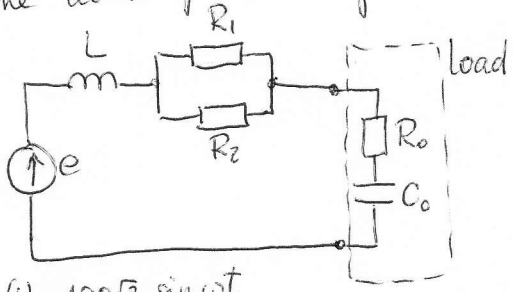
Tutorials No 4 — Circuits and Systems

1. Determine the resistance and reactance of the load to provide power matching of the load to the real generator for the circuits. What is the active power dissipated in the load

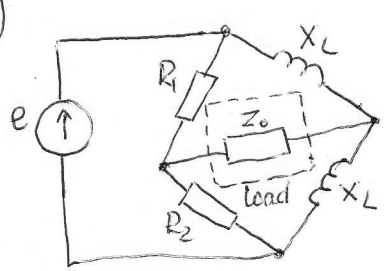
a)



$e(t) = 100\sqrt{2}\sin\omega t$

$X_L = \omega L = 5\Omega$, $R_1 = 10\Omega$, $R_2 = 50\Omega$

b)

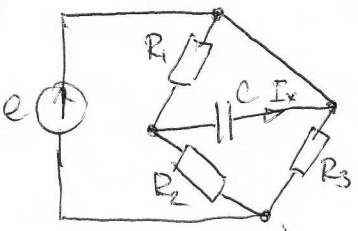


$e(t) = 50\sqrt{2}\sin\omega t$

$R_1 = 50\Omega$, $R_2 = 150\Omega$, $X_L = 30\Omega$

2. Calculate the current I_x using Thevenin method

a)

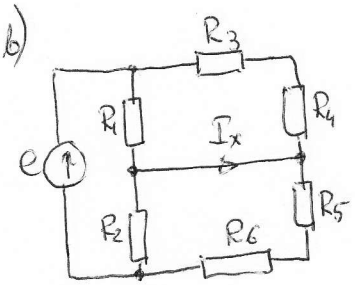


$e(t) = 20\sqrt{2}\sin(\omega t - 90^\circ)$

$R_1 = 10\Omega$, $R_2 = 20\Omega$, $R_3 = 30\Omega$

$X_C = \frac{1}{\omega C} = 5\Omega$

b)

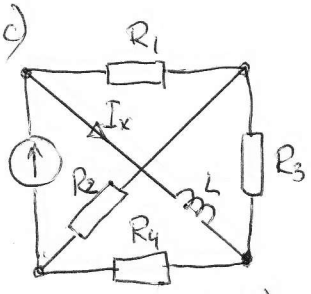


$e(t) = 50\sqrt{2}\sin\omega t$

$R_1 = 10\Omega$, $R_2 = 10\Omega$, $R_3 = 15\Omega$

$R_4 = 5\Omega$, $R_5 = 10\Omega$, $R_6 = 10\Omega$

c)



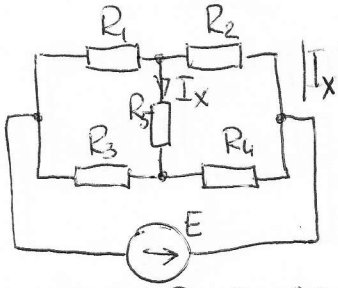
$e(t) = 20\sin(\omega t + 45^\circ)$

$R_1 = 10\Omega$, $R_2 = 10\Omega$

$R_3 = R_4 = 5\Omega$, $\omega L = 10\Omega$

3) Adjust E or I to provide $|I_x|$ determined for each circuit

a)

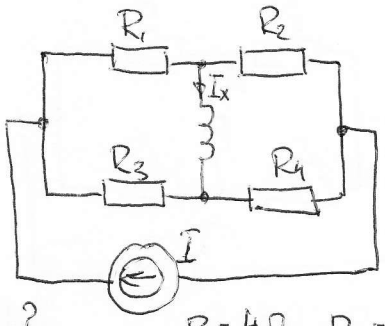


$|I_x| = 10A$

$R_1 = 12\Omega$, $R_2 = 3\Omega$, $R_3 = 6\Omega$

$R_4 = 9\Omega$, $R_5 = 1\Omega$

b)



$|I_x| = 2A$

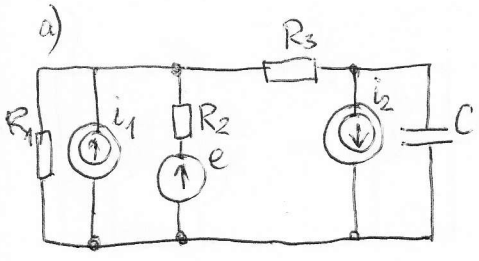
$i(t) = ?$

$R_1 = 4\Omega$, $R_2 = 6\Omega$

$R_3 = 6\Omega$, $R_4 = 4\Omega$, $\omega L = 5\Omega$

4) Transform the circuits to the form of the same type of sources

a)



b)