

task_kricv9fh7haauo6q_with_calculation

Student Group

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complex impedance, exam ee1 WS2022

Exercise E1 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

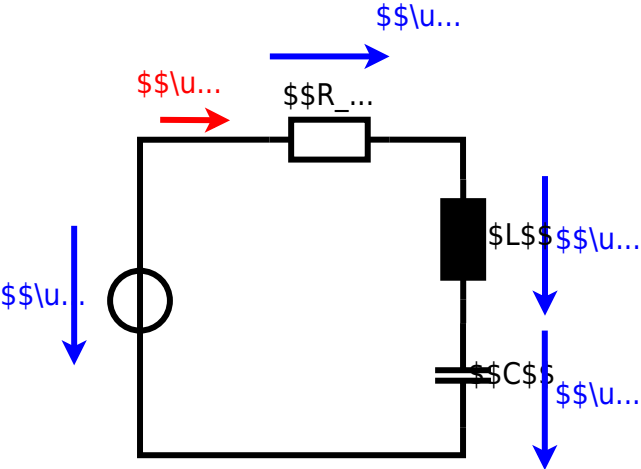
$$\begin{aligned} Z &= 107.31 \angle 11.1^\circ \text{ m}\Omega \text{ and } Z_{\text{load}} = 48.2 \sim \Omega \\ Z &= 19.8 \sim \Omega \end{aligned}$$

Draw the circuit diagram of the given circuit.

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label all components, voltages, and currents.
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$$\begin{aligned} Z &= \frac{\hat{U}}{\hat{I}} \quad \text{and} \quad Z_C = \frac{1}{2\pi f C} = \frac{1}{2\pi \cdot 0.22 \cdot 10^{-6}} \end{aligned}$$

$$\begin{aligned} \omega_{\text{eff}} &= \sqrt{\omega_p^2 - \omega_c^2} \\ \omega_p &= \sqrt{\frac{4\pi n e^2}{m}} \\ \omega_c &= \frac{e B}{m c} \\ \omega_{\text{eff}} &= \sqrt{\omega_p^2 - \omega_c^2} \\ \omega_{\text{eff}} &= \sqrt{\frac{4\pi n e^2}{m} - \left(\frac{e B}{m c}\right)^2} \\ \omega_{\text{eff}} &= \sqrt{\frac{4\pi n e^2}{m} - \frac{e^2 B^2}{m^2 c^2}} \\ \omega_{\text{eff}} &= \sqrt{\frac{4\pi n e^2}{m} - \frac{e^2 B^2}{m^2 c^2}} \end{aligned}$$



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