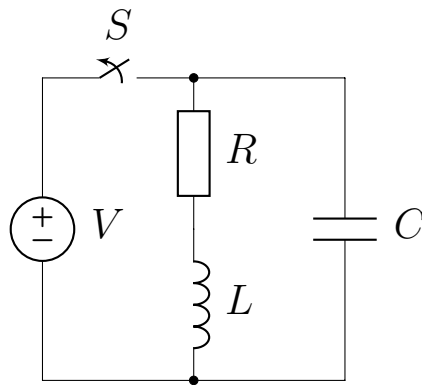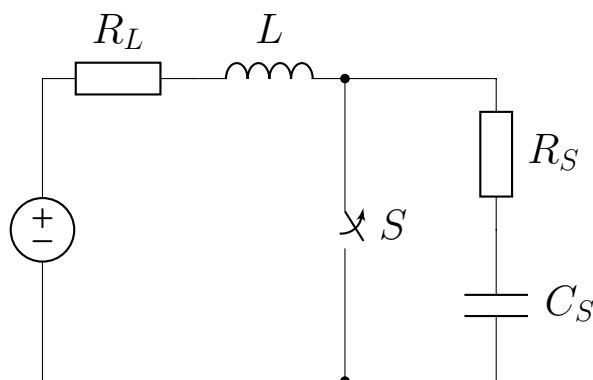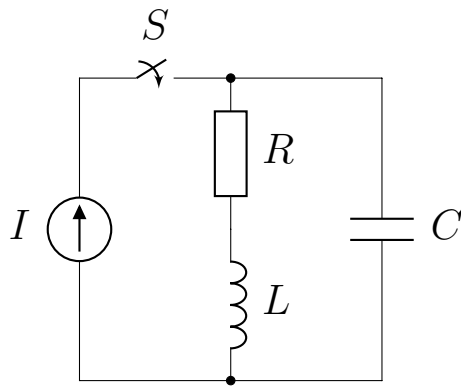# Seminar - 11th week

1. The switch in the circuit has been closed for a long time, and it is opened at $t = 0$. Calculate $i_R(t)$ for $t \geq 0$. Draw its waveform both at $t < 0$ and $t \geq 0$. $V = 20\,\text{V}$, $L = 1\,\text{H}$, $C = 1\,\mu\text{F}$. Solve it for three different resistor values:

   a) $R = 10\,\text{k}\Omega$
   b) $R = 2\,\text{k}\Omega$
   c) $R = 10\,\Omega$

2. A semiconductor switch switches DC power supply, represented by voltage source $V = 12\,\text{V}$ to the resistive circuit $R_L = 2\,\Omega$. The wiring has inductance $L = 1\,\text{mH}$. To limit the voltage the RC snubber circuit is connected in parallel to the switch. $C_S = 5\,\text{nF}$. Calculate snubber resistor resistance R_S to minimize transient time.

3. The switch in the circuit has been opened for a long time, and it is closed at $t = 0$. Calculate $i_C(t)$ for $t \geq 0$. Draw its waveform both at $t < 0$ and $t \geq 0$. $I = 10\,\text{mA}$, $L = 1\,\text{H}$, $C = 1\,\mu\text{F}$. $R = 5\,\text{k}\Omega$.

4. The switch in the circuit has been opened for a long time, and it is closed at $t = 0$. Calculate $v_C(t)$ for $t \geq 0$. Draw its waveform both at $t < 0$ and $t \geq 0$. Draw frequency response (Bode plot) as well. $V = 30\,\text{V}$, $L = 100\,\text{mH}$, $C = 10\,\text{μF}$.

   a) $R = 20\,\text{k}\Omega$
   b) $R = 200\,\Omega$
   c) $R = 1\,\Omega$