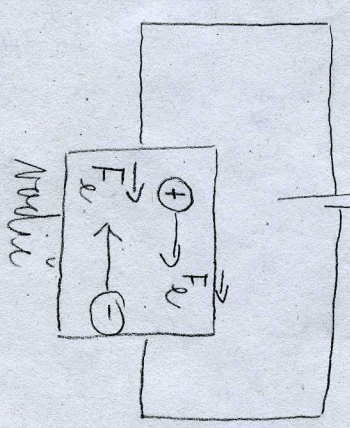


Električni napetosti

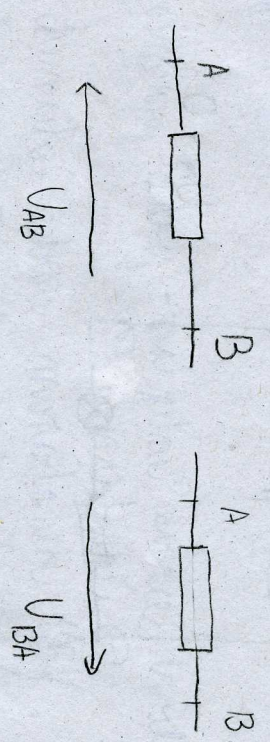
I) Definicije

- izračun U
- izračun $W = 1 \text{ Volt}$
- merjenje velikosti med dvema točkama x in y

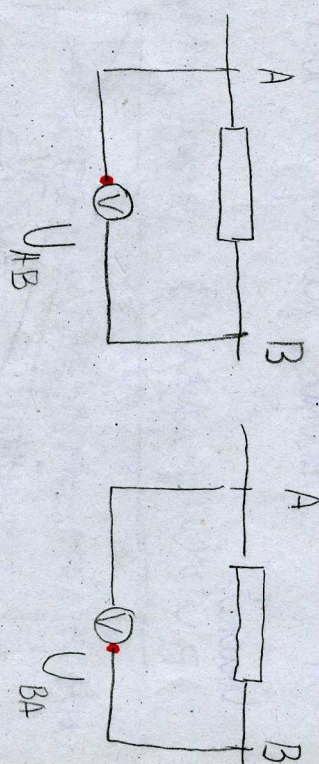


Električni napetosti med točkama A in B
 je razlika potencialov in energijskih gostot električnega polja pri prenosni poti med točkama A in B

Merjenje

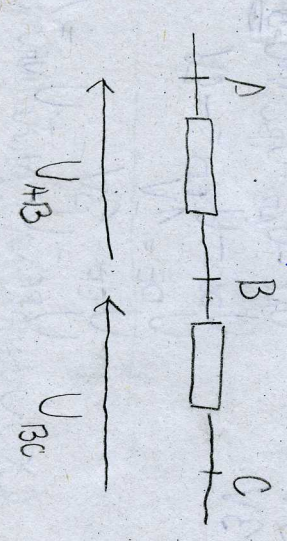


Primeri



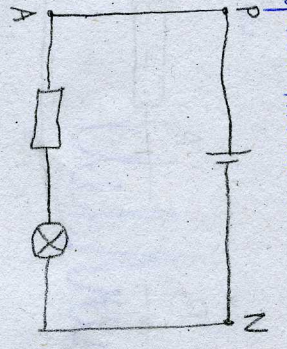
II) Skalarni napetosti

- $U_{AB} = -U_{BA}$
- Skalarni napetosti:



$$U_{AC} = U_{AB} + U_{BC}$$

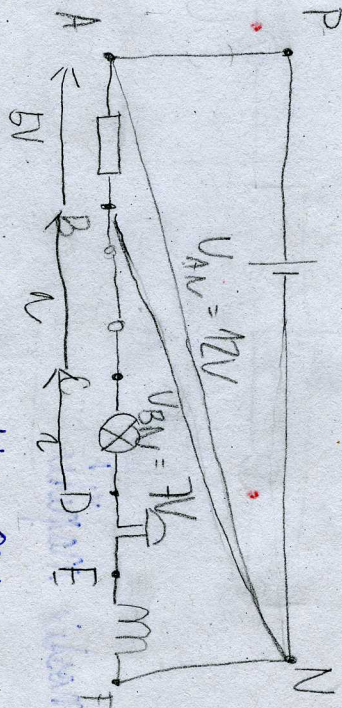
napětí mezi body elektrické sítě je 0



$$U_{PN} = 0$$

napětí mezi srovnáním zdrojů je přímé
potenciál v ohrazení

číslo



$$U_{AB} = -U_{BA}$$

$$U_{AC} = U_{AB} + U_{BC}$$

$$U_{PN} = 12V$$

$$U_{BN} = 7V$$

$$U_{DN} = 5V$$

$$U_{EN} = 3V$$

$$U_{AP} = 0V$$

$$U_{AB} = U_{AN} + U_{NB} = U_{AN} - U_{BN} = 12V - 7V = 5V$$

$$U_{AC} = U_{AB} + U_{BC} = 5V + 0V = 5V$$

$$U_{DC} = -U_{CD} = -2V$$

$$U_{DE} = 1V$$

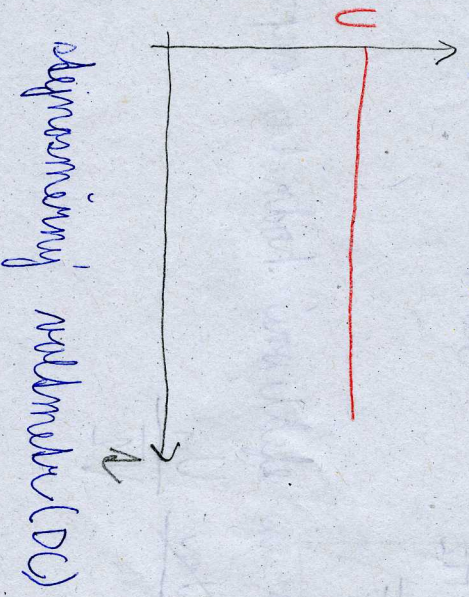
$$U_{EF} = 3V$$

$$U_{PF} = U_{PN} + U_{NF} = 12V + 0V = 12V$$

III. Zdroje napětí

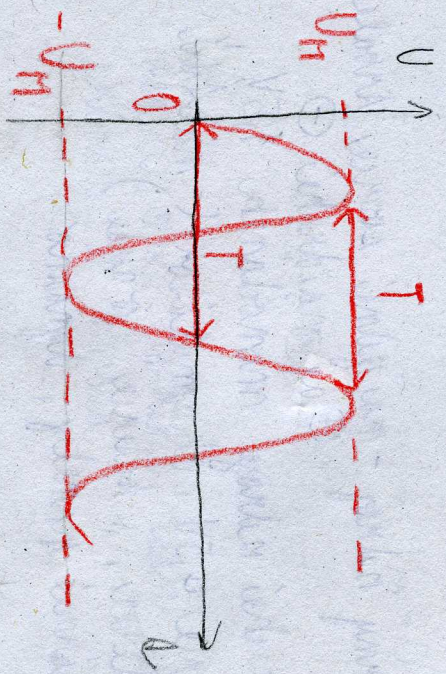
- dynamický zdroj - na jehož výstupu klesá \oplus a \ominus napětí
- chemický zdroj: manganové 1,5V, kadmiové 4,5V, akumulátor (= malý zdroj "baterie", "kabele" (tradičně) elektrický proud, dynamický)
- sluneční zdroj - fotovoltaický zdroj
- alternátor - zdroj elektrického napětí

1. Stejněsměrné napětí



stejněsměrný napětí (DC)

2. Napięcie napięcia



U_M - maksymalna wartość = amplituda

T - okres, przeliczeni na prędkość napięcia zawsze określamy

f - częstotliwość = prędkość napięcia

$$[f] = \frac{1}{T} = \text{Hz}$$

$$f = \frac{1}{T}$$

Wartość skuteczna określami wartość napięcia

$$U_{sk} = \frac{U_M}{\sqrt{2}}$$

Pr. 10 silnik (10 prądów) je określami napięcia
 o $U_{sk} = 230V$ a częstotliwość $f = 50 \text{ Hz}$

$$U_M = \sqrt{2}$$

$$T = \frac{1}{f}$$

Przeliczymy na 1 sekunda na moment
 polowania?

$$f = \frac{1}{T} \quad U_{sk} = \frac{U_M}{\sqrt{2}} \quad | \cdot \sqrt{2}$$

$$f \cdot T = 1 \quad | \cdot f$$

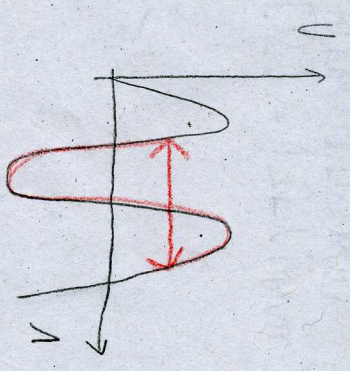
$$T = \frac{1}{f} = \frac{1}{50}$$

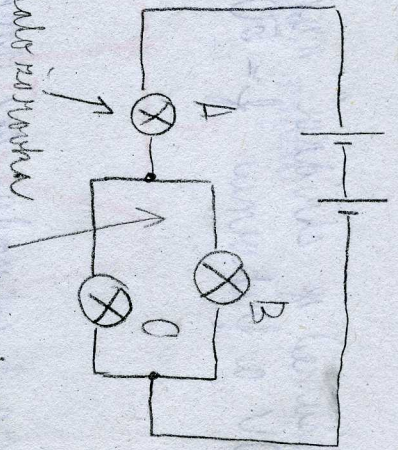
$$U_{sk} \cdot \sqrt{2} = U_M$$

$$T = 0,02 \text{ s} = 20 \text{ ms}$$

$$U_M = 325V$$

skuteczna

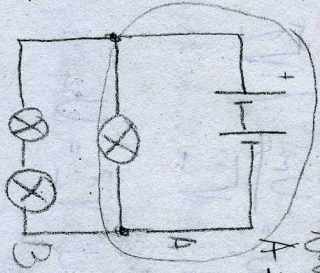




Adas parysomas
bulb, arklis
rejusis

puskis ar rodeliki

ar rebusis parysomas B bulb
kudrai arklis menes



A = B + C

1. ometis A
2. ometis B

Kapitel 4

Elektrichy odner

I. Ommir zakon

- vyglyadit sovshchit masi poverdom a malyim masi korni masi materialu
- kladi poverie pur rezistor, nepolki pur koverche, kedy, dirdi

Malie poverie pur rezistor

$$U = R \cdot I$$

Rezistor
povidit k poverie
kimerony nepolki
na rezistoru

odner rezistoru
[R] = 1 Ω (1 ohm)

⇒ diveden: $U = R \cdot I / R$

$$\frac{U}{R} = I$$

⇒ kudyz pvelimne R, kmenoi ar I

- odner k zavivly ma kapitel
- kudyz kude odovetiti 0 kude nuzhno oditi kude

Ex. 1

Sebuah lampu memiliki hambatan 15Ω dan arus yang mengalir 300 mA .

$U = 15V$

$I = 300 \text{ mA} = 0,3 \text{ A}$

$R = ? \Omega$

$U = R \cdot I \quad | : I$

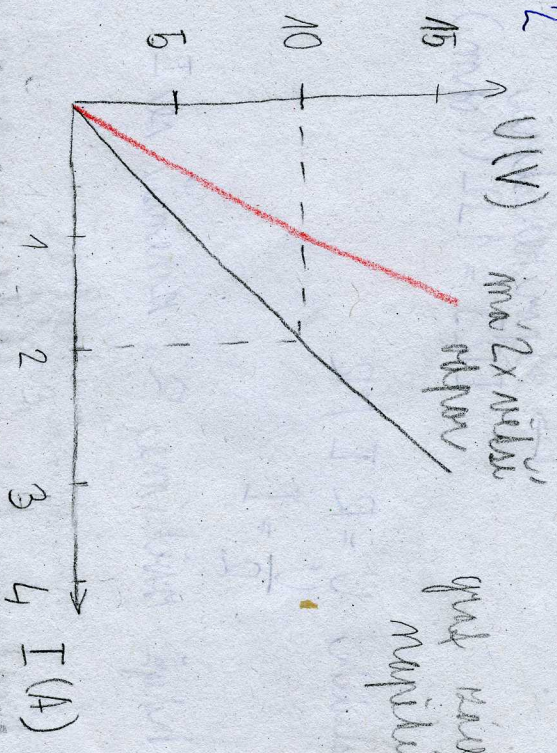
$\frac{U}{I} = R$

$R = \frac{15}{0,3}$

$R = 50 \Omega$



Ex. 2



$U(V)$ *misal 2x nilai*

graf tersebut dapat menjadi resistor

II

Resistor, resistansi, - merupakan seri



se dengan rumus



$R = R_1 + R_2$

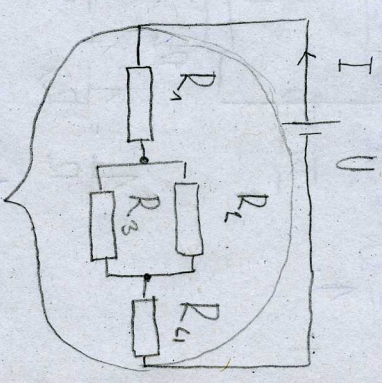
$U = 10V$
 $I = 2A$
 $R = ? \Omega$
 $U = R \cdot I \quad | : I$

$\frac{U}{I} = R$

$R = \frac{10}{2}$

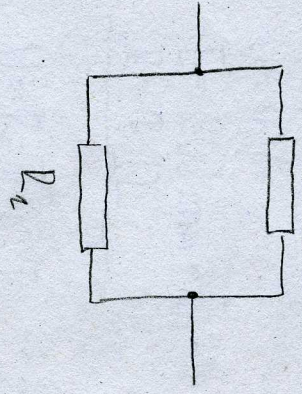
$R = 5 \Omega$

$R = 10 \Omega$
 $I = 1A$
 $U = 10V$

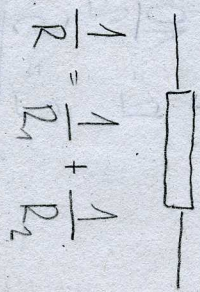


$R = \frac{U}{I}$
 $U = R \cdot I$

- rangkaian paralel

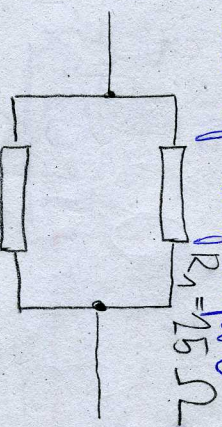


atau dapat juga



$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

1. Dit. Mula-mula aplikasikan Ohm



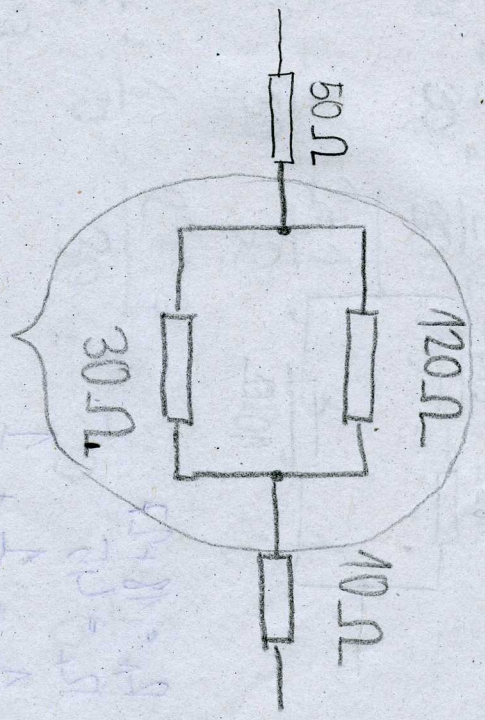
$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$\frac{1}{R} = \frac{1}{25} + \frac{1}{100} = \frac{4+1}{100} = \frac{5}{100} = \frac{1}{20}$$

$$\frac{1}{R} = \frac{1}{20}$$

$$R = 20 \Omega$$

2.



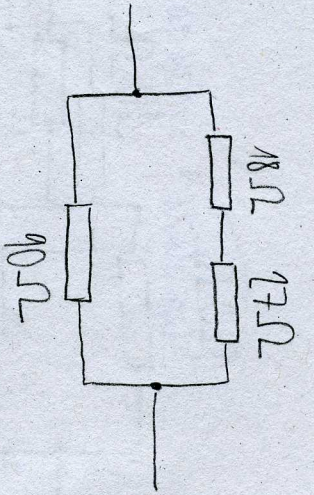
$$\frac{1}{R_A} = \frac{1}{120} + \frac{1}{30} = \frac{5}{120} = \frac{1}{24}$$

$$\frac{1}{R_A} = \frac{1}{24}$$

$$R_A = 24 \Omega$$

$$R = 24 + 50 + 10 = 84 \Omega$$

3.



$$R_A = 18 + 17$$

$$R_A = 45$$

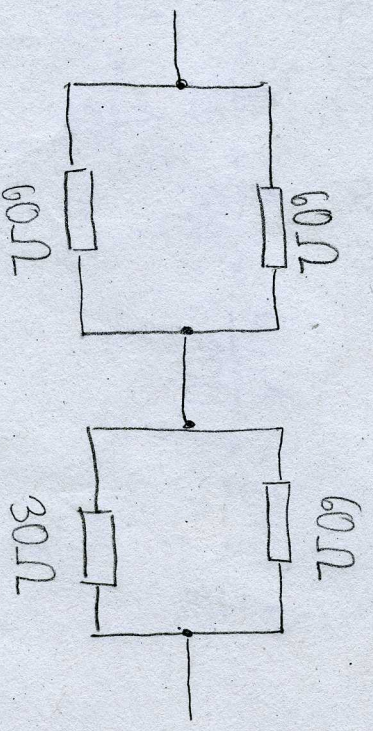
$$\frac{1}{R} = \frac{1}{R_A} + \frac{1}{90}$$

$$\frac{1}{R} = \frac{1}{45} + \frac{1}{90}$$

$$\frac{1}{R} = \frac{2}{90}$$

$$R = 30 \Omega$$

4.



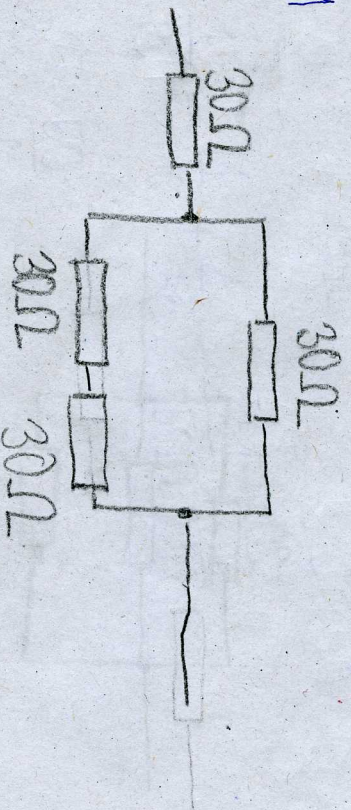
$$\frac{1}{R} = \frac{1}{30} + \frac{1}{30} = \frac{2}{30} = \frac{1}{15}$$

$$\frac{1}{R} = \frac{1}{60} + \frac{1}{30} = \frac{2+1}{30} = \frac{3}{30} = \frac{1}{10}$$

$$\frac{1}{R} = \frac{1}{15} + \frac{1}{10} = \frac{2+3}{30} = \frac{5}{30} = \frac{1}{6}$$

$$R = 6 \Omega$$

Ex. 1



$$R = R_1 + R_2$$

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

$$R = R_1 + R_2$$

$$R = 30 \Omega + 30 \Omega$$

$$R = 60 \Omega$$

$$\frac{1}{R} = \frac{1}{30} + \frac{1}{60}$$

$$\frac{1}{R} = \frac{2}{60} + \frac{1}{60}$$

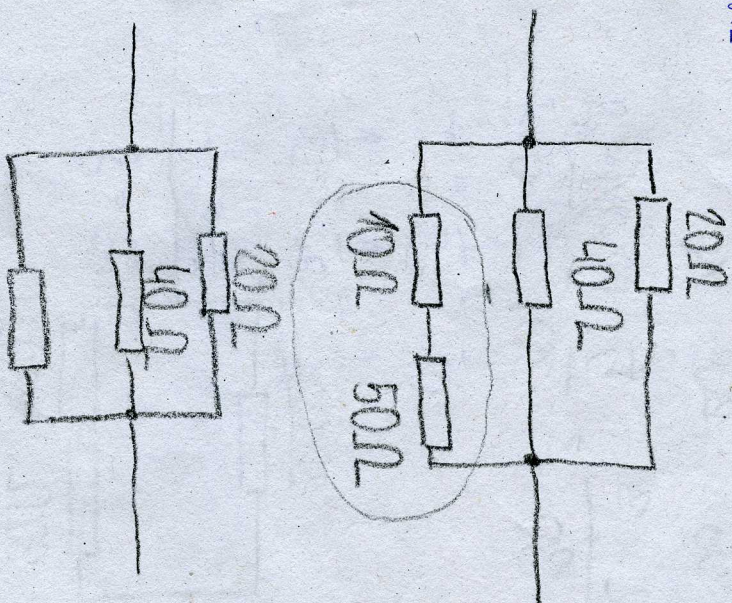
$$\frac{1}{R} = \frac{3}{60} = \frac{1}{20}$$

$$R = 20 \Omega$$

$$R = 30 + 20$$

$$R = \underline{\underline{50 \Omega}}$$

W2



$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}$$

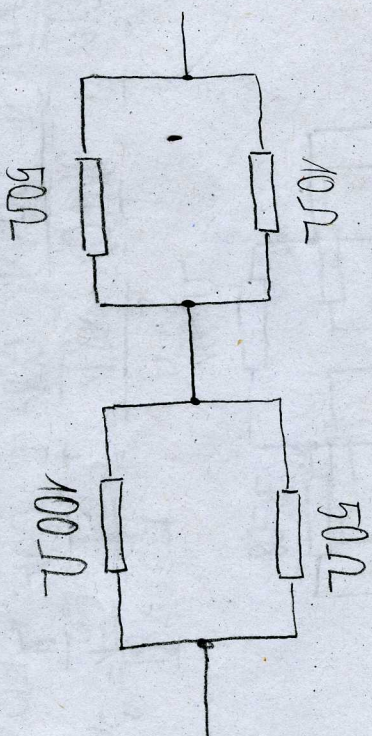
$$\frac{1}{R} = \frac{1}{20} + \frac{1}{40} + \frac{1}{60}$$

$$\frac{1}{R} = \frac{6+3+2}{120} = \frac{11}{120}$$

$$R = \frac{120}{11} \Omega$$

$$R = 10,9 \Omega$$

W3



$$\frac{1}{R_1} = \frac{1}{10} + \frac{1}{50} = \frac{5+1}{50} = \frac{6}{50}$$

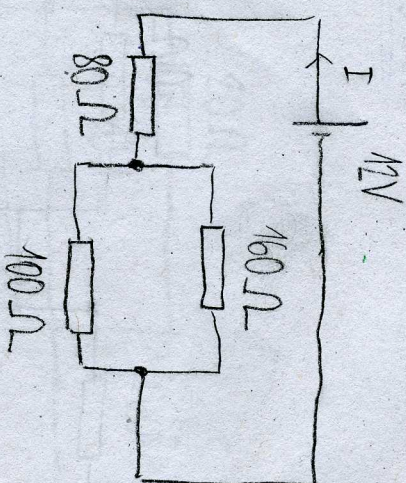
$$R_1 = \frac{50}{6}$$

$$\frac{1}{R_2} = \frac{1}{50} + \frac{1}{100} = \frac{2+1}{100} = \frac{3}{100}$$

$$R_2 = \frac{100}{3}$$

$$R = \frac{50}{6} + \frac{100}{3} = \frac{50 + 200}{6} = \frac{250}{6} = \underline{\underline{41,7 \Omega}}$$

Gr 4



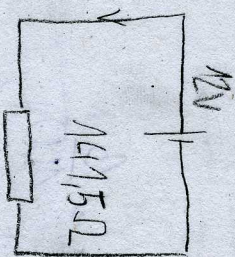
$I = i$

$$\frac{1}{R} = \frac{1}{80} + \frac{1}{100} = \frac{10+16}{1600} = \frac{26}{1600}$$

$$R_A = \frac{1600}{26} \Omega = 61,5 \Omega$$

$$R = 61,5 + 80$$

$$R = 141,5 \Omega$$



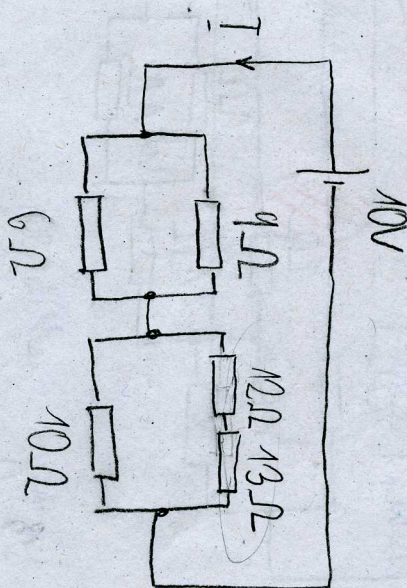
$$U = R \cdot I \quad | \cdot R$$

$$I = \frac{U}{R}$$

$$I = \frac{12}{141,5}$$

$$I = 0,0847 \text{ A} = 84 \text{ mA}$$

Gr 5



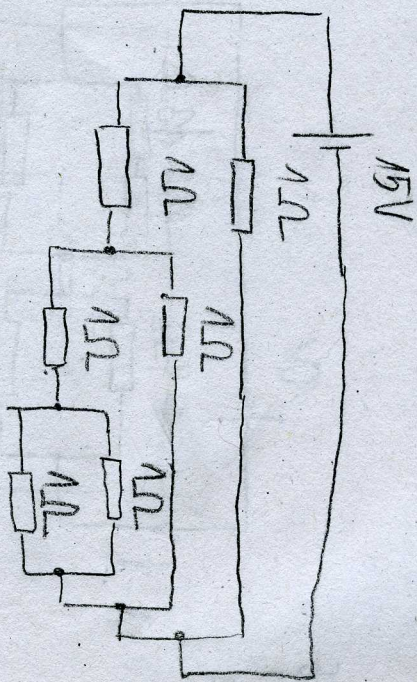
$$\frac{1}{R_1} = \frac{1}{9} + \frac{1}{6} = \frac{2+3}{18} = \frac{5}{18} = \frac{18}{5} = 3,6 \Omega$$

$$\frac{1}{R_2} = \frac{1}{25} + \frac{1}{10} = \frac{2+5}{50} = \frac{7}{50} = \frac{50}{7} = 7,1 \Omega$$

$$R = 3,6 + 7,1 = 10,7 \Omega$$

$$I = \frac{U}{R} = \frac{10}{10,7}$$

$$I = \underline{0,93 \text{ A}} = 930 \text{ mA}$$



$$\frac{1}{R_1} = \frac{3}{2} \Omega$$

$$\frac{1}{R_2} = \frac{3}{2} \Omega$$

$$\frac{1}{R_3} = \frac{3}{2} \Omega$$

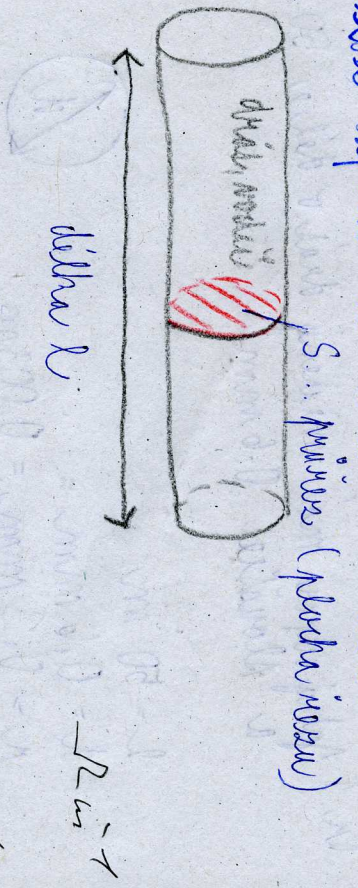
$$R = \frac{1}{\frac{1}{2} + \frac{1}{2} + \frac{1}{2}} = \frac{2}{3} \Omega$$

$$I = \frac{U}{R} = \frac{15}{0.67} = 22.5 \text{ A}$$

$$I = \frac{U}{R} = \frac{15}{0.2}$$

$$I = 10 \text{ A}$$

III. Jarak antar atom dan konstanta Boltzmann



$$R = \rho \cdot \frac{L}{S}$$

ρ - diameter material $\frac{\Omega \cdot m}{m}$
 S - luas penampang m^2

menyebutkan
 n $\Omega \cdot m$ resistansi
 material

(berikutnya)

$$R_{Al} = 2,67 \cdot 10^{-8} \Omega \cdot m$$

$$R_{Cu} = 1,69 \cdot 10^{-8} \Omega \cdot m$$

$$R_{Ag} = 1,52 \cdot 10^{-8} \Omega \cdot m$$

$$R_{Fe} = 9,96 \cdot 10^{-8} \Omega \cdot m$$

Pr. 1 Polný odpor má měřicí drát o délce 50 m
a průřezem 0,6 mm²

$$L = 50 \text{ m}$$

$$d = 0,6 \text{ mm} =$$

$$S = \pi \cdot r^2 = 0,003 \text{ m}^2$$

$$R = ?$$

$$R = ?$$

$$g_{cu} = 1,69 \cdot 10^{-8} \Omega \cdot \text{m}$$

$$R = g \cdot \frac{L}{S}$$

$$S = \pi \cdot 0,00000009 = 0,000000283$$

$$R = 1,69 \cdot 10^{-8} \cdot \frac{50}{0,000000283}$$

$$R = 2,99 \Omega$$