

Cvičenie č.10/4.

Meranie odporu III.

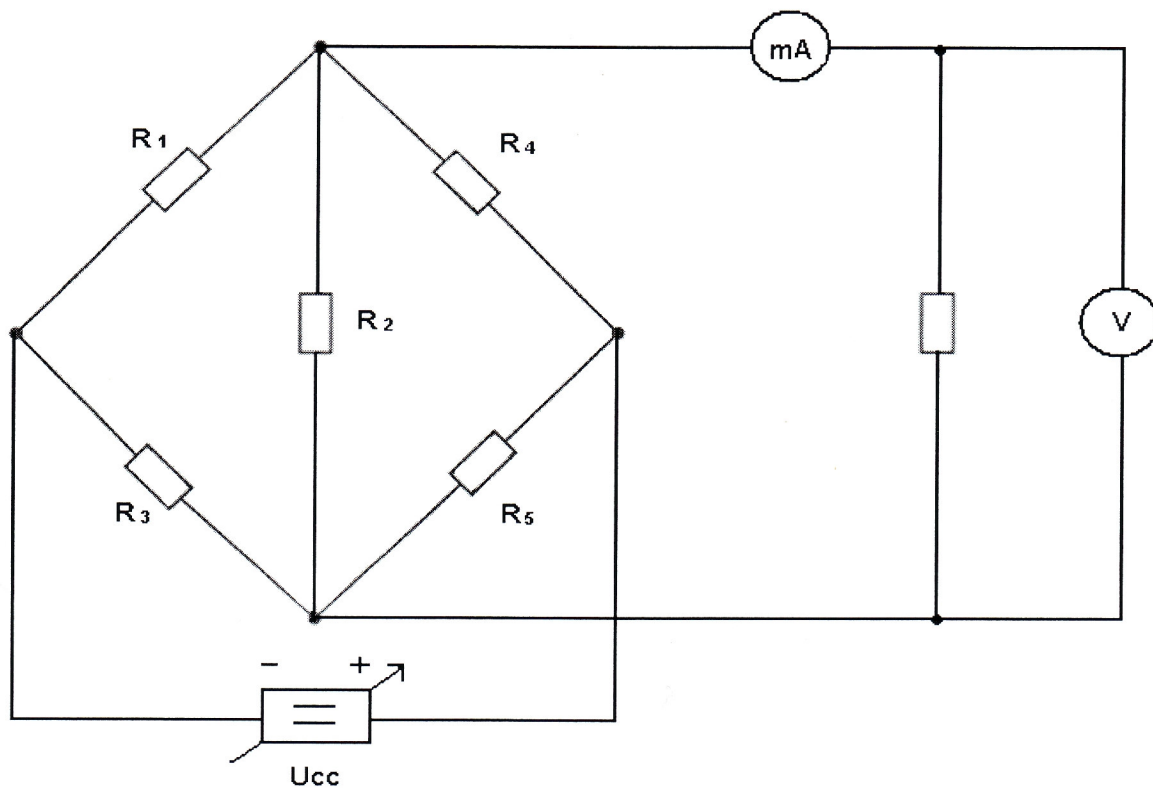
Wheatsonov mostík II.

- Úloha cvičenia: 1.) Zostrojte Wheatsonov mostík z predložených odporníkov.
2.) Vykonaajte výpočet prúdov a napätí v mostíku.
3.) Porovnajate a vypočítajte zmerané hodnoty.

Vstupné hodnoty:

Rezistory	Označené[Ω]	Zmerané[Ω]
R ₁	1k5	1.540k
R ₂	4k7	4.62k
R ₃	6k8	6.88k
R ₄	8.2	8.2
R ₅	10k	9.91k

Schéma zapojenia:



$$R_A = \frac{R_1 R_3}{R_1 + R_2 + R_3} = \frac{10595200}{13040} = 812,51\Omega \quad R_D = \frac{R_2 R_4}{R_2 + R_4 + R_5} = \frac{37884000}{14538,2} = 2,6\Omega$$

$$R_B = \frac{R_1 R_3}{R_1 + R_2 + R_3} = \frac{7114800}{13040} = 545,61\Omega \quad R_E = \frac{R_2 R_5}{R_2 + R_4 + R_5} = \frac{45784200}{14538,2} = 3149,23\Omega$$

$$R_C = \frac{R_2 R_3}{R_1 + R_2 + R_3} = \frac{31785600}{13040} = 2437,54\Omega \quad R_F = \frac{R_4 R_5}{R_2 + R_4 + R_5} = \frac{45784200}{14538,2} = 5,58\Omega$$

$$R = R_A + \frac{(R_B + R_4)(R_C + R_5)}{R_4 + R_5 + R_B + R_C} = \frac{851,51 + (545,51 + 8,2)(2437,54 + 9910)}{8,2 + 9910 + 545,61 + 2437,54} = 1342,54\Omega$$

$$I = \frac{U}{R} = \frac{8}{1342,54} = 5,88\text{mA}$$

$$U_{RA} = I \cdot R_A = 0,0059588 \cdot 812,51 = 4,841\text{V}$$

$$U_1 = U - U_{RA} = 8 - 4,841 = 3,159\text{V}$$

$$I_{R4} = \frac{U_1}{R_B + R_4} = 0,0057041\text{A} \quad U_{R4} = I_{R4} \cdot R_4 = 0,0468\text{V}$$

$$I_{R5} = \frac{U_1}{R_C + R_5} = 0,000256\text{A} \quad U_{R5} = I_{R5} \cdot R_5 = 2,5369\text{V}$$

Pre transformáciu sprava:

$$R_D = \frac{R_4 R_5}{R_2 + R_4 + R_5} = 5,59\Omega$$

$$R = 4411,38\Omega$$

$$I = 0,0018134\text{A}$$

$$U_{RF} = 5,71\text{V}$$

$$R_E = \frac{R_2 R_4}{R_2 + R_4 + R_5} = 2,6\Omega$$

$$U_2 = 2,29\text{V}$$

$$I_{R1} = 0,00148\text{A} \quad U_{R1} = 2,27\text{V}$$

$$I_{R2} = 0,000028\text{A} \quad U_{R2} = 0,13\text{V}$$

$$R_F = \frac{R_2 R_5}{R_2 + R_4 + R_5} = 3149,23\Omega$$

$$I_{R3} = 0,000228\text{A} \quad U_{R3} = 1,56\text{V}$$

Vypočítaná hodnota	Nameraná hodnota
$I_{R1} =$	$I_{R1} =$
$I_{R2} =$	$I_{R2} =$
$I_{R3} =$	$I_{R3} =$
$I_{R4} =$	$I_{R4} =$
$I_{R5} =$	$I_{R5} =$