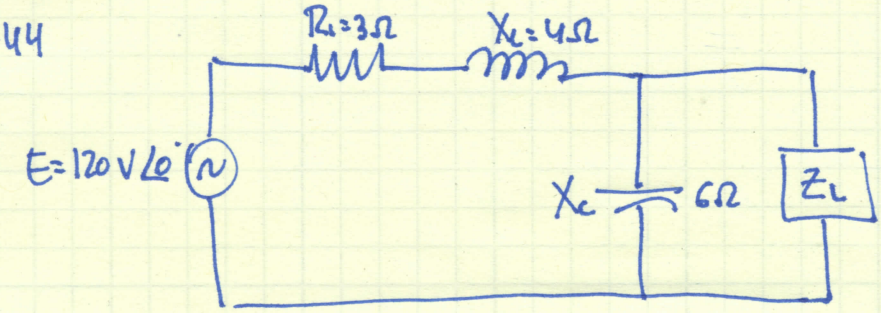
HW #24

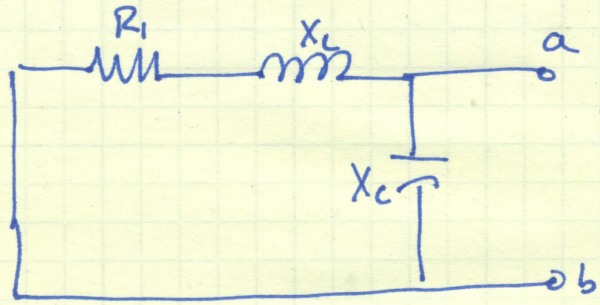
18-44



Max Power condition

$Z_L = Z_{TH}^*$

Z_{TH}

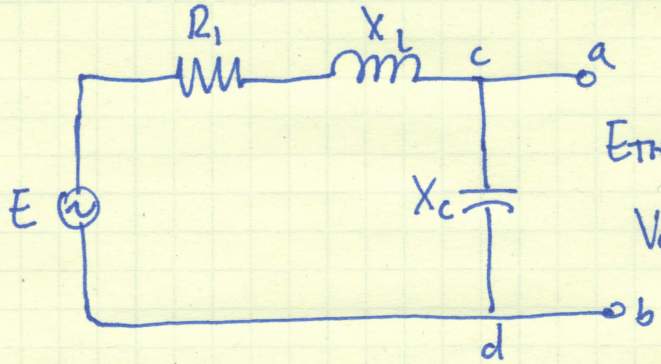


$Z_{TH} = Z_c \parallel (Z_{R_1} + Z_L) =$

$= -6j \parallel (3+4j) =$

$= 8{,}32 \angle -3{,}2° \ \Omega = Z_{TH}$

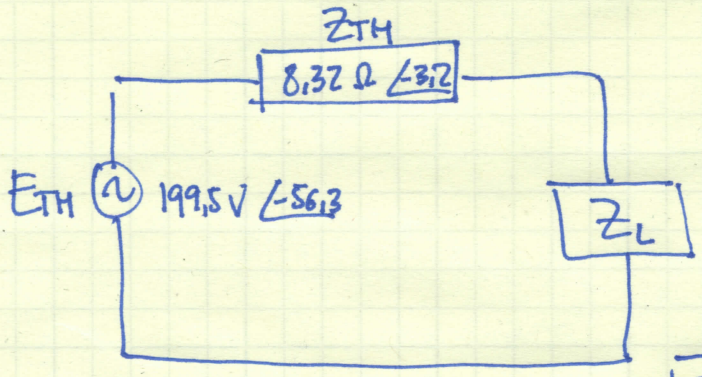
E_{TH}



$E_{TH} = V_{ab} = V_{cd}$

$V_{cd} = E \cdot \dfrac{Z_c}{Z_{R_1} + Z_L + Z_c} = 120\angle 0 \cdot \dfrac{6\angle -90}{3-2j}$

$V_{cd} = 199.5 \angle -56{,}3° = E_{TH}$

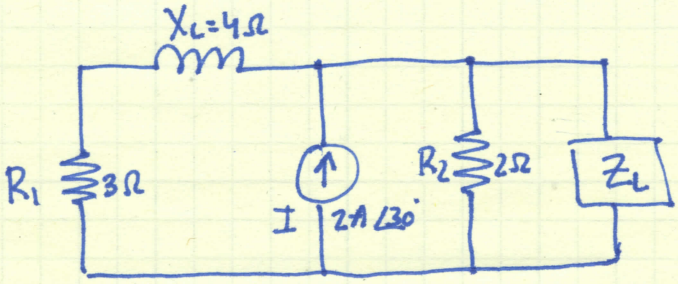


$Z_L = Z_{TH}^* = \boxed{8{,}32 \angle 3{,}2 \ \Omega}$

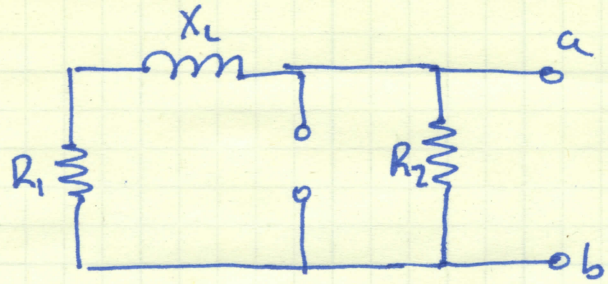
$P_{max} = \dfrac{E_{TH}^2}{4R_{TH}} = \dfrac{(199{,}5)^2}{4 \cdot 8{,}32}$

$\boxed{P_{max} = 1198{,}2 \ W}$

18-45



Z_{TH}

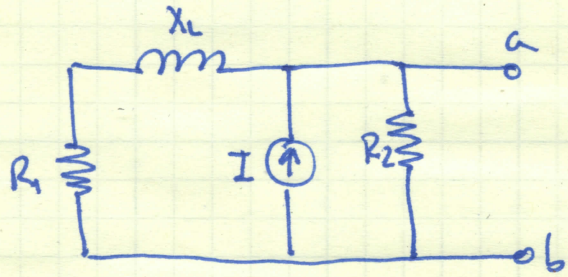


$Z_{TH} = Z_{R2} \parallel (Z_{R1} + Z_{XL}) =$

$= 2\Omega \parallel (3+4j)$

$Z_{TH} = 1{,}56 \angle 14{,}47$

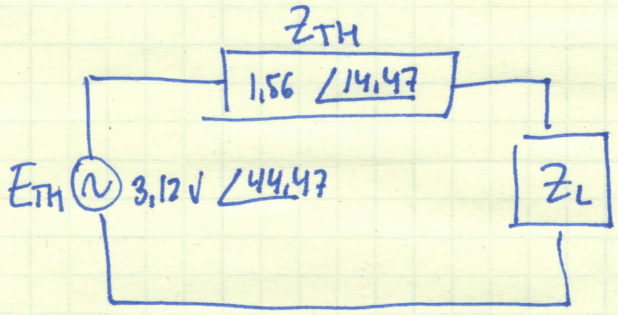
E_{TH}



$E_{TH} = I \cdot Z_{eq} = I \cdot ((Z_{R1} + Z_L) \parallel Z_{R2})$

$E_{TH} = I \cdot Z_{TH} = 2A\angle 30 \cdot 1{,}56 \angle 14{,}47$

$E_{TH} = 3{,}12 \angle 44{,}47$



Max Power Transfer

$$\boxed{Z_L = Z_{TH}^* = 1{,}56 \angle -14{,}47}$$

$$P_{max} = \frac{E_{TH}^2}{4 R_{TH}} = \frac{(3{,}12)^2}{4 \cdot 1{,}51} = 1{,}61 \text{ W}$$

$Z_{TH} = 1{,}56 \angle 14{,}47 = 1{,}51 + 0{,}39j$

$$\boxed{P_{max} = 1{,}61 \text{ W}}$$