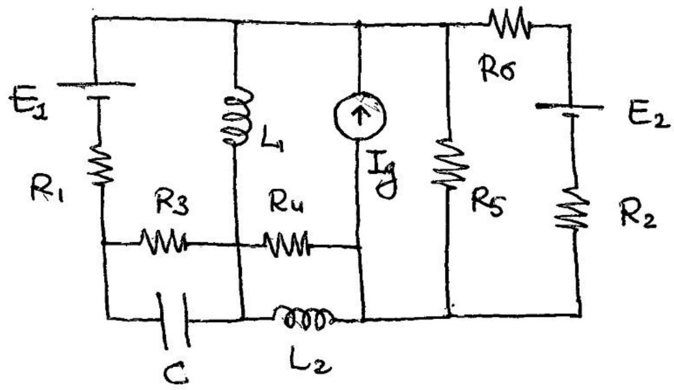
COMPITO ELETTROTECNICA 13-09-2019

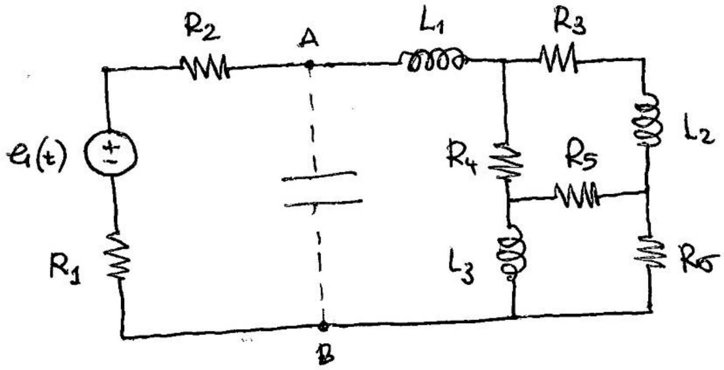
COGNOME	NOME	MATRICOLA	CORSO DI LAUREA
k_C = ______ (numero di lettere cognome)	k_N = ______ (numero di lettere nome)	k_M = ______ (matricola / 10000)	

1. Il sistema in figura si trova a regime. Determinare la potenza erogata e quella generata dal generatore E_1-R_1 e l'energia immagazzinata in L_1.
   $E_1=k_M$ V, $E_2=k_C$ V, I_g=1A, $R_1=k_N$ Ω, R_2=1Ω, R_3=3Ω, R_4=3Ω, R_5=6Ω, R_6=3Ω, C=20mF, $L_1=k_N$ mH, L_2=10mH.



RISULTATI
$P_{erog\text{-}E1R1}$ =
$P_{gen\text{-}E1R1}$ =
W_{L1} =

2. Dato il circuito in figura, determinare la potenza attiva sulla resistenza di linea R_2 prima e dopo il rifasamento del carico a valle della sezione A-B a $\cos\varphi_R$=0.98.
   $e_1(t) = k_M\sqrt{2}\sin(\omega t)$ V, R_1=3Ω, $R_2=k_N$ Ω, R_3=8Ω, R_4=2Ω, $R_5=k_N$ Ω, R_6=8Ω, L_1=500mH, $L_2=k_C$ mH, L_3=100mH, ω=100rad/s.



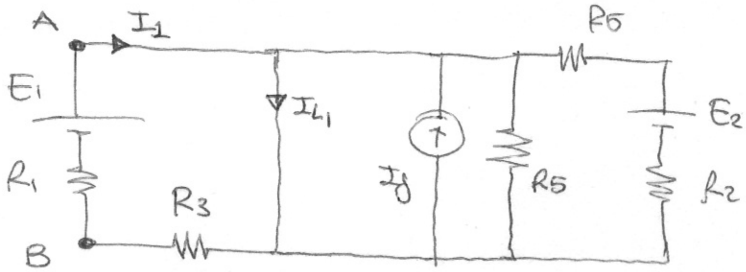
RISULTATI
$P_{R2(prima)}$ =
$P_{R2(dopo)}$ =

13.09.2019

$\boxed{\text{Es. 1}}$

CIRCUITO A REGIME: $C \to$ circuito aperto; $L \to$ cortocircuito

R_4 trascurabile in // a cortoc.

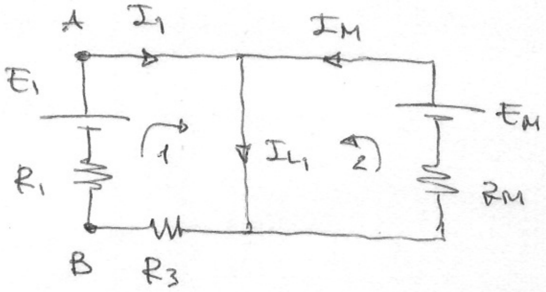


$P_{erog} = V_{AB} \cdot I_1$

$P_{gen} = E_1 \cdot I_1$

$W_{L_1} = \frac{1}{2} L_1 I_{L_1}^2$

$\Downarrow$



$$E_M = \frac{\frac{E_2}{R_2+R_6} + I_g}{\frac{1}{R_2+R_6} + \frac{1}{R_5}}$$

$$R_M = \frac{1}{\frac{1}{R_2+R_6} + \frac{1}{R_5}}$$

maglia 1: $I_1 = \frac{E_1}{R_1+R_3}$

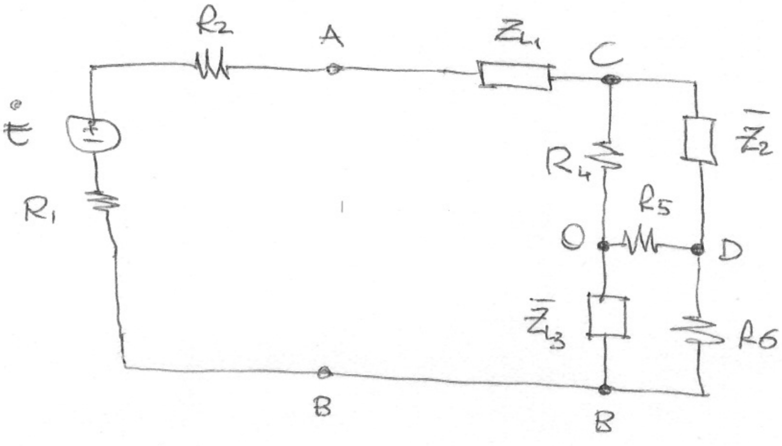
maglia 2: $I_M = \frac{E_M}{R_M}$

$I_{L_1} = I_1 + I_M \Rightarrow \underline{W_{L_1} = \frac{1}{2} L_1 I_{L_1}^2}$

$V_{AB} = E_1 - R_1 I_1 \Rightarrow \underline{P_{erog} = V_{AB} \cdot I_1}$

e $\underline{P_{gen} = E_1 \cdot I_1}$

Es. 2



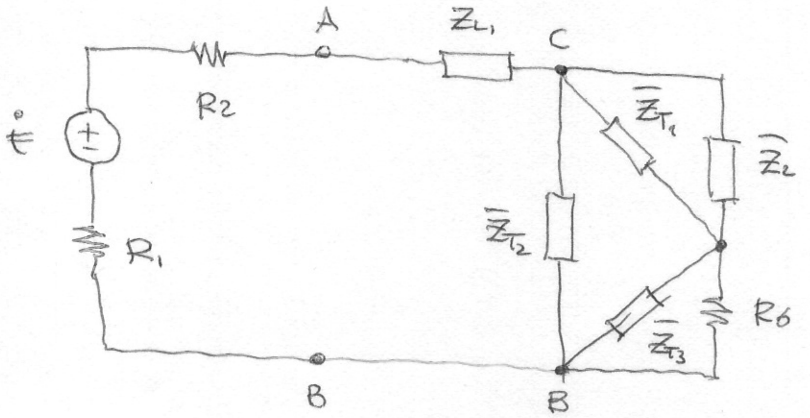
$\dot{E} = K_M$

$\bar{Z}_{L1} = j\omega L_1$

$\bar{Z}_2 = R_3 + j\omega L_2$

$\bar{Z}_{L3} = j\omega L_3$

Trasformo $R_4 - R_5 - \bar{Z}_{L3}$ da stella a triangolo

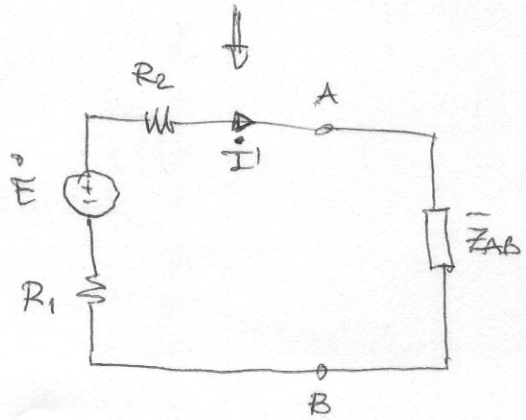


$$\bar{Z} = \frac{1}{\frac{1}{R_4} + \frac{1}{R_5} + \frac{1}{\bar{Z}_{L3}}}$$

$$\bar{Z}_{T1} = \frac{R_4 R_5}{\bar{Z}}$$

$$\bar{Z}_{T2} = \frac{R_4 \bar{Z}_{L3}}{\bar{Z}}$$

$$\bar{Z}_{T3} = \frac{R_5 \bar{Z}_{L3}}{\bar{Z}}$$

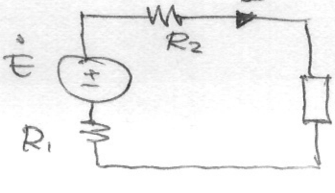


$$\bar{Z}_{AB} = \left\{ \left(R_6 // \bar{Z}_{T3} + \bar{Z}_{T1} // \bar{Z}_2 \right) // \bar{Z}_{T2} \right\} + \bar{Z}_{L1}$$

$$\dot{I}' = \frac{\dot{E}}{R_1 + R_2 + \bar{Z}_{AB}} \qquad \bar{S}_{AB} = \dot{V}_{AB}\check{I}' = \bar{Z}_{AB} \cdot I'^2 = $$
$$= P_{AB} + jQ_{AB}$$

Se $\operatorname{arctg} \frac{Q_{AB}}{P_{AB}} > \arccos 0.97$ si RIFASA e $C_R = \frac{Q_{AB} - P_{AB}\,\operatorname{tg}(\operatorname{acos} 0.97)}{\omega V_{AB}^2}$

Con il rifasamento:



$\bar{Z}_{TOT} = \bar{Z}_{CR} // \bar{Z}_{AB}$

$$\dot{I}'' = \frac{\dot{E}}{R_1 + R_2 + \bar{Z}_{TOT}}$$

$P_{R2}' = R_2 I'^2 ; \; P_{R2}'' = R_2 I''^2$

Deve essere $P_{R2}'' < P_{R2}'$