

1. Exercise:

A coil with self inductance $\mathcal{L} = 5.0 \text{ H}$ is placed across the terminals of a battery labeled $U = 12 \text{ V}$ with inner resistance $R = 15 \Omega$.

- What is the final current I_f ?
- State the time constant τ .
- When has the current reached 75% of its maximum value?
- How large would be the maximum current \hat{I} if the battery was replaced by an AC-source with frequency $\omega = 50 \text{ s}^{-1}$ and maximum strength $\hat{U} = U$?

2. Exercise:

A capacitor with $C = 4.0 \mu\text{F}$ is charged to $U = 24 \text{ V}$ and then connected across two serially connected resistors with $R = 100 \Omega$.

- Find the initial charge Q_0 on the capacitor.
- Determine the initial current I_0 through the resistor.
- What is the time constant τ ?
- How much charge Q is on the capacitor after $t = 4 \mu\text{s}$?
- Sketch the time dependence of the current $I_1(t)$ through one of the resistors and mark where I_0 and τ can be found in the diagram.

3. Exercise:

A capacitor with $C = 2.0 \mu\text{F}$ is charged to $U = 20 \text{ V}$ and is then connected across an inductor with $\mathcal{L} = 6.0 \mu\text{H}$.

- What is the frequency f of the oscillation?
- Find the maximum value of the charge on the capacitor Q_0 .
- Determine the maximum value of the current I_0 .