

task_c9fj1si7l797equs_with_calculation

Student Group

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Exercise E4 Complex voltage dividers

(written test, approx. 16 % of a 60-minute written test, SS2023)

7. Derive the two impedances $\underline{Z}_L$ and $\underline{Z}_O$ resulting from the circuit below. Choose an appropriate scaling factor and write it down.

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

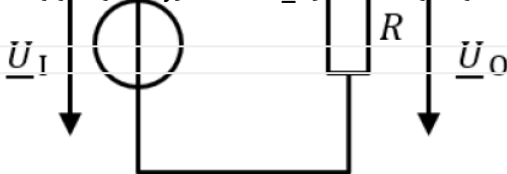
Solution $L = 3.5 \text{ mH}$

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

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

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

At the cutoff frequency the absolute values of impedances $|\underline{Z}_L|$ is equal to $|\underline{Z}_O|$. This leads to $\sqrt{R^2 + (\omega L)^2} = \sqrt{R^2 + \frac{1}{(\omega C)^2}}$



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

Solution

$$\underline{Z}_L = j \cdot \omega L = j \cdot 2\pi \cdot 150 \text{ kHz} \cdot 3.5 \text{ mH}$$

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