

task_c9fj1si7l797equs_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

Exercise E1 Complex voltage dividers (written test, approx. 16 % of a 60-minute written test, SS2023)	2
---	---

impedance, phasor, cutoff, exam ee1 SS2023

Exercise E1 Complex voltage dividers
(written test, approx. 16 % of a 60-minute written test, SS2023)

Task: Calculate the voltage divider for the circuit below. The resulting phasor for the output impedance \underline{Z}_L is given by $\underline{U}_O = 0.5 \text{ V} - j \cdot 1.5 \text{ V}$. Choose an appropriate scaling factor and write it down.

- $R = 1.1 \text{ k}\Omega$

Solution: $L = 3.5 \text{ mH}$

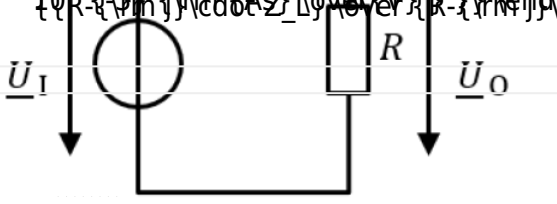
Solution:

$$\underline{U}_I = 5 \text{ V}$$

$$\underline{Z}_L = 50 \text{ m}\Omega$$

$$\underline{U}_O = 0.5 \text{ V} - j \cdot 1.5 \text{ V}$$

The cutoff frequency is the absolute value of the impedance \underline{Z}_L is equal to $\sqrt{R^2 + (\omega L)^2}$. This leads to $\sqrt{1.1^2 + (\omega L)^2} = 10 \text{ m}\Omega$. However, $R = 1.1 \text{ k}\Omega$ is much larger than ωL . Therefore, we can approximate $\omega L \approx \sqrt{10^2 - 1.1^2} \text{ m}\Omega \approx 9.9 \text{ m}\Omega$.



.. Calculate the impedance \underline{Z}_L .

Solution

$$\underline{Z}_L = j \cdot \omega \cdot L = j \cdot 2\pi \cdot 3.5 \text{ mH}$$

From: <https://wiki.mexle.org/> - **MEXLE Wiki**

Permanent link: https://wiki.mexle.org/ee1/task_c9fj1si7l797equis_with_calculation?rev=1692247422

Last update: **2023/08/17 06:43**

