KIT - International Department GmbH

Pre-Semester Physics - Exercises **Summer 2010**

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Extra Sheet VI
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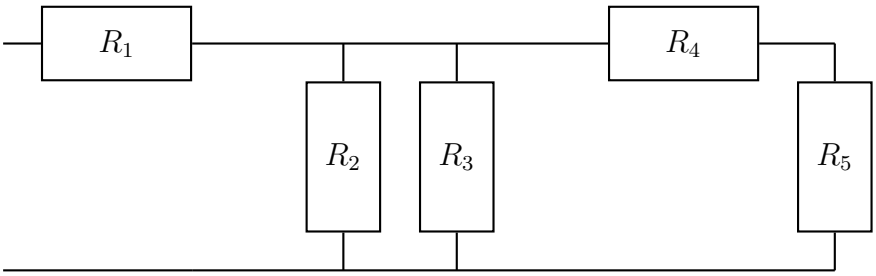
1. Exercise:



Consider the above resistor network with resistances of $R_1 = 2.5\,\Omega$, $R_2 = 2\,\Omega$, $R_3 = 4\,\Omega$, $R_4 = 0.2\,\Omega$ and $R_5 = 0.6\,\Omega$. On it a voltage of $U_0 = 3.0\,\mathrm{V}$ is applied. The goal is to calculate the power dissipated in the resistor R_5.

(a) Redraw the circuit so that parallel and series connections are more apparent (e.g. when all resistors are positioned horizontally).

(b) Specify therein the substitution resistances R_a (containing (not only) the resistor R_4), R_b (containing (not only) the resistor R_3), R_c (which do not contain the resistor R_1) and R_d (containing (not only) the resistor R_1) which are given either by pure series or parallel connection.

(c) How are the substitution resistances connected to the ones given?

$R_a =$

$R_b =$

$R_c =$

$R_d =$

(d) Use Ohm's law to calculate the current I_0 provided by the voltage source.

$I_0 =$

(e) Now consider the components of R_d. What current flows through each of them?

$I_1 =$

$I \quad =$

(f) Use again Ohm's law to determine the voltage drop on its components.

$U_1 =$

$U \quad =$

(g) Next focus on the components of R_c. What voltage drop on each of its components?

$U \quad =$

$U \quad =$

(h) Find the current through each of its components.

$I \quad =$

$I \quad =$

(i) Finally consider the components of R_a and state the current which flows through them.

$I_4 =$

$I \quad =$

(j) Calculate the voltage drop along its components.

$U_4 =$

$U \quad =$

(k) Use your results to give the power dissipated in the resistor R_5.

$\underline{\underline{P_5}} =$