

task_jti0uzudcmg4u22t_with_calculation

Student Group

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Table of Contents

Exercise E1.1 Analyzing complex Impedances (written test, approx. 14 % of a 60-minute written test, WS2022)	2
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complex impedance, exam ee1 WS2022

Exercise E1.1 Analyzing complex Impedances (written test, approx. 14 % of a 60-minute written test, WS2022)

2. Calculate the complex impedance Z of the circuit shown in Figure 1. The voltage U and the current I shall be given.

After analysis, the full width dimensioned complex impedance Z shall be extracted and given in phase notation $Z = |Z| \cdot e^{j\varphi}$ with φ in degrees.

Solution: $Z = \frac{U}{I} = \frac{10 \text{ V}}{1 \text{ A}} = 10 \text{ } \Omega$

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The current I and voltage U are phase aligned, therefore Z is real.

resulting $Z = \frac{U}{I} = \frac{10 \text{ V}}{1 \text{ A}} = 10 \text{ } \Omega$

The Z is the component Z of the Z and Z is $Z = \frac{U}{I} = \frac{10 \text{ V}}{1 \text{ A}} = 10 \text{ } \Omega$

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With the complex part $Z = \frac{U}{I} = \frac{10 \text{ V}}{1 \text{ A}} = 10 \text{ } \Omega$

The phase φ shall be calculated as $\varphi = \arctan\left(\frac{\text{Im}(Z)}{\text{Re}(Z)}\right) = \arctan\left(\frac{-4.68}{0.24}\right)$

$\varphi = \arctan\left(\frac{-4.68}{0.24}\right) = -10.8^\circ$

$Z = 10 \text{ } \Omega \cdot e^{-j10.8^\circ}$

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Last update: 2023/03/29 18:01

