Osnovi elektrotehnike

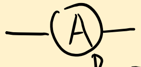
RN 13 - Predavanja 27 – 28.12.2021.

Studijski program: Energetika, elektronika i telekomunikacije (E1)

28.12.2021. godine

OSNOVNA EL. MERENJA (2/2) – MERENJE OTPORNOSTI

I^m - ?


$R_A \to 0$

$\Rightarrow \delta_I \searrow$

1. $R_A = 0$
2. $R_A << R$

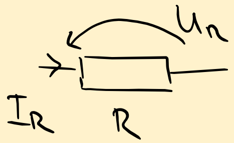
U^m - ?

$R_V \to \infty$

$\Rightarrow \delta_u \searrow$

1. $R_V \to \infty$
2. $R_V >> R$

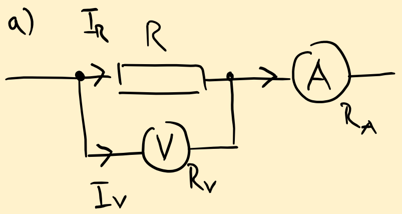
A) merenje na bazi Omovog zakona



$$U_R = +R I_R \Rightarrow R = \frac{U_R}{I_R} = R^t$$

$$\Rightarrow R^m = \frac{U_R^m}{I_R^m}$$

a)



$$R^t = \frac{U_V}{I_R} \qquad R^m = \frac{U_V}{I_A} = \frac{U_V}{I_R + \boxed{I_V}}$$

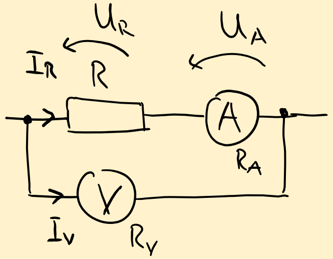
$$\Rightarrow \delta_R = \frac{R^m - R^t}{R^t} = \boxed{-}\,\frac{R}{R + R_V} < 0$$

$\Rightarrow \delta_R \searrow$

1. $R_V \to \infty$
2. $\boxed{R << R_V}$

$\Rightarrow R \searrow,\ I_R \nearrow,\ P_R \nearrow$

b)



$$R^t = \frac{U_R}{I_A} \qquad R^m = \frac{U_V}{I_A} = \frac{U_R + \boxed{U_A}}{I_A}$$

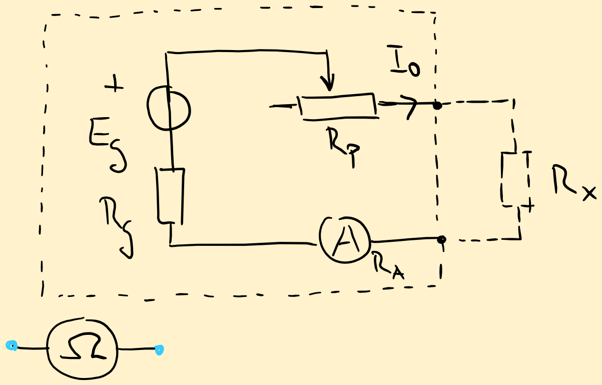
$$\Rightarrow \delta_R = \frac{R^m - R^t}{R^t} = \boxed{+}\,\frac{R_A}{R} > 0$$

$\Rightarrow \delta_R \searrow$

1. $R_A \to 0$
2. $\boxed{R >> R_A}$

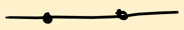
$\Rightarrow R \nearrow,\ I_R \searrow,\ P_R \searrow$

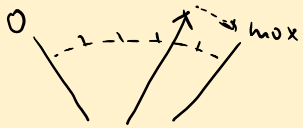
B) merenje pomoću ommetra

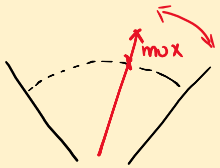


$$I_o = \frac{E_g}{R_g + R_p + R_A + R_x} = f\left(\frac{1}{R_x}\right)$$

$\Rightarrow$ $R_x \to \infty$ $\Rightarrow$ $I_o = 0$

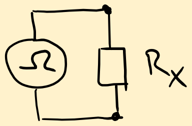
$R_x = 0$  $\Rightarrow$ $I_o^{max} = \dfrac{E_g}{R_g + R_p + R_A}$



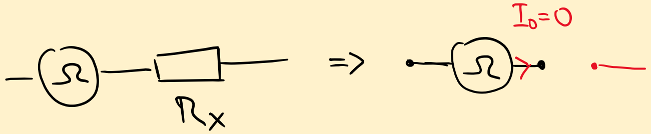


$\Rightarrow$ $R_p \searrow$ $\Rightarrow$ $I_o \nearrow I_o^{max}$

- R_p služi za kalibraciju instrumenta, tako da skazaljka skreće skroz na desnu stranu

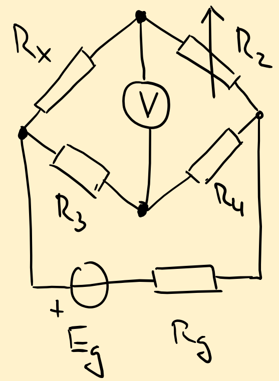
$\Rightarrow$ 

MORA



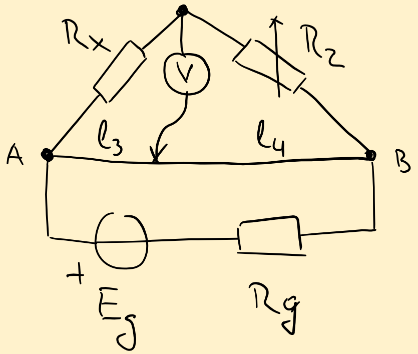
NESME

c) Vitstonov most



R_2 - promenljiv $\Rightarrow$ $U_V = 0$ - most je u ravnoteži $\Rightarrow$ $R_x R_4 = R_2 R_3$

$$\Rightarrow \quad R_x = \frac{R_3}{R_4} R_2$$



$$R = \rho \frac{L}{S} \Rightarrow R_3 = \rho \frac{l_3}{S} \qquad R_4 = \rho \frac{l_4}{S}$$

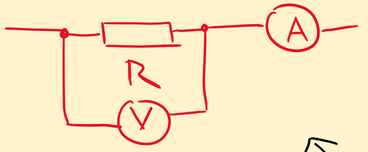
$$\Rightarrow \quad R_x = \frac{l_3}{l_4} R_2$$

MERENJE SNAGE

A) $P = \boxed{UI} = RI^2 = \frac{U^2}{R}$

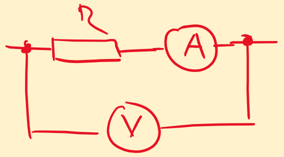
UI - metoda za merenje snage

a)



P_a ↗

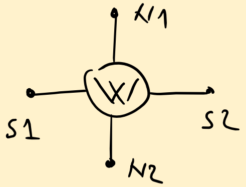
b)



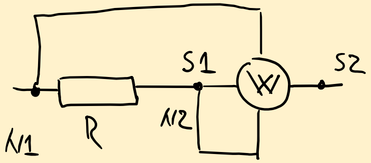
P_b ↘

- dva merna instrumenta
- kada izmerimo U i I moramo "ručno" da izvršimo množenje

B) W - vatmetar



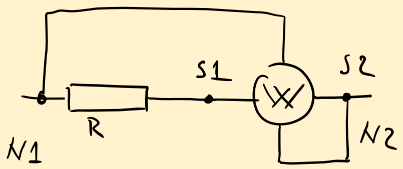
a)



S1 ≡ N2

R ↘, I ↗, P ↗

b)



S2 ≡ N2

R ↗, I ↘, P ↘