

# task\_kricv9fh7haauo6q\_with\_calculation

## Student Group

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complex impedance, exam ee1 WS2022

### Exercise E1.1 Complex Impedance Circuit

**(written test, approx. 15 % of a 60-minute written test, WS2022)**

[illegible]

**Solution** A linear source is connected with an inductor of  $330 \sim \{\rm \mu H\}$  and a capacitor of  $0.22 \sim \{\rm \mu F\}$ , all in series.

Result

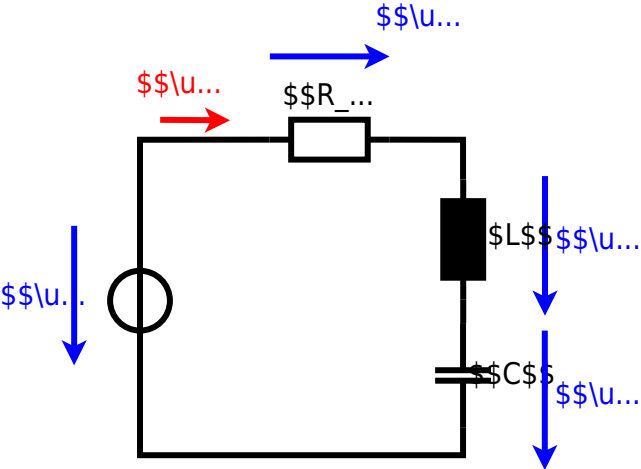
$$\begin{aligned} Z &= 107.31 \angle 11.1^\circ \text{ m}\Omega \text{ and } Z_{\text{load}} = 48.2 \sim \Omega \\ Z &= 19.8 \sim \Omega \end{aligned}$$

Draw the circuit diagram of the given circuit.

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label all components, voltages, and currents.
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$$\begin{aligned} Z &= \frac{\hat{U}}{\hat{I}} \quad \text{and} \quad Z_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \cdot 0.22 \cdot 10^{-6}} \end{aligned}$$
$$\begin{aligned} \omega_{\text{eff}} &= \sqrt{\omega_p^2 - \omega_c^2} \\ \omega_p &= \sqrt{\frac{4\pi n e^2}{m}} \\ \omega_c &= \frac{e B}{m c} \\ Z &= \frac{1}{\omega} \sqrt{\frac{m}{\mu_0}} \sqrt{\frac{4\pi n e^2}{m}} \\ Z_L &= \frac{1}{\omega} \sqrt{\frac{m}{\mu_0}} \sqrt{\frac{4\pi n_L e^2}{m}} \\ Z_C &= \frac{1}{\omega} \sqrt{\frac{m}{\mu_0}} \sqrt{\frac{4\pi n_C e^2}{m}} \\ \underline{Z} &= R + j \underline{Z}_L - j \underline{Z}_C \\ |\underline{Z}| &= \sqrt{R^2 + (\underline{Z}_L - \underline{Z}_C)^2} \end{aligned}$$





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