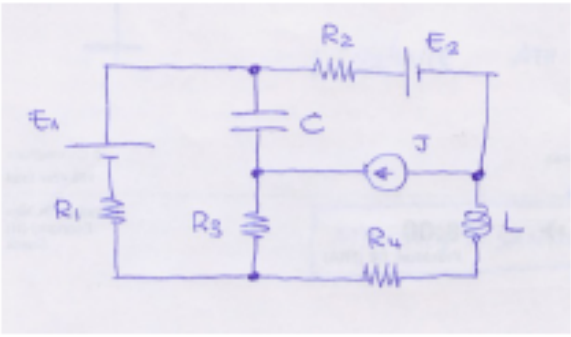
COMPITO DI ELETTROTECNICA 19/09/2018

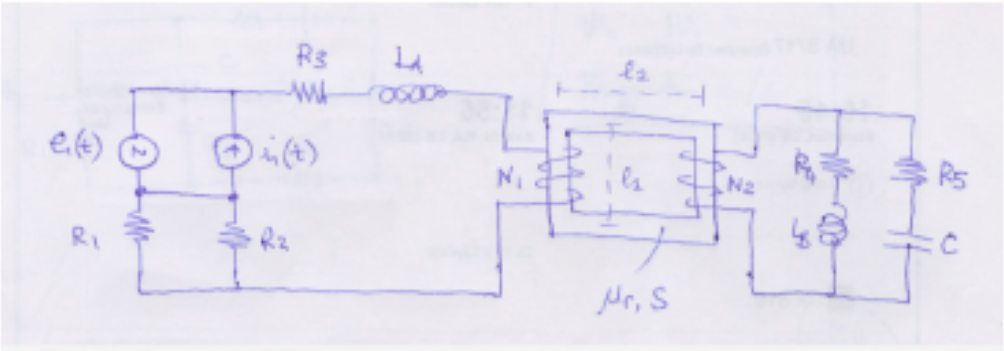
Studente _____ Matricola _____

Corso di Laurea _____

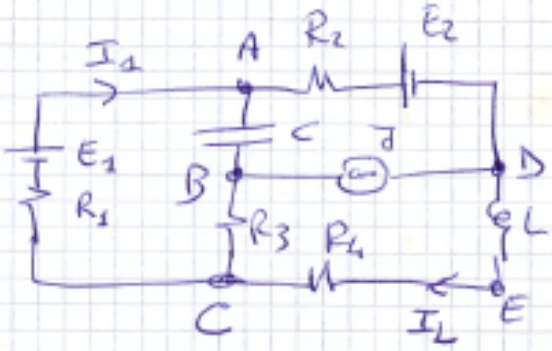
1. Il circuito in figura si trova in condizioni di regime. Determinare l'energia immagazzinata dal condensatore e dall'induttore. Determinare inoltre la potenza erogata dal generatore di tensione reale E_1-R_1.
   E_1=10 V, E_2=3 V, J=0.2 A, R_1=3 Ω, R_2=3 Ω, R_3=2 Ω, R_4=10 Ω, C=100 μF, L=0.1 mH.



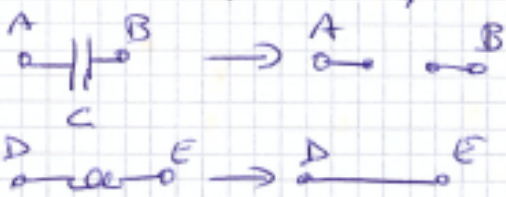
2. Il circuito in figura è alimentato da generatori AC a frequenza 50Hz. Determinare la potenza attiva e reattiva complessiva richiesta dai due carichi R_4-L_B e R_5-C.
   $e_1(t)$=10sin(ωt+π/4) V, $i_1(t)$=0.5sin(ωt) A, R_1=3 Ω, R_2=3 Ω, R_3=2 Ω, R_4=10 Ω, R_5=5 Ω, L_A=0.1 mH, L_B=3 mH, C=1 mF, N_1=100, N_2=200, l_1=2 cm, l_2=3 cm, S=0.1 cm², μ_r=1000.



ESERCIZIO 1



SISTEMA A REGIME

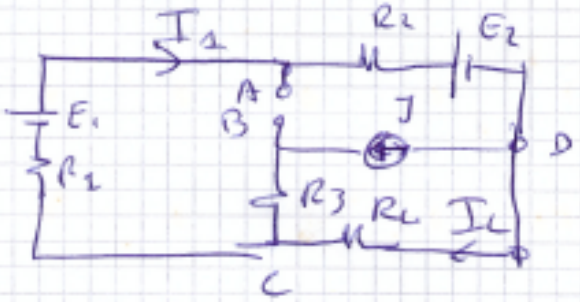


POTENZA EROGATA $E_1 R_1 \rightarrow (E_1 - R_1 I_1) I_1 = P_E$

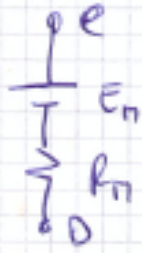
ENERGIA IMMAGAZZINATA L e C $\quad L \rightarrow \frac{1}{2} L I_L^2$

$\quad C \rightarrow \frac{1}{2} C V_{AB}^2$

RISOLVIAMO LA RETE



RAMO IN PARALLELO RISPETTO I PUNTI C-D

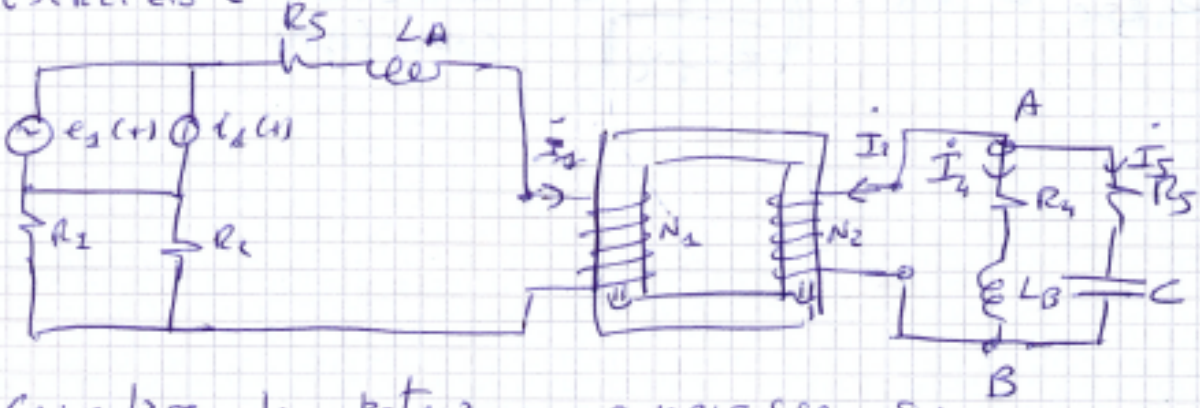


$$E_n = \frac{J + \frac{E_2 - E_1}{R_1 + R_2}}{\frac{1}{R_1 + R_2} + \frac{1}{R_4}}$$

$$\boxed{I_L = -\frac{V_{CD}}{R_4}} \qquad \boxed{I_1 = \frac{V_{CD} + E_1 - E_2}{R_1 + R_2}}$$

$$\boxed{V_{AB} = E_1 - R_1 I_1 - J R_3}$$

ESERCIZIO 2



Calcolare la potenza complessa su R_4-L_B e R_5-C. Dobbiamo calcolare $\dot{I}_4, \dot{I}_5$ e $\dot{V}_{AB}$

$\dot{E}_1 =$

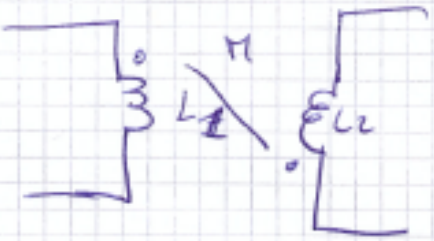
$i_0(t)$ prevalente in non influenza la potenza da calcolare

$R_{12} = \frac{R_1 R_2}{R_1 + R_2}$ Risolvo circuito magnetico

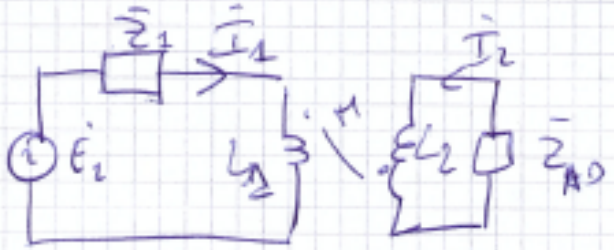
$M = \sqrt{L_1 L_2}$

$L_1 = \frac{N_1^2}{\mathcal{R}_{eq1}}$ $L_2 = \frac{N_2^2}{\mathcal{R}_{eq2}}$

$\mathcal{R}_{eq1} =$ $\mathcal{R}_{eq2} =$



$\bar{Z}_1 = R_{12} + R_5 + j\omega L_A$ $\bar{Z}_{AB} = \frac{(R_4 + j\omega L_B)(R_5 - \frac{1}{\omega C})}{R_4 + R_5 + j(\omega L_B - \frac{1}{\omega C})}$



$$\begin{cases} \dot{E}_1 = (\bar{Z}_1 + j\omega L_1)\dot{I}_1 - j\omega M \dot{I}_2 \\ 0 = (\bar{Z}_{AB} + j\omega L_2)\dot{I}_2 - j\omega M \dot{I}_1 \end{cases} \Rightarrow \text{Ricavo } \dot{I}_1 \text{ e } \dot{I}_2$$

$\dot{V}_{AB} = \bar{Z}_{AB} \cdot \dot{I}_2$ $\bar{S}_{e-R_4L_B} = \dot{V}_{AB} \cdot \left(\frac{\dot{V}_{AB}}{\bar{Z}_1 + j\omega L_B}\right)^*$ complesso coniugato

$$\bar{S}_{C,RS-C} = \dot{V}_{AB} \cdot \left(\frac{\dot{V}_{AB}}{R_S - \frac{1}{j\omega C}} \right)^{*}$$ ← COMPLESSO CONIUGATO