

task_ezrkjzifcegttcpc_with_calculation

Student Group

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Table of Contents

Exercise E1 Resonant Circuit (written test, approx. 4 % of a 120-minute written test, SS2021)
..... 2

resonance, resonant circuit, RMS, power, exam ee2 SS2021

Exercise E1 Resonant Circuit (written test, approx. 4 % of a 120-minute written test, SS2021)

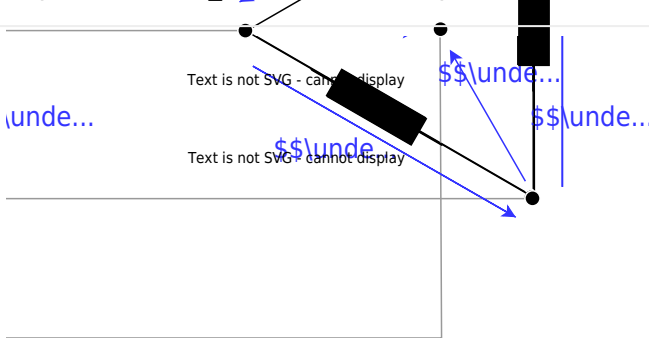
Specify the RMS value of the phase voltage U_{ph} and the resulting voltage U_{rms} .
Results be considered in the following.

A voltage with the RMS value $U_{\text{RMS}} = 110 \text{ V}$ is applied between the terminals
Path

Through each of the windings, there is a current with an RMS value $I_{\text{RMS}} = 5 \text{ A}$
and a phase $\varphi = \pm 25^\circ$ compared to the voltage.

- $U_{\text{RMS}} = 110 \text{ V}$
 - $I_{\text{RMS}} = 5 \text{ A}$
- a) Draw the circuit diagram.
This analysis power P is given by $P = U_{\text{RMS}} \cdot I_{\text{RMS}} \cdot \cos(\varphi)$
For initial case $\varphi = 0$ and $\cos(0) = 1$ $P = 110 \text{ V} \cdot 5 \text{ A} \cdot 1 = 550 \text{ W}$
Result must be zero: $\sum P_i = 0$.

By this (and showing in the example in the image below), One can see, that $I_{\text{L}} = \sqrt{3} \cdot I_{\text{RMS}} = \sqrt{3} \cdot 5 \text{ A}$



one single phase as an example



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