

Einführung in die Elektrotechnik für Medienwissenschaftler

Elektrotechnische Grundlagen der Technischen Informatik

Übungsblatt 2 (Lösung)

Aufgabe 1

Gesucht: I_1 , I_2 , I_3 und U_5 ?

$$\text{M1: } \overset{\circ}{I}_a(R_1 + R_3) + \overset{\circ}{I}_b R_3 = U_1$$

$$\text{M2: } \overset{\circ}{I}_a R_3 + \overset{\circ}{I}_b(R_3 + R_5 + R_4) - \overset{\circ}{I}_c R_5 = 0$$

$$\text{M3: } -\overset{\circ}{I}_b R_5 + \overset{\circ}{I}_c(R_5 + R_2) = U_2$$

- $I_1 = \overset{\circ}{I}_a = 2,989A$
- $I_2 = \overset{\circ}{I}_c = 0,041A$
- $I_3 = \overset{\circ}{I}_a + \overset{\circ}{I}_b = 3,011A$
- $I_5 = \overset{\circ}{I}_c - \overset{\circ}{I}_b = 0,019A$, $U_5 = I_5 R_5 = 8,93V$

Aufgabe 2

Gesucht: I_1 , I_2 , I_3 und U_5 ?

$$\text{M1: } \overset{\circ}{I}_a(R_1 + R_4 + R_2) - R_2 \overset{\circ}{I}_b = I_{01} R_i - U_{02}$$

$$\text{M2: } \overset{\circ}{I}_b(R_2 + R_5 + R_3) - R_2 \overset{\circ}{I}_a = U_{02} - U_{03}$$

- $I_1 = \overset{\circ}{I}_a = -0,185A$
- $I_2 = \overset{\circ}{I}_b - \overset{\circ}{I}_a = 0,1A$

- $I_3 = -\overset{\circ}{I}_b = 0,074A$
- $U_5 = -I_3 R_5 = -0,740V$

Aufgabe 3

Gesucht: I_1, I_2, I_3, I_6 und U_6 ?

$$\begin{array}{l}
 M1: \overset{\circ}{I}_a(R_4 + R_5 + R_6) - \overset{\circ}{I}_b R_4 + \overset{\circ}{I}_c R_5 = 0 \\
 M2: \overset{\circ}{I}_a(-R_4) + \overset{\circ}{I}_b(R_1 + R_2 + R_4) + \overset{\circ}{I}_c R_2 = U_{01} - I_{02} \frac{R_2}{2} \\
 M3: \overset{\circ}{I}_a R_5 + \overset{\circ}{I}_b R_2 + \overset{\circ}{I}_c(R_3 + R_5 + R_2) = U_{03} - I_{02} \frac{R_2}{2}
 \end{array}$$

- $I_1 = \overset{\circ}{I}_b = -98,8mA$
- $I_2 = -\overset{\circ}{I}_b - \overset{\circ}{I}_c = -1,8mA$
- $I_3 = -\overset{\circ}{I}_c = 100,6mA$
- $I_6 = \overset{\circ}{I}_a = -88mA$
- $U_6 = I_6 R_6 = -8,8V$

Aufgabe 4

Gesucht: C_{ab} ?

- $C_{ab} = \frac{(C_4 + \frac{C_1 C_3}{C_1 + C_3}) C_2}{C_4 + \frac{C_1 C_3}{C_1 + C_3} + C_2} + \frac{C_6 C_5}{C_6 + C_5}$