

task_x357drkaqv84jnsc_with_calculation

Student Group

First Name	Surname	Matrikel Nr.

Table of Contents

Exercise E1 Pure Resistor Network Simplification (written test, approx. 13 % of a 60-minute written test, WS2022) 2

exam ee1 WS2022

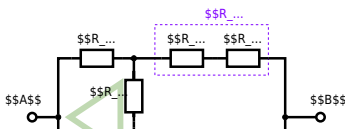
Exercise E1 Pure Resistor Network Simplification
(written test, approx. 13 % of a 60-minute written test, WS2022)

The following shall be calculated: R_{AB} at $\omega = 100 \text{ rad/s}$ and the voltage U_{AB} at $\omega = 100 \text{ rad/s}$.
 The switch shall now be open. Calculate the equivalent resistance R_{AB} between A and B .

Solution

$$R_{eq} = 133.8 \text{ } \Omega$$

Now a wye-delta transformation is necessary.



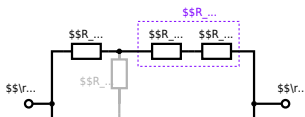
Since $R_2 = R_3$ and based on the equations for the transformation, the transformed R_Y is given as:
$$R_Y = \frac{R_2 \cdot R_2}{R_2 + R_2 + R_2} = \frac{(100 \text{ } \Omega)^2}{3 \cdot 100 \text{ } \Omega} = \frac{1}{3} \cdot 100 \text{ } \Omega = 33.33 \text{ } \Omega$$

The equivalent resistor is given by a parallel configuration of resistors in series:
$$R_{eq} = R_Y + (R_Y + R_1) \parallel (R_Y + R_2) \parallel R_{switch}$$

$$= 33.33 \text{ } \Omega + (33.33 \text{ } \Omega + 400 \text{ } \Omega) \parallel (33.33 \text{ } \Omega + 100 \text{ } \Omega) \parallel 100 \text{ } \Omega$$

 .. The switch shall now be open. Calculate the equivalent resistance R_{AB} between A and B .

Solution



The equivalent resistor is given by a parallel configuration of resistors in series:

$$R_{\text{eq}} = (R_2 + R_1 + R_1) \parallel (R_2 + R_2) \parallel R_{\text{eq}} = (100 \sim \Omega + 200 \sim \Omega + 200 \sim \Omega) \parallel (100 \sim \Omega + 100 \sim \Omega) \parallel R_{\text{eq}} = \{500 \sim \Omega \cdot 200 \sim \Omega\} \over {500 \sim \Omega + 200 \sim \Omega}$$

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

Permanent link:
https://mexle.te.hs-heilbronn.de/electrical_engineering_1/task_x357drkaqv84jns_c_with_calculation?rev=1680388284

Last update: **2023/04/02 00:31**

