

task_cgeyprm6oboukcci_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

Exercise E12 Pure Resistor Network Simplification (written test, approx. 12 % of a 60-minute written test, SS2023)	2
--	---

network simplification, exam ee1 SS2023

Exercise E12 Pure Resistor Network Simplification (written test, approx. 12 % of a 60-minute written test, SS2023)

The circuit below has a voltage source U and a resistor R_1 . Calculate the voltage at node K , when switch S is closed.

Result

The values in the circuit are

Solution

- $R_1 = 60 \text{ } \Omega$

The circuit is a simple resistor network. The voltage source U is connected to the circuit through a resistor R_1 . The circuit is shown below.

$$R_2 = 40 \text{ } \Omega \quad R_3 = 150 \text{ } \Omega$$

$$R_4 = 10 \text{ } \Omega \quad R_5 = 50 \text{ } \Omega$$

The voltage divider formed by R_1 and R_2 has the same proportionality as the voltage divider formed by R_3 and R_4 . Therefore, the potential of K is the same as for K' . There will be no current flow through R_5 . The resistance does not create a voltage drop and therefore does not interfere with the circuit.

1. Calculate the voltage at node K , when switch S is open.
It might be beneficial to redraw the circuit first.

Solution

Rearranging the circuit one can get:

Once the switch S is opened, the upper part is a parallel circuit. Therefore, R_{eq} is given as:
$$R_{\text{eq}} = (R_1 + R_2) \parallel (R_1 + R_2) + R_4 = \frac{1}{2} \cdot (R_1 + R_2) + R_4 = \frac{1}{2} \cdot (60 \Omega + 40 \Omega) + 100 \Omega$$

From:

<https://first.mexle.te.hs-heilbronn.de/> - MEXLE Wiki

Permanent link:

https://first.mexle.te.hs-heilbronn.de/electrical_engineering_and_electronics/task_cgeyprm6oboukcci_with_calculation

Last update: **2023/07/24 20:24**

