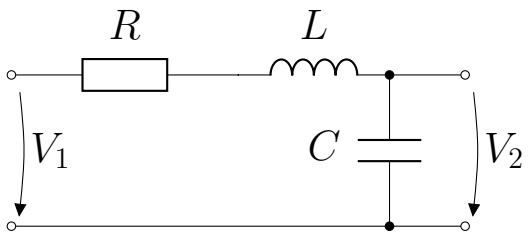
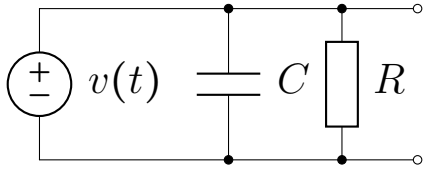
Seminar - 10th week

1. In the circuit below calculate active, reactive and apparent power, if $R = 10\,\Omega$, $L = 1\,\text{H}$, $C = 1\,\mu\text{F}$, $V_1 = 10\,\text{V}$, at frequency:
   a) $f = 1591.55\,\text{Hz}$
   b) $f = 159.155\,\text{Hz}$

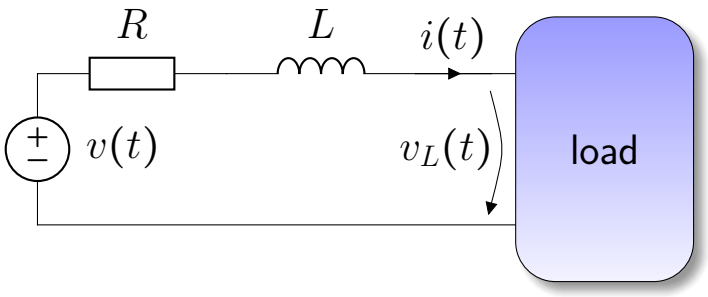


2. In the circuit below calculate active, reactive and apparent power, if $R = 2\,\text{k}\Omega$, $C = 5\,\mu\text{F}$, $V_m = 100\,\text{V}$, $\varphi = \frac{\pi}{4}$, $f = 159.155\,\text{Hz}$



3. An industrial load consumes 10 kW of power (active power) from a 230 V line. The voltage leads the load current. Is the load the capacitive, or an inductive? What is the angle, by which the load voltage leads the load current, if the power factor is 0.7?
4. The industrial load consumes 50 kW at load voltage 400 V rms. The power factor is 0.6. What is the power loss in the transmission line with resistance $0.1\,\Omega$? Calculate the power savings, if the power factor would be compensated to 0.95.
5. Circuit in the figure is supplied from the sinusoidal voltage source. The circuit is in the steady state. The load voltage was measured as $v_L(t) = 325.36\,\sin\left(\omega t + \frac{\pi}{2}\right)\,\text{V}$ and load current $i(t) = 0.46\,\sin(\omega t + \frac{\pi}{4})\text{A}$.
   a) Determine active and reactive power absorbed by the load.
   b) Determine, which circuit elements the load can include.
   c) Determine active and reactive power absorbed by R and L.

d) Determine apparent power, delivered to the circuit by the voltage source.



6. In the circuit below determine the source voltage, if $\mathbf{V}_2$ = 230 V rms, R = 0.1 Ω, L = 0.1 H.