

task_kricv9fh7haauo6q_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

Exercise E1 Complex Impedance Circuit (written test, approx. 15 % of a 60-minute written test, WS2022) 2

complex impedance, exam ee1 WS2022

Exercise E1 Complex Impedance Circuit (written test, approx. 15 % of a 60-minute written test, WS2022)

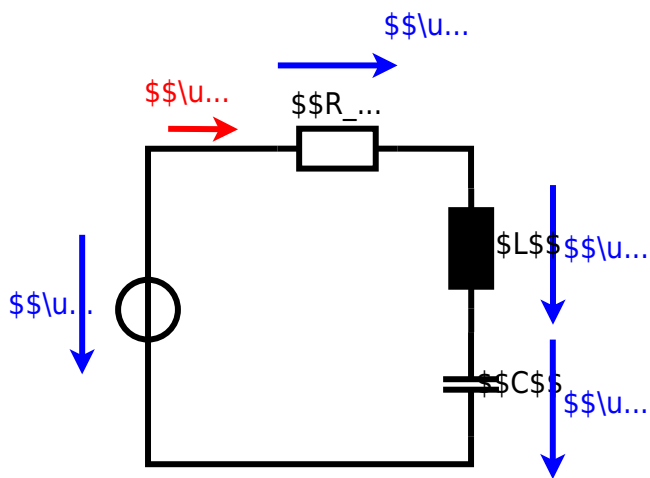
1. Calculate the circuit impedance Z for the series circuit shown in the figure. The voltage source $u(t) = 3.0 \sin(2\pi \cdot 15 \cdot 10^3 t) \text{ V}$ is connected with an inductor of $330 \mu\text{H}$ and a capacitor of $0.22 \mu\text{F}$, all in series.

Solution
Result

```

.. \begin{align*} Z &= 19.8 - j31.4 \text{ } \Omega \end{align*} \\
\end{align*} \\
\begin{align*} Z &= \frac{\hat{U}}{\hat{I}} \parallel \hat{I} \hat{=} \frac{\hat{U}}{Z} \parallel \\
\begin{align*} Z_C &= \frac{1}{2\pi \cdot f \cdot C} \parallel \hat{=} \frac{1}{2\pi \cdot 15 \\
\text{Result} \\
\begin{align*} Z &= \sqrt{2} \cdot \frac{\hat{U}}{\hat{I}} \parallel \hat{=} \sqrt{2} \cdot \frac{3.0 \text{ V}}{0.15 \text{ A}} \parallel \\
\begin{align*} Z_C &= \frac{1}{2\pi \cdot 15 \text{ kHz} \cdot 0.22 \mu\text{F}} \parallel \\
\begin{align*} Z_L &= \frac{1}{2\pi \cdot 15 \text{ kHz} \cdot 330 \mu\text{H}} \parallel \\
\begin{align*} \underline{Z} &= R + \underline{Z}_L + \underline{Z}_C \parallel \hat{=} R + j \\
&\cdot \underline{Z}_L - j \cdot \underline{Z}_C \parallel \hat{=} R + j \cdot (\underline{Z}_L - \underline{Z}_C) \parallel |\underline{Z}| \hat{=} \\
&\sqrt{R^2 + (\underline{Z}_L - \underline{Z}_C)^2} \parallel \end{align*}

```

From:

<https://mexle.te.hs-heilbronn.de/> - **MEXLE Wiki**

Permanent link:

https://mexle.te.hs-heilbronn.de/electrical_engineering_1/task_kricv9fh7haauo6q_with_calculation?rev=1680242550

Last update: **2023/03/31 08:02**

