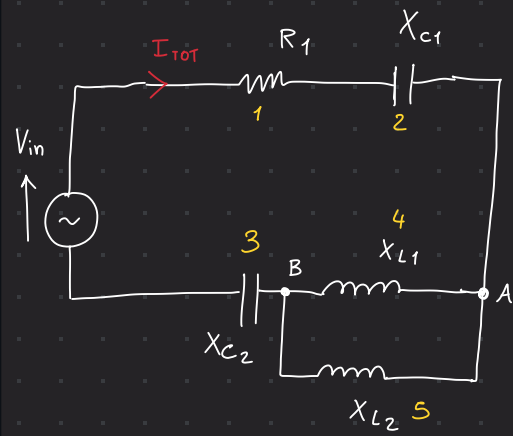




$$V_{in} = 70 \text{ V}$$

$$R_1 = 50 \text{ ohm} \quad X_{C1} = 30 \text{ ohm} \quad X_{C2} = 70 \text{ ohm} \quad X_{L1} = 60 \text{ ohm} \quad X_{L2} = 90 \text{ ohm}$$

calcolare la  $Z_{eq}$ , il fasore  $I_{tot}$  e lo sfasamento tensione-corrente  $V_{in}$ - $I_{tot}$



$$1 \quad Z_{R_1} = 50 \Omega$$

$$\Rightarrow 2 \quad Z_{C1} = -j30$$

$$3 \quad Z_{C2} = -j70$$

$$4 \quad Z_{L1} = j60$$

$$5 \quad Z_{L2} = j90$$

$$Z_{eq} = (4 \parallel 5) + 1 + 2 + 3 = 50 - 64j = 81.21 \angle -52^\circ \quad \leftarrow \text{gradi}$$

$$V = R \cdot I \Rightarrow I_{TOT} = \frac{V_{in}}{Z_{eq}}$$

$$\text{ma} \quad V_{in} = 70 \text{ V} \Rightarrow \dot{V}_{in} = 70 \angle 0$$

$$\dot{Z}_{eq} = 81.2 \angle -52$$

$$\Rightarrow \dot{I}_{TOT} = \frac{70 \angle 0}{81.2 \angle -52} = \frac{70}{81.2} \angle 0 - (-52) = 0.86 \angle 52^\circ \quad \dot{I}_{TOT}$$

Sfasamento



$$\Rightarrow \phi = |\angle V_{in} - \angle I_{TOT}| = |0 - 52| = 52^\circ \quad \text{Ans 3}$$