

COMPITINI E PROVE SCRITTE A.A. 03/04

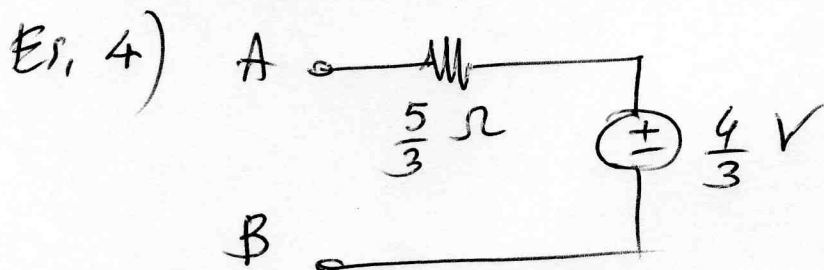
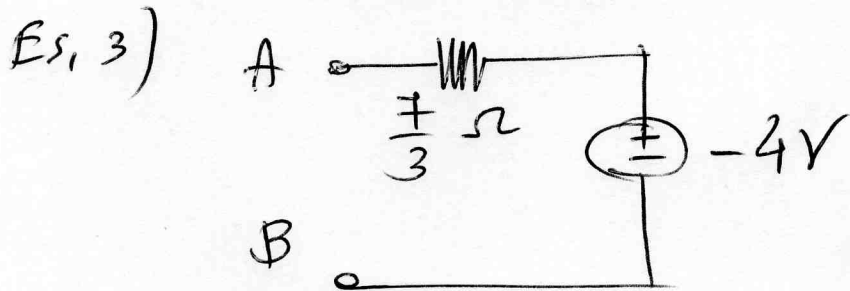
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Compitino 1 (11/11/03)

Es. 1) $C_{equivalente} = \frac{1}{2} F$

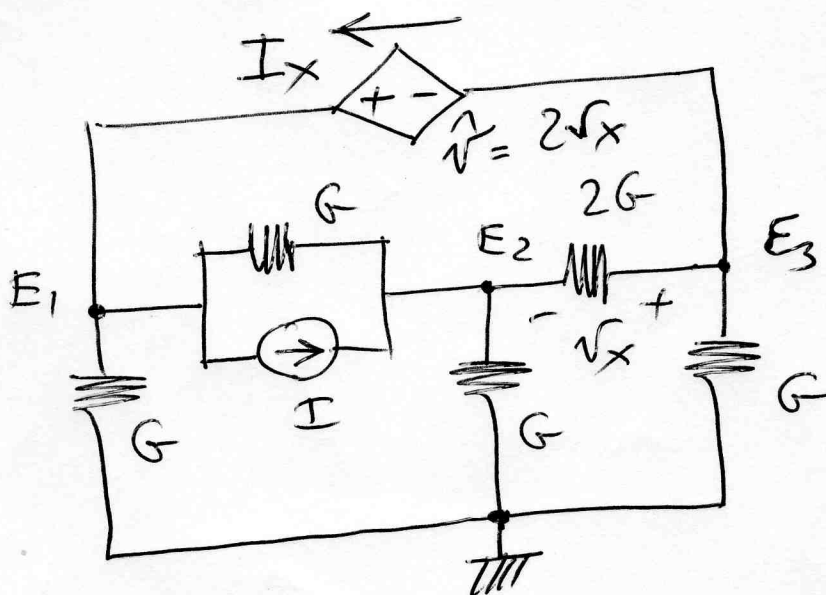
Es. 2) $V_0(\text{per la tensione}) = 4V$

$V_0(\text{per la corrente}) = -4V$



Compitino 2 (28/11/03)

Es. 2)



Inconosciute: $E_1, E_2, E_3; I_X$

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KI nodi

$$\begin{bmatrix} 2G & -G & 0 \\ -G & 4G & -2G \\ 0 & -2G & 3G \end{bmatrix} \begin{bmatrix} E_1 \\ E_2 \\ E_3 \end{bmatrix} = \begin{bmatrix} I_X - I \\ I \\ -I_X \end{bmatrix}$$

Vincolo

$$\hat{V} = E_1 - E_3$$

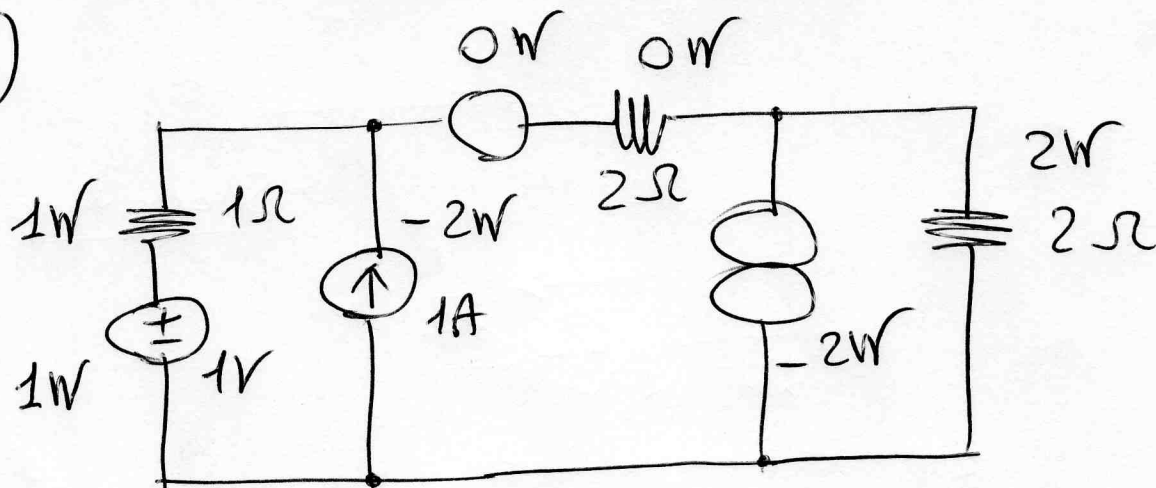
Relazione costitutiva per il controllato

$$\hat{V} = 2\hat{V}_X = 2(E_3 - E_2)$$

$\Rightarrow$ IV^a equazione:

$$3E_3 - 2E_2 - E_1 = 0.$$

Es. 3)



potenze assorbite dai bipoli

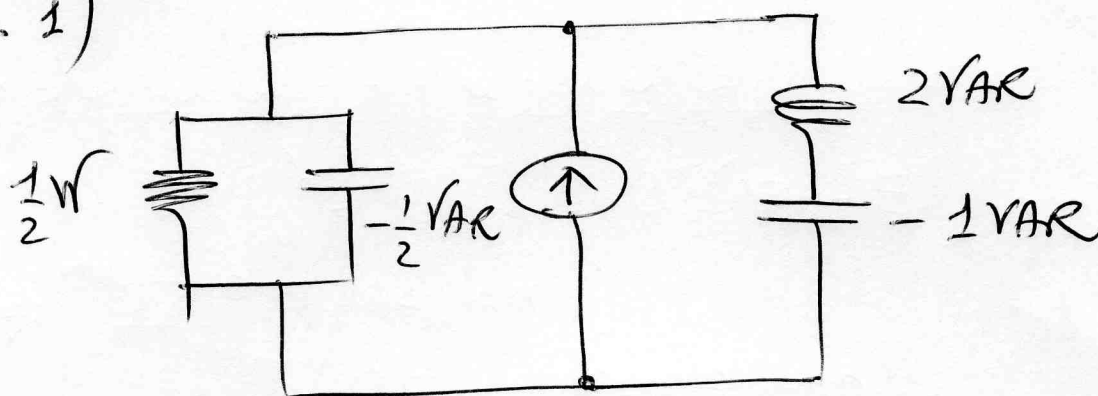
Es. 4) $\bar{V} = -\frac{1}{5} - j\frac{3}{5}$; $v(t) = 0.632 \cos(2t + 251^\circ) \text{ V}$ ^{3/9}

$\bar{I}_L = -\frac{3}{10} + j\frac{1}{10}$; $i_L(t) = 0.316 \cos(2t + 162^\circ) \text{ A}$

$\bar{I}_C = \frac{3}{5} - j\frac{1}{5}$; $i_C(t) = 0.632 \cos(2t - 18.4^\circ) \text{ A}$

Compitino 3 (18 Dicembre 03)

Es. 1)



$\bar{P}_{gen.re} = \frac{1}{2} + j\frac{1}{2}$ (energia)

Es. 2)

$C \approx 435 \mu\text{F} = 435 \times 10^{-6} \text{ F}$

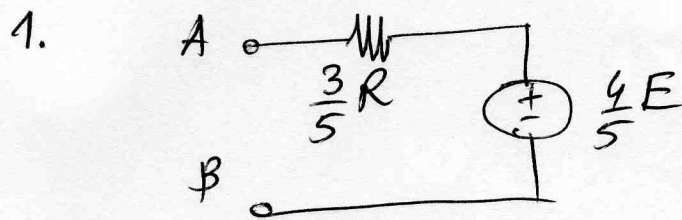
Es. 3)

$i_{libera}(t) = 2 e^{-\frac{5}{6}t} \text{ A}$

$i_{forzata}(t) = \frac{1}{5} (1 - e^{-\frac{5}{6}t}) \text{ A}$

Se $L' = 4 \text{ H}$, cambia solo la costante di tempo, cioè $\tau'_{eq} = 2 \tau_{eq} = \frac{12}{5} \text{ sec}$.

9/1/04 Recupero 1, parte 1

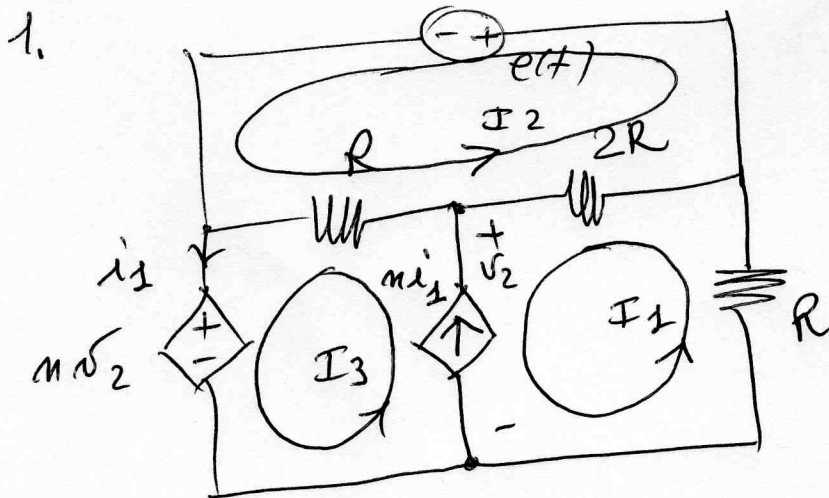


2. $i_0 = -5A$; $P_0 = 45W$.

3. $V_{AB, \text{gen. re corrente}} = \frac{7}{3} RI_0$
 $V_{AB, \text{gen. re tensione}} = \frac{2}{3} E$.

4. $L_{[0,1]} = \frac{1}{12} \text{ joule}$.

9/1/04 Recupero 1, parte 2



incognite: I_1, I_2, I_3, v_2

KV mf.
$$\begin{bmatrix} 3R & -2R & 0 \\ -2R & 3R & -R \\ 0 & R & R \end{bmatrix} \begin{bmatrix} I_1 \\ I_2 \\ I_3 \end{bmatrix} = \begin{bmatrix} -v_2 \\ -e \\ -m v_2 + v_2 \end{bmatrix}$$

viuols

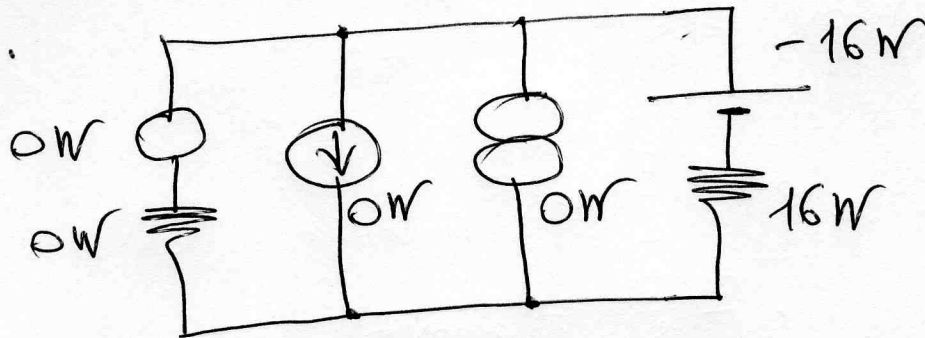
$$m i_1 = I_3 - I_1 \Rightarrow$$

$$n I_3 = I_3 - I_1 \Rightarrow$$

$$(1-n) I_3 = I_1.$$

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3.



potenze assorbite.

$$4. \quad \bar{V} = -\frac{3}{10} + j\frac{1}{10} = 0.316 e^{j161.6^\circ}$$

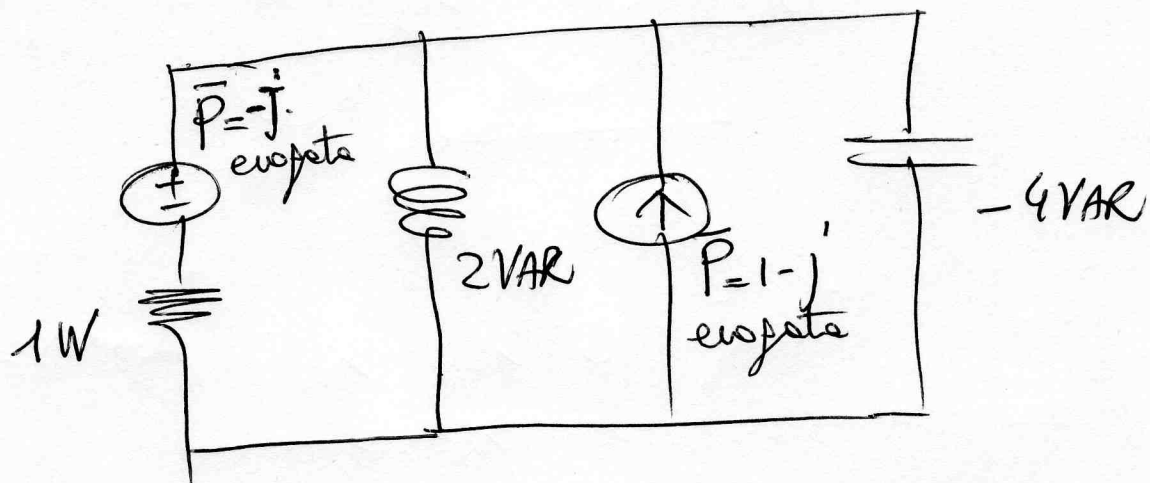
$$v(t) = 0.316 \cos(2t + 161.6^\circ) \text{ V}$$

$$\bar{I} = \frac{13}{20} - j\frac{1}{20} = 0.652 e^{j4.4^\circ}$$

$$i(t) = 0.652 \cos(2t + 4.4^\circ) \text{ A}$$

9/1/04 Recupero 1, parte 3

1.



$$2. \quad \bar{Z}_{carica} = \frac{7}{5} - j\frac{1}{5} \Omega$$

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$$P_{max} = P_d = \frac{2}{7} W.$$

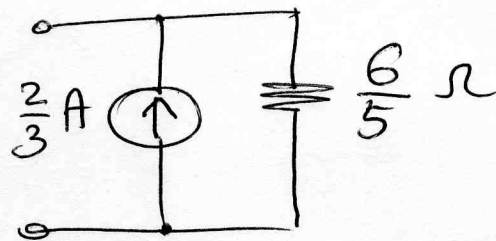
$$3. \quad i'(0^-) = \frac{\sqrt{5}}{10} \cos\left(2t + \frac{1}{2} + \pi\right) A$$

$$i'_{libera}(t) = -i'_{trans}(t) = \frac{\sqrt{5}}{10} \cos\left(2t + \frac{1}{2} + \pi\right) e^{-t} \cdot A.$$

23/1/04 Recupero 2, parte 1

1. Il bipolo non è controllabile in corrente

2.



$$3. \quad I_X \text{ per tensione } 2V = 1A$$

$$I_X \text{ per tensione di corrente} = -\frac{1}{2} A$$

$$I_X \text{ per tensione } 5V = \frac{5}{4} A$$

$$4. \quad v(t) = \frac{7}{3} \frac{d}{dt} i(t); \quad L_{eq} = \frac{7}{3} H.$$

23/1/04 Recupero 2, parte 3

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$$1. \quad \overline{P}_{\text{gen. re corrente}} = 0 \quad ; \quad \overline{P}_{\text{gen. re tensione}} = -\frac{1}{2} j$$

$$2. \quad \overline{Z} \approx 12.6 + j 9.5 \, \Omega$$

$$3. \quad i(t) = \frac{3}{20} e^{-2t} + \frac{\sqrt{2}}{4} \cos\left(2t - \frac{\pi}{4}\right) \text{ A.}$$

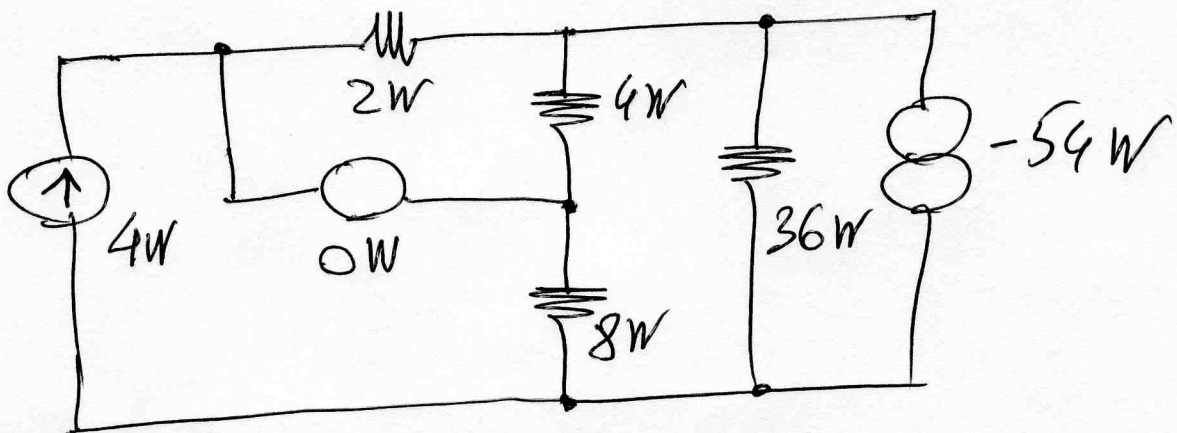
23/4/04

$$1. \quad \overline{Z}_{\text{carico}} = 1 - j \, \Omega \quad ; \quad P_{\text{max}} = P_d = \frac{1}{2} \text{ W.}$$

$$2. \quad i_{\text{libera}}(t) = 2 e^{-\frac{5}{24}t} \quad ; \quad t > 0$$

$$i_{\text{forzata}}(t) = 2 \left(1 - e^{-\frac{5}{24}t}\right) \quad ; \quad t > 0$$

3.



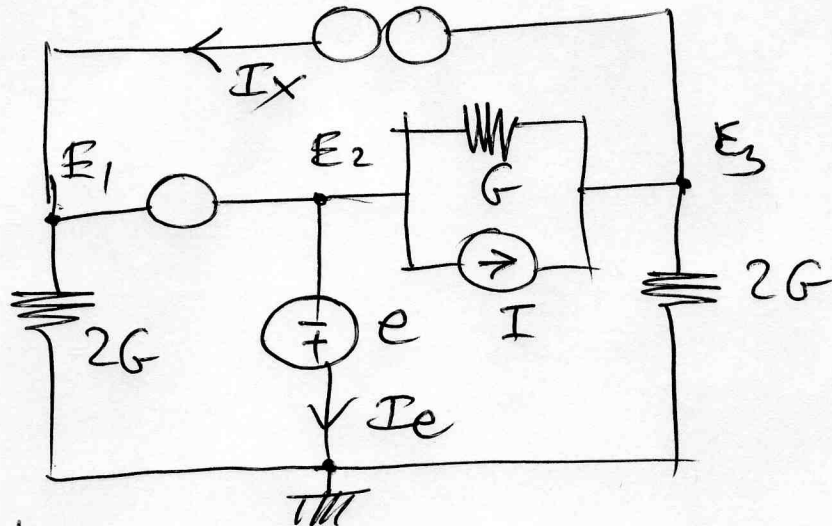
potenze assorbite

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1. $R_{eq} = \frac{3}{8} R$; $V_{eq} = 0$.

2.



variables: $E_1, E_2, E_3; I_x, I_e$

KI nodes:

$$\begin{bmatrix} 2G & 0 & 0 \\ 0 & G & -G \\ 0 & -G & 3G \end{bmatrix} \begin{bmatrix} E_1 \\ E_2 \\ E_3 \end{bmatrix} = \begin{bmatrix} I_x \\ -I_e - I \\ I - I_x \end{bmatrix}$$

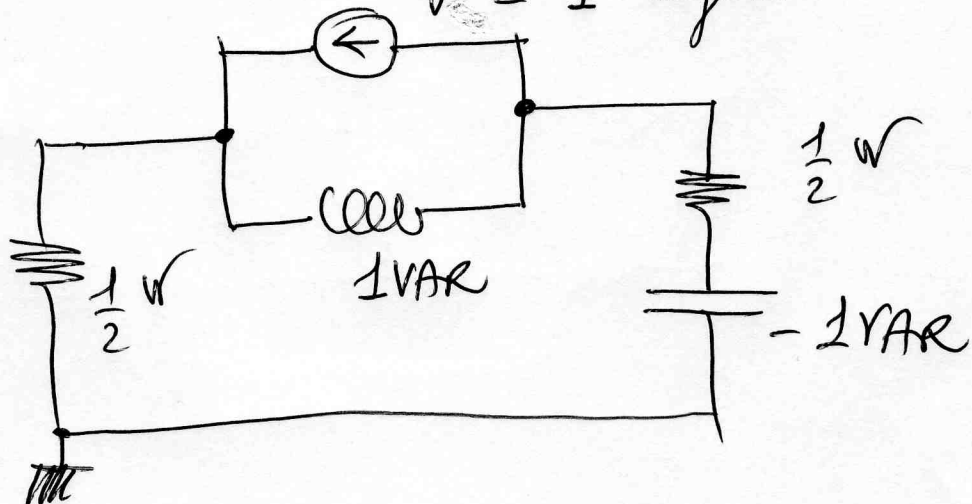
relations:

$$E_1 = E_2$$

$$E_2 = -e$$

$$\bar{P} = 1 \text{ ergs}$$

3.

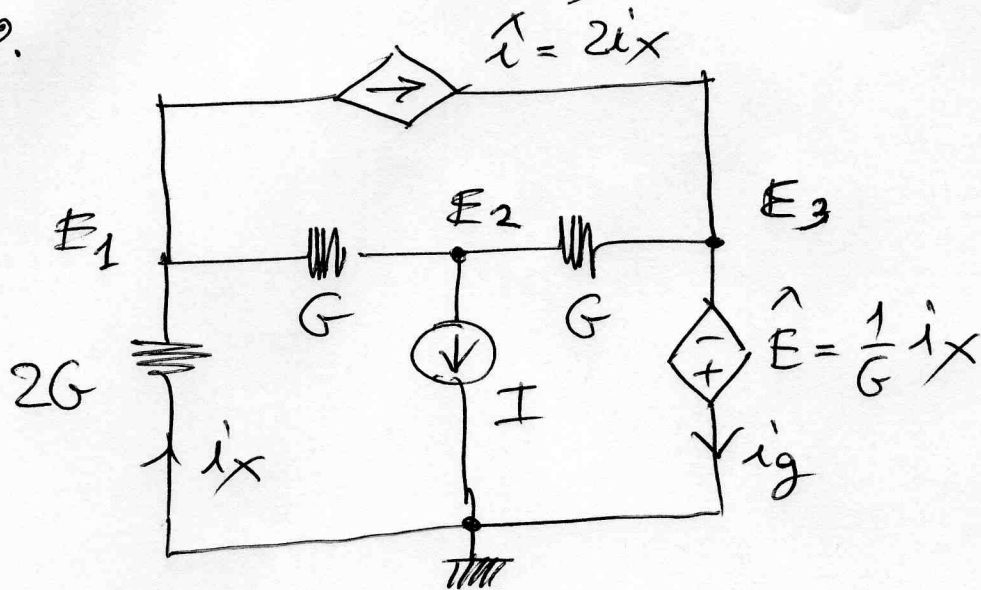


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1. $C_{uf} \approx 575.5 \mu F.$

2.



Incongnite : E_1, E_2, E_3, ig

KI nodi :

$$\begin{bmatrix} 3G & -G & 0 \\ -G & 2G & -G \\ 0 & -G & G \end{bmatrix} \begin{bmatrix} E_1 \\ E_2 \\ E_3 \end{bmatrix} = \begin{bmatrix} -\hat{\lambda} \\ -I \\ \hat{\lambda} - ig \end{bmatrix}$$

Vincolo : $E_3 = -\hat{E}$

Relazioni Costitutive Gen. n° Controllati :

$$\hat{\lambda} = 2ix = -4GE_1$$

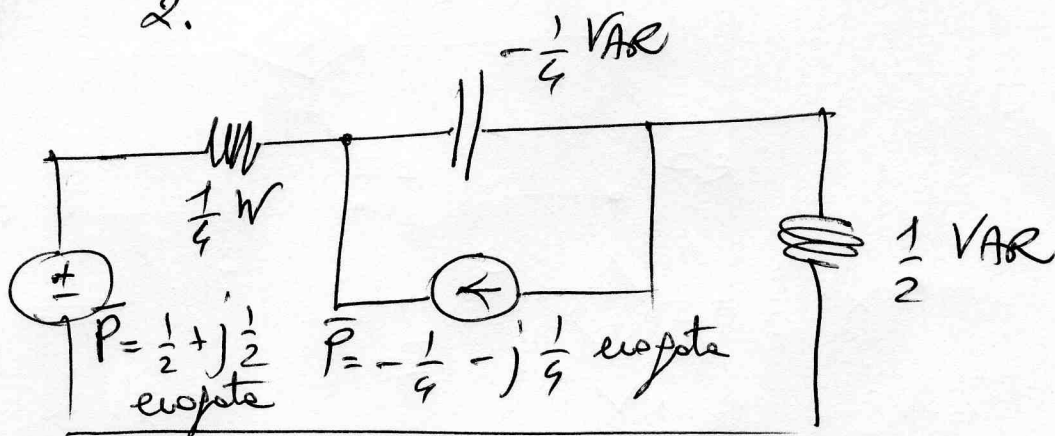
$$\hat{E} = \frac{1}{G} (-2GE_1) = -2E_1.$$

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1. $R_{eq} = \frac{1}{3} R$; $V_{eq} = \frac{1}{3} R I_f$

2.



3.

$i'(t) = -\frac{1}{5} e^{-2t} + \frac{1}{\sqrt{5}} \cos(t - 63.4^\circ) \text{ A}$
complete