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Prova scritta di ELETTROTECNICA del 16-9-2019

1) Si calcoli la corrente $i_R(t)$ per $t \geq 0$, sapendo che la rete in figura 1 è a regime prima dell'istante t=0 s, in cui avviene la chiusura dell'interruttore K.

$$R_1 = 2\ \Omega, \qquad R_2 = 1\ \Omega, \qquad C = 1\ F, \qquad L = \frac{1}{3}\ H, \qquad \alpha = 2,$$

☐ STANDARD: $R_0 = 1\ \Omega,\ i_g(t) = 181\cos(3t)$ A.

$$\left\langle \mathbf{i_R(t) = \left(\frac{33}{400} + \frac{117}{160}\,t\right) e^{-\frac{3}{2}t} + \frac{5973}{100}\cos(3t) + \frac{543}{50}\sin(3t) = (0.0825 + 0.73125\,t)\, e^{-1.5\,t} + 60.709\cos(3t + 6.1033)\ A} \right.$$
$$\left. [v_C(t) = (-0.76 - 0.975\,t)\, e^{-1.5\,t} + 21.753\cos(3t + 1.91009)\ V;\ i_L(t) = (-5.52 + 2.925\,t)\, e^{-1.5\,t} + 18.1\cos(3t + 2.49809)\ A] \right\rangle$$

☐ LIGHT: $R_0 = 0\ \Omega,\ i_g(t) = 30$ A. $\langle \mathbf{i_R(t) = 6\, e^{-1.2\,t} + 15\ A} \quad [v_C(t) = -10\, e^{-1.2\,t} - 10\ V] \rangle$

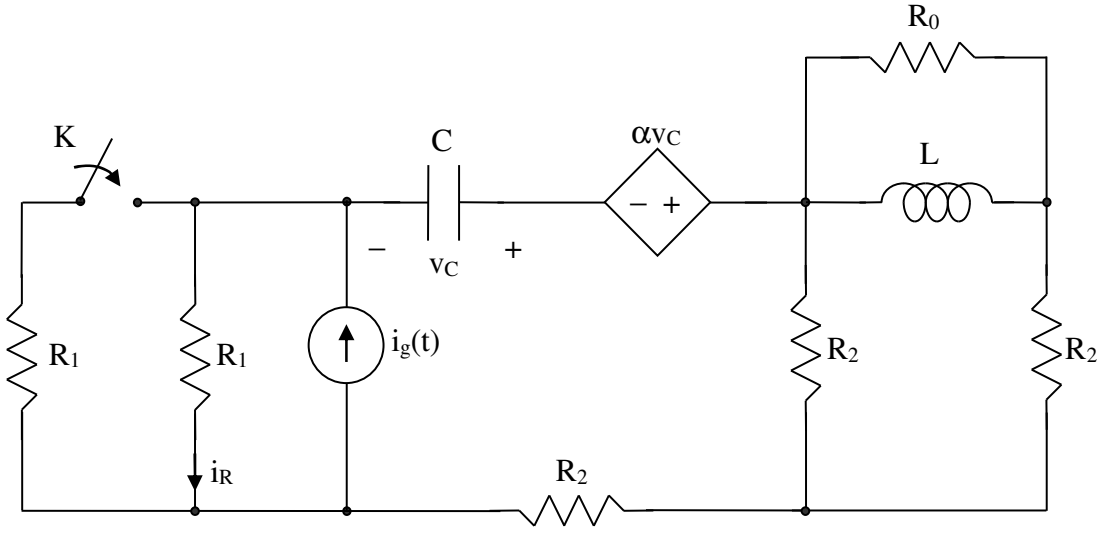

fig. 1

2) Dato il doppio bipolo di figura 2 in regime sinusoidale, calcolare la matrice di trasmissione diretta [T].

$$n = \frac{1}{3}, \quad R_0 = \frac{1}{3}\ \Omega, \quad R_1 = 9\ \Omega, \quad X_C = -\frac{4}{3}\ \Omega, \quad X_1 = 3\ \Omega, \quad X_2 = 9\ \Omega,$$

☐ STANDARD: $X_M = 3\ \Omega,\ g_m = 1$ S. $\left\langle [T] = \frac{1}{8}\begin{bmatrix} 5+j & 24+j18\ \Omega \\ 3-jS & 24+j6 \end{bmatrix} \right\rangle$

☐ LIGHT: $X_M = 0\ \Omega,\ g_m = 0$ S. $\left\langle [T] = \frac{1}{2}\begin{bmatrix} 1-j & 7-j5\ \Omega \\ 1-jS & 9-j3 \end{bmatrix} \right\rangle$

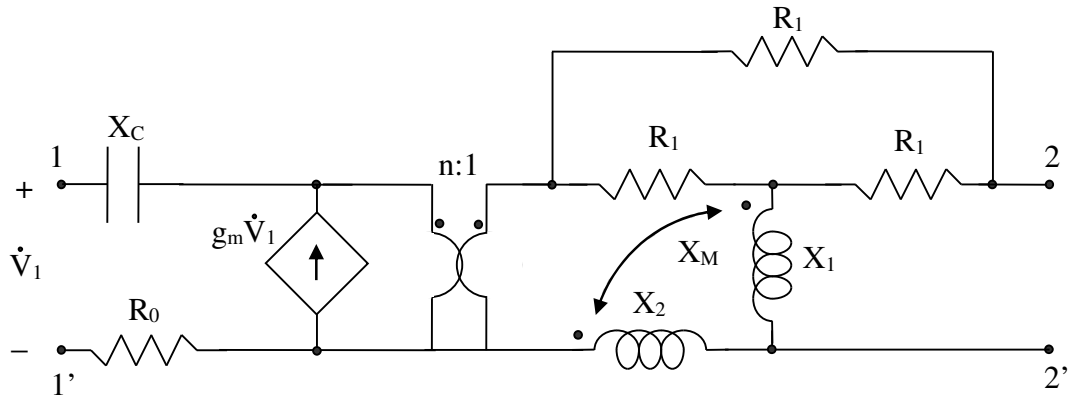

fig. 2