

1)

$$R_4 = \sqrt{1/G \parallel R_3}$$

$$R_{34} \parallel R_2 \parallel R_0$$

$$R_{2-4} = \sqrt{1/G \parallel R_1}$$

$$R_{3-4} = R_3 + R_4 = 50 + 40 = 90 \Omega$$

$$R_0(50) = R_0(20) \cdot [1 + \alpha(T - 20)] = 60 \cdot [1 + 0.003 \cdot (50 - 20)] = 65.4 \Omega$$

$$R_{2-4,0(50)} = \left(\frac{1}{R_{3-4}} + \frac{1}{R_2} + \frac{1}{R_0(50)} \right)^{-1} = \left(\frac{1}{90} + \frac{1}{36} + \frac{1}{65.4} \right)^{-1} = 18.457 \Omega$$

$$(\text{Sic. } \rightarrow) R_T = R_{2-4,0(50)} + R_1 = 18.457 + 12 = 30.457 \Omega$$

$$P_{(\text{Sic})} = 500 \text{ W}$$

$$P = \frac{E^2}{R}$$

$$N \quad E = \sqrt{P \cdot R} = \sqrt{500 \cdot 30.457} = 123.404 \text{ V}$$

$$R_{T(20)} = \underbrace{\left(\frac{1}{R_{3-4}} + \frac{1}{R_2} + \frac{1}{R_0(20)} \right)^{-1}}_{R_{2-4,0(20)}} + R_1 = \left(\frac{1}{90} + \frac{1}{36} + \frac{1}{60} \right)^{-1} + 12 = 18 + 12 = 30 \Omega$$

$$I_{T(20)} = \frac{E}{R_{T(20)}} = \frac{123.404}{30} = 4.113 \text{ A}$$

$$2 \quad U_{x_{(20)}} = I_{T(20)} \cdot R_{2-4,0(20)} = 4.113 \cdot 18 = 74.042 \text{ V}$$

: 1 נקודת מדידה נלקחה

$$I(R_2) = 1.8 \text{ A}$$

$$R_2 = 36 \Omega$$

$$U(R_2) = I(R_2) \cdot R_2 = 1.8 \cdot 36 = 64.8 \text{ V}$$

$$U(R_2) = U_{xy} = 64.8 \text{ V} = U(R_{3-4})$$

$$U(R_1) = E - U_{xy} = 123.404 - 64.8 = 58.604 \text{ V}$$

$$I_T = \frac{U(R_1)}{R_1} = \frac{58.604}{12} = 4.883 \text{ A}$$

$$I(R_{3-4}) = \frac{U(R_{3-4})}{R_{3-4}} = \frac{64.8}{90} = 0.72 \text{ V}$$

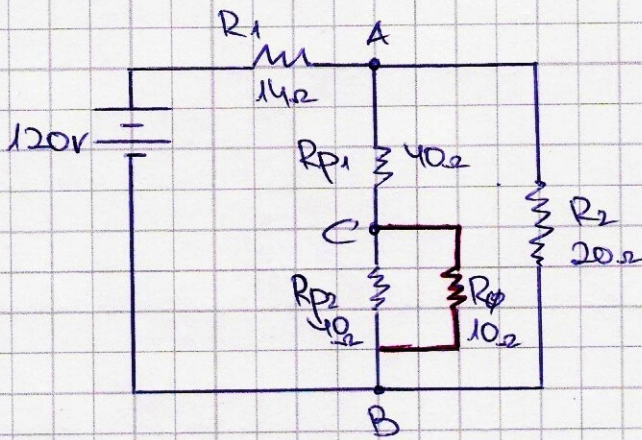
$$I(R_\phi) = I_T - I(R_2) - I(R_{3-4}) = 4.883 - 1.8 - 0.72 = 2.363 \text{ A}$$

$$R_\phi = \frac{U_{xy}}{I(R_\phi)} = \frac{64.8}{2.363} = 27.422 \Omega$$

$$R_\phi = R_{(20)} \cdot [1 + \alpha (T - 20)] = 60 \cdot [1 + 0.003 \cdot (T - 20)]$$

$$\lambda \quad T = \frac{\frac{27.422}{60} - 1}{0.003} + 20 = -160.988^\circ \text{C}$$

2



$$N \quad R_{p1} = \frac{1}{\frac{1}{40} + \frac{1}{R_{p2}}}$$

$$R_2 \parallel R_{p1,2}$$

$$R_{2-p1-2} = \frac{1}{\frac{1}{R_2} + \frac{1}{R_{p1,2}}}$$

$$R_T = \left(\frac{1}{R_2} + \frac{1}{R_{p1} + R_{p2}} \right)^{-1} + R_1 = \left(\frac{1}{20} + \frac{1}{80} \right)^{-1} + 14 = 30 \Omega$$

$$I_T = \frac{E}{R_T} = \frac{120}{30} = 4 \text{ A}$$

$$U_{AB} = I_T \cdot R_{(2-p1-2)} = 4 \cdot 16 = 64 \text{ V}$$

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

החלף את U_{CB} ב- U_{BC} כי זהו הפך

$$U_{CB} = \frac{U_{AB}}{2} = \frac{64}{2} = 32 \text{ V}$$

החלף את U_{BC} ב- -32 V כי זהו הפך

$$U_{BC} = -32 \text{ V}$$

: 2 nodes nodes given

$$R_0 \parallel R_{p2}$$

$$R_{p1} - \text{is } 1/60 \text{ } R_{p2} - \text{is}$$

$$R_2 \parallel R_{p1-20}$$

$$R_1 - \text{is } 1/60 \text{ } R_{p1-20}$$

$$R_{p2-0} = \left(\frac{1}{R_0} + \frac{1}{R_{p1}} \right)^{-1} = \left(\frac{1}{10} + \frac{1}{40} \right)^{-1} = 8 \Omega$$

$$R_{p1-20} = R_{p1} + R_{p2-0} = 40 + 8 = 48 \Omega$$

$$R_{2-p1-20} = \left(\frac{1}{R_2} + \frac{1}{R_{p1-20}} \right)^{-1} = \left(\frac{1}{20} + \frac{1}{48} \right)^{-1} = 14.117 \Omega$$

$$R_T = R_1 + R_{2-p1-20} = 14.117 + 14 = 28.117 \Omega$$

$$I_T = \frac{E}{R_T} = \frac{120}{28.117} = 4.267 \text{ A}$$

$$U_{AB} = I_T \cdot R_{2-p1-20} = 4.267 \cdot 14.117 = 60.249 \text{ V}$$

$$I_{AB} = \frac{U_{AB}}{R_{p1-20}} = \frac{60.249}{48} = 1.255 \text{ A}$$

$$U_{CB} = I_{AB} \cdot R_{p2-0} = 1.255 \cdot 8 = 10.041 \text{ V}$$

$$I_{(R_0)} = \frac{U_{CB}}{R_0} = \frac{10.041}{10} = 1.0041 \text{ A}$$

$$P_{(R_0)} = U_{CB} \cdot I_{(R_0)} = 10.041 \cdot 1.0041 = 10.0827 \text{ W}$$

3) X קבוצת המספרים של המולי
 R_3 R_2 R_p נמצאת במעגל אחד
 R_1 - נמצאת בצד השני של המעגל

$$R_T = R_1$$

$$U = I \cdot R_1 = 2 \cdot 30 = 60V$$

$$I \cdot I_T = 1.2A$$

$$R_T = \frac{U}{I_T} = \frac{60}{1.2} = 50\Omega$$

$$R_T = \left(\frac{1}{R_2 + R_3} + \frac{1}{R_p} \right)^{-1} + R_1 = 50 = \left(\frac{1}{40} + \frac{1}{R_p} \right)^{-1} + 30 = 50\Omega$$

$$\left(\frac{1}{40} + \frac{1}{R_p} \right)^{-1} = 50 - 30 = 20$$

$$\left(\frac{1}{40} + \frac{1}{R_p} \right)^{-1} = 20$$

$$\frac{1}{40} + \frac{1}{R_p} = \frac{1}{20}$$

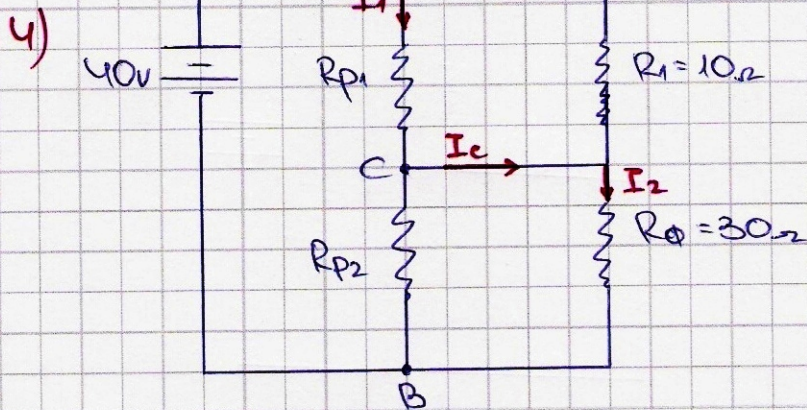
$$\frac{1}{R_p} = \frac{1}{20} - \frac{1}{40} = \frac{1}{40}$$

$$R_p = 40\Omega$$

$$50 \cdot X\% = 40$$

$$X = \frac{40 \cdot 100}{50} = 80$$

$$X = 80\%$$



$$I_1 = I_2$$

$$R_{p1} = R_0 = 30 \Omega$$

$$U_{AB} = U(R_1 + R_0)$$

$$R_{p2} = R_1 = 10$$

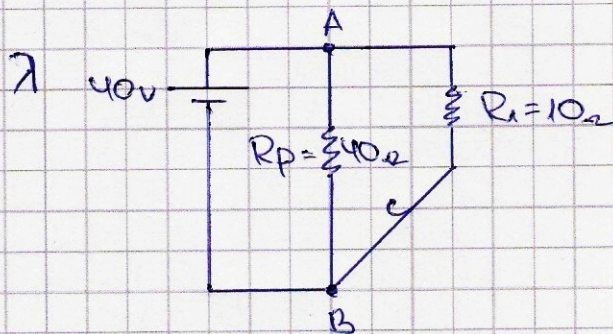
$$R_p = R_{p1} + R_{p2} = 30 + 10 = 40 \Omega$$

$$\frac{40 \cdot X}{100} = 30$$

$$X = \frac{30 \cdot 100}{40} = 75$$

$$X = 75\% = 30 \Omega$$

$$I_{\text{left}} = \frac{40}{30} = 1.33 \text{ A}$$



$$R_T = \left(\frac{1}{R_1} + \frac{1}{R_p} \right)^{-1} = \left(\frac{1}{10} + \frac{1}{40} \right)^{-1} = 8\Omega$$

$$I = \frac{U}{R} = \frac{40}{8} = 5 \text{ A}$$

$$P = U \cdot I = 40 \cdot 5 = 200 \text{ W}$$

7. R₀ արդե ինքն իր ծախսերը
 էլան արդյունքով
 էլան և լավ և R₀ արդյունքով
 արդյունք էլ արդյունք արդյունք և արդյունք
 R₀ արդյունք և ինքն

הכמה מתח נחלקה ל-4

$$I_1 = I_2$$

$$I_1 = I_T \cdot \frac{R_1}{X + R_1} = I_T \cdot \frac{10}{X + 10}$$

$$I_2 = I_T \cdot \frac{40 - X}{40 - X + 30}$$

$$\cancel{I_T} \cdot \frac{10}{X + 10} = \cancel{I_T} \cdot \frac{40 - X}{70 - X}$$

$$700 - 10X = 40X + 400 - X^2 - 10X$$

$$X^2 + 300 - 40X = 0$$

$$X^2 - 40X + 300 = 0$$

$$X_{1,2} = \frac{40 \pm \sqrt{40^2 - 4 \cdot 1 \cdot 300}}{2} \quad \begin{matrix} X_1 = 30 \\ X_2 = 10 \end{matrix}$$

X יהיה מתח של 30V אז כל הזרם ילך דרך R_1 ו- R_2 יקבלו 0V.
אם מתח של 30V - אז מתח וזרם ילכו דרך R_2 ו- R_1 יקבלו 0V.

$$R_{p1} = 30\Omega$$

$$R_{p2} = 10\Omega \quad (40 - 30)$$

2

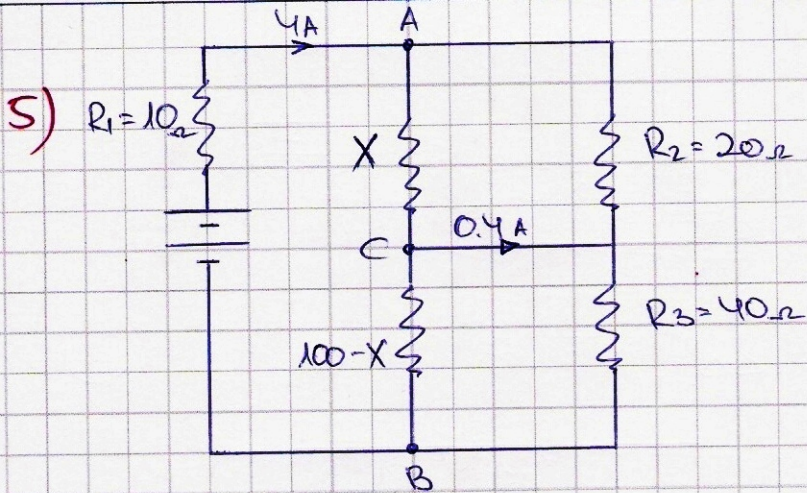
$$I_c = I_{R_1} - I_{R_2}$$

$$R_T = \left(\frac{1}{10} + \frac{1}{30} \right)^{-1} + \left(\frac{1}{10} + \frac{1}{30} \right)^{-1} = 15$$

$$I_T = \frac{E}{R_T} = \frac{40}{15} = 2.666_A$$

$$I_c = I_T \cdot \frac{R_{P1}}{R_{P1} + R_1} - I_T \cdot \frac{R_{P2}}{R_{P2} + R_2} = \frac{2.666 \cdot 30}{40} - \frac{2.666 \cdot 10}{40} =$$

$$I_c = 1.333_A$$



$$I_X - I_{100-X} = 0.4 \text{ A}$$

$$0.4 = I_T \cdot \frac{R_2}{R_2 + X} - I_T \cdot \frac{R_3}{100 - X + R_3}$$

$$0.4 = 4 \cdot \left(\frac{20}{20 + X} - \frac{40}{100 - X + 40} \right)$$

$$\frac{1}{10} = \frac{20}{20 + X} - \frac{40}{140 - X} \quad | \cdot 10$$

$$1 = \frac{200}{20 + X} - \frac{400}{140 - X} \quad | \cdot (20 + X)(140 - X)$$

$$(20 + X)(140 - X) = 200(140 - X) - 400(20 + X)$$

$$2800 - 20X + 140X - X^2 = 28000 - 200X - 8000 - 400X$$

$$-X^2 + 120X + 2800 = 20000 - 600X$$

$$-X^2 + 720X - 17200 = 0$$

$$X_{1,2} = \frac{-720 \pm \sqrt{720^2 - 4 \cdot (-1) \cdot (-17200)}}{2 \cdot (-1)}$$

~~$X_1 = 698.2 \Omega$~~
~~plausibel~~
 $X_2 = 24.73 \Omega$

$$R_{p1} = 24.73 \Omega = 24.73 \%$$

$$R_{p2} = R_p - R_{p1} = 100 - 24.73 = 75.27 \Omega$$

:S nicht mehr geben

$$R_{AB} = \left(\frac{1}{R_2} + \frac{1}{R_{p1}} \right)^{-1} + \left(\frac{1}{R_3} + \frac{1}{R_{p2}} \right)^{-1} = \left(\frac{1}{20} + \frac{1}{24.73} \right)^{-1} + \left(\frac{1}{40} + \frac{1}{75.27} \right)^{-1} = 37.177 \Omega$$

$$R_T = R_{AB} + R_1 = 37.177 + 10 = 47.177 \Omega$$

$$U = I \cdot R_T = 4 \cdot 47.177 = 188.708 \text{ V}$$