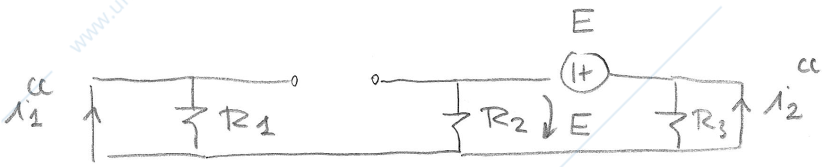
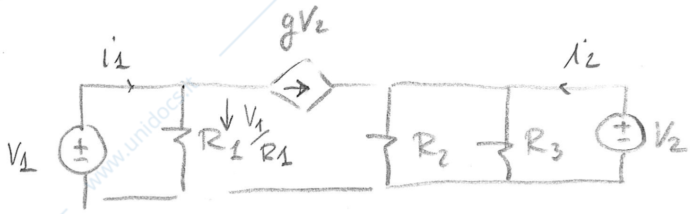
1a $(V_1 = V_2 = 0)$



$$A_1 = i_1^{cc} \equiv 0 \qquad i_2^{cc} = A_2 = -\frac{E}{R_2}$$

1b $(E \equiv 0)$



$$i_1 = \frac{V_1}{R_1} + gV_2 \qquad i_2 + gV_2 = \left(\frac{1}{R_2} + \frac{1}{R_3}\right) V_2$$

$$i_2 = \underbrace{\left(\frac{1}{R_2} + \frac{1}{R_3} - g\right)}_{G_{22}} V_2 \qquad G_{21} \equiv \emptyset$$

$$[G] = \begin{bmatrix} \frac{1}{R_1} & +g \\ \frac{1}{R_2} + \frac{1}{R_3} - g & \emptyset \end{bmatrix}$$

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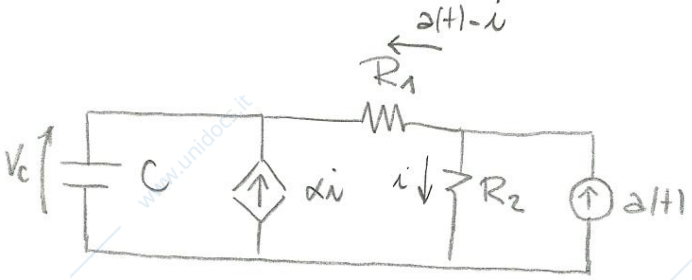
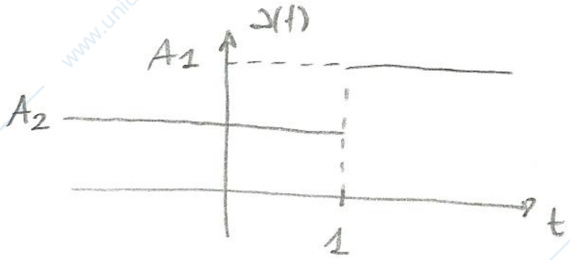
Es. 2





$$C\frac{dV_c}{dt} = \alpha i + a(t) - i = (\alpha - 1) i + a(t)$$

$$V_c + R_1(a(t) - i) - R_2 i = 0 \qquad i = \frac{V_c + R_1 a(t)}{R_1 + R_2}$$

$$C\frac{dV_c}{dt} = (\alpha - 1)\frac{V_c + R_1 a(t)}{R_1 + R_2} + a(t)$$

$$\frac{dV_c}{dt} = \frac{\alpha - 1}{(R_1+R_2)C} V_c + \frac{a(t)}{C}\left(1 + \frac{(\alpha-1)R_1}{R_1+R_2}\right)$$

$$a(t) = A \rightarrow V_c = H$$

$$0 = \frac{\alpha - 1}{(R_1+R_2)C} H + \frac{A}{C}\left(1 + \frac{(\alpha-1)R_1}{R_1+R_2}\right)$$

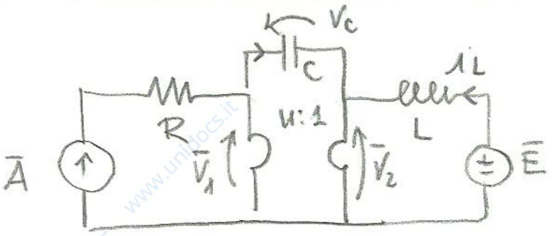
$$H = -\frac{A}{\cancel{C}} \, \frac{\cancel{R_1} + R_2 + \alpha R_1 - \cancel{R_1}}{\cancel{R_1 + R_2}} \cdot \frac{\cancel{(R_1+R_2)C}}{\alpha - 1} = -\frac{A}{\alpha - 1}(R_2 + \alpha R_1)$$

in $t = 1^-$ $\quad V_c(1^-) = -\frac{A_2}{\alpha - 1}(R_2 + \alpha R_1)$

$V_c(1^+) = V_c(1^-)$ (ingresso limitato)

$$V_c(t)\Big|_{t \geq 1} = k e^{\lambda(t-1)} + V_0 \qquad V_0 \longrightarrow -\frac{A_1}{\alpha - 1}(R_2 + \alpha R_1)$$

$$k - \frac{A_1}{\alpha - 1}(R_2 + \alpha R_1) = -\frac{A_2}{\alpha - 1}(R_2 + \alpha R_1) \qquad k = \frac{(R_2 + \alpha R_1)(A_1 - A_2)}{\alpha - 1}$$



$\bar{V}_1 = n\bar{V}_2$

$\bar{I}_1 = -\frac{1}{n}\bar{I}_2 \qquad \bar{I}_2 = -n\bar{I}_1$

$$\bar{V}_1 - \bar{V}_2 = \bar{V}_c \qquad \boxed{\bar{V}_c = (n-1)\bar{V}_2}$$

$$\bar{A} + \bar{I}_L = \bar{I}_1 + \bar{I}_2 = \left(1 - \frac{1}{n}\right)\bar{I}_2 = \frac{n-1}{n}\bar{I}_2$$

$$\boxed{\bar{A} + \bar{I}_L = \frac{n-1}{n}\bar{I}_2}$$

$$j\omega C\bar{V}_c = \boxed{j\omega C(n-1)\bar{V}_2 = \bar{I}_2 - \bar{I}_L}$$

$$\boxed{\bar{V}_2 = \bar{E} - j\omega L\bar{I}_L}$$

$$\begin{cases} \bar{V}_2 = \bar{E} - j\omega L\bar{I}_L \\ j\omega C(n-1)\bar{V}_2 = \bar{I}_2 - \bar{I}_L \\ \bar{A} + \bar{I}_L = \frac{n-1}{n}\bar{I}_2 \end{cases}$$

$$\bar{I}_2 = \bar{I}_L + j\omega C(n-1)\bar{V}_2$$

$$\bar{I}_L = \frac{n-1}{n}\left(\bar{I}_L + j\omega C(n-1)\bar{V}_2\right) - \bar{A}$$

$$\left(1 - \frac{n-1}{n}\right)\bar{I}_L + \bar{A} = j\omega C\frac{(n-1)^2}{n}\bar{V}_2$$

$$-\frac{1}{n}\left(\frac{\bar{V}_2 - \bar{E}}{j\omega L}\right) + \bar{A} = j\omega C\frac{(n-1)^2}{n}\bar{V}_2$$

$$\bar{V}_2\left(j\omega C\frac{(n-1)^2}{n} - j\frac{1}{n\omega L}\right) = \bar{A} - j\frac{\bar{E}}{n\omega L}$$

$$\bar{V}_2 = \frac{\bar{A}n\omega L - j\bar{E}}{\cancel{n\omega L}} \cdot \frac{\cancel{n\omega L}}{j\omega^2 LC(n-1)^2 - j} = \frac{\bar{E} - jn\omega L\bar{A}}{1 - \omega^2 LC(n-1)^2}$$

$$\bar{V}_1 = n\bar{V}_2$$

$$\hat{P}_e^A = \frac{1}{2}\left(R\bar{A} + n\bar{V}_2\right)\bar{A}^* = \frac{1}{2}RA^2 + \frac{n}{2}\,\frac{\bar{E} - jn\omega L\bar{A}}{1 - \omega^2 LC(n-1)^2}\,\bar{A}^* =$$

$$= \frac{1}{2}RA^2 + \frac{n}{2(1 - \omega^2 LC(n-1)^2)}\left(-jEA - jn\omega LA^2\right)$$