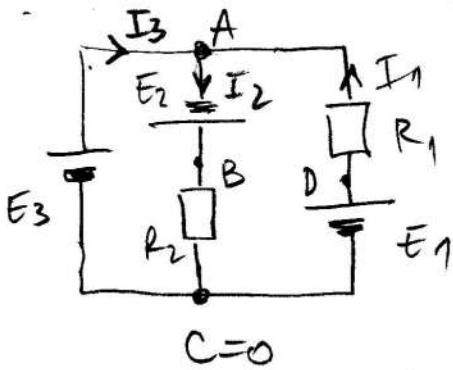
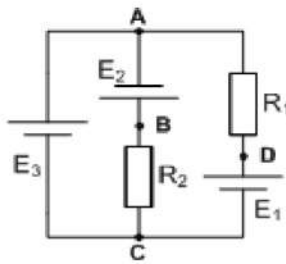


1. U kolu na slici, primenom metode napona između čvorova, odrediti intenzitete struja u svim granama i napon U_{BD} . Poznato je: $E_1 = 6V$, $E_2 = 2V$, $E_3 = 10V$, $R_1 = 10\Omega$ i $R_2 = 20\Omega$.



МНУ $n_C^y - 1 = 1 \Rightarrow 1 \times 1$

$C=0 \rightarrow U_{AO} = \text{НОПОЗНАТА}$

$\textcircled{A} \quad \sum_{A} I_g = 0$

$E_3 \rightarrow I_g!$
ИДЕАЛНИ НАП. ГЕН.

ЈЕДНОСТАВНО РЕШЕЊЕ: $U_{AO} = E_3!$

$(A=0 \Rightarrow U_{AO} = -E_3)$

$I_1, I_2 = ?$

$U_{AO} = R_2 I_2 - E_2 = E_1 - R_1 I_1$

$I_1 = \frac{E_1 - U_{AO}}{R_1} = \frac{E_1 - E_3}{R_1} = -0,4A$

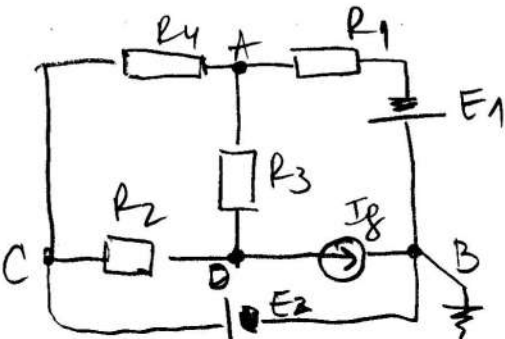
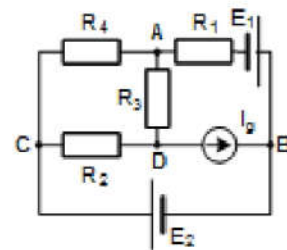
$I_2 = \frac{U_{AO} + E_2}{R_2} = \frac{E_3 + E_2}{R_2} = 0,6A$

$I_3 = -I_1 + I_2$ (МОЖЕ САМО I_{K3} !)

$I_3 = 1A$ ЈЕР НЕМА $R_3 \dots$

$U_{BD} = \dots$

2. U kolu na slici, metodom napona između čvorova odrediti: (struje u svim granama), snagu strujnog generatora, P_{I_g} , snagu naponskog generatora P_{E_1} i snagu otpornika R_3 , P_{R_3} . Poznato je: $E_1 = 60V$, $E_2 = 40V$, $I_g = 1A$, $R_1 = R_2 = R_3 = R_4 = R = 10\Omega$.



E_2 - ИД. НАП. ГЕН. ИЗМЕЂУ 2 ЧВОРА

$\Rightarrow C$ ИЛИ B - РЕФ. ЧВОР

НПР. $\underline{B=0}$ $n_C^y - 1 = 3$ ($V_B=0$)

$\Rightarrow 3 \times 3 - \underline{U_{AO}, U_{CO}, U_{DO}}$

$\textcircled{1}$

$$\textcircled{A} \quad G_{AA}U_{AO} - G_{AC}U_{CO} - G_{AD}U_{DO} = \sum_A I_g$$

$$\textcircled{C} \quad -G_{CA}U_{AO} + G_{CC}U_{CO} - G_{CD}U_{DO} = \sum_C I_g \rightarrow U_{CO} = E_2$$

$$\textcircled{D} \quad -G_{DA}U_{AO} - G_{DC}U_{CO} + G_{DD}U_{DO} = \sum_D I_g$$

$$G_{AA} = \frac{1}{R_4} + \frac{1}{R_3} + \frac{1}{R_1}, \quad G_{AC} = \frac{1}{R_4}, \quad G_{AD} = \frac{1}{R_3} = G_{DA}, \quad G_{DC} = \frac{1}{R_2},$$

$$G_{DD} = \frac{1}{R_2} + \frac{1}{R_3}, \quad \sum_A I_g = -\frac{E_1}{R_1}, \quad \sum_D I_g = -I_g$$

$$\textcircled{A} \quad \left(\frac{1}{R_4} + \frac{1}{R_3} + \frac{1}{R_1}\right)U_{AO} - \frac{1}{R_4}U_{CO} - \frac{1}{R_3}U_{DO} = -\frac{E_1}{R_1}$$

$$\textcircled{C} \quad U_{CO} = E_2 = 40V$$

$$\textcircled{D} \quad -\frac{1}{R_3}U_{AO} - \frac{1}{R_2}U_{CO} + \left(\frac{1}{R_2} + \frac{1}{R_3}\right)U_{DO} = -I_g$$

1. $\cdot R_1$, 2. $(E_2) = \checkmark$

$$3U_{AO} - U_{DO} = -E_1 + E_2 = -20V$$

$$-U_{AO} + 2U_{DO} = -RI_g + E_2 = 30V$$

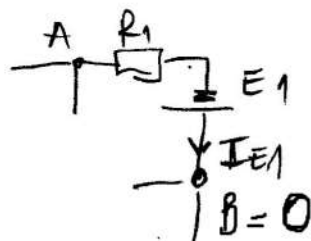
$$U_{AO} = -2V, \quad U_{DO} = 14V, \quad U_{CO} = 40V$$

$$P_{I_g} = U_{I_g} \cdot I_g = U_{DO} I_g = U_{DO} I_g = -U_{DO} \cdot I_g = -14W$$

$$P_{R_3} = R_3 I_{R_3}^2 = \frac{U_{R_3}^2}{R_3} = \frac{U_{AD}^2}{R_3} = \frac{(U_{AO} - U_{DO})^2}{R_3} = 25,6W$$

$$[U_{AD} = V_A - V_D = U_{AO} - U_{DO} = \dots]$$

$$P_{E_1} = E_1 \cdot I_{E_1}$$

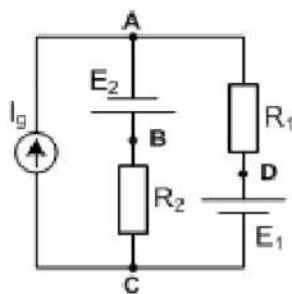


$$U_{AO} = R_1 I_{E_1} - E_1$$

$$I_{E_1} = \frac{U_{AO} + E_1}{R_1} = \frac{58}{10} = 5,8A$$

$$P_{E_1} = \dots = 348W$$

3. U kolu na slici, primenom metode superpozicije, odrediti intenzitete struja u svim granama i napon U_{BD} . Poznato je: $E_1 = 6V$, $E_2 = 2V$, $R_1 = 10\Omega$ i $R_2 = 20\Omega$, $I_g = 2A$.

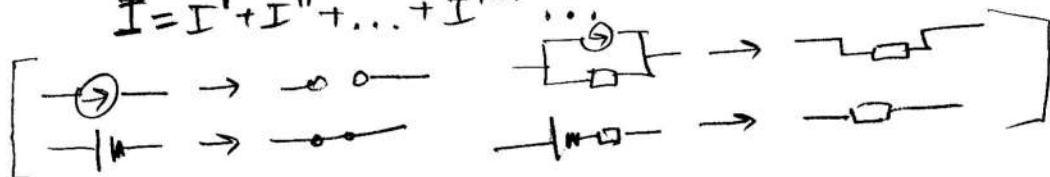


СУПЕРПОЗИЦИЈА:

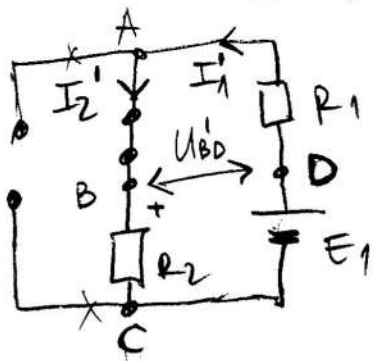
1 КОЛО СА N ГЕНЕРАТОРА =

= N КОЛА СА ПО 1 ГЕНЕРАТОРОМ!

$$I = I' + I'' + \dots + I^{(N)}$$



1) КОЛО СА (E_1) , $I_g \rightarrow \text{---}$, $E_2 \rightarrow \text{---}$

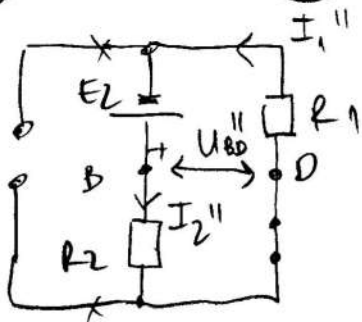


ПРОСТА КОЛТИЈА:

$$I_1' = I_2' = \frac{E_1}{R_1 + R_2} = \frac{6}{30} = \frac{1}{5} A$$

$$U_{BD}' = -R_1 I_1' = -2V$$

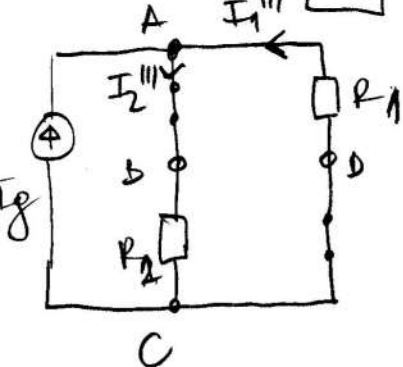
2) КОЛО СА (E_2) , $E_1 \rightarrow \text{---}$, $I_g \rightarrow \text{---}$



$$I_1'' = I_2'' = \frac{E_2}{R_2 + R_1} = \frac{2}{30} = \frac{1}{15} A$$

$$U_{BD}'' = R_2 I_2'' = \frac{4}{3} V$$

3) КОЛО СА (I_g) , $E_1, E_2 \rightarrow \text{---}$



$$R_{12} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2}} = \frac{20}{3} \Omega$$

$$U_{AC} = R_{12} \cdot I_g = \frac{40}{3} V$$

$$I_2''' = \frac{U_{AC}}{R_2} = \frac{2}{3} A$$

$$I_1''' = \frac{U_{CA}}{R_1} = -\frac{U_{AC}}{R_1} = -\frac{4}{3} A$$

$$V_A = V_B, V_C = V_D$$

$$U_{BD}''' = U_{AC} = \frac{40}{3} V$$

(3)

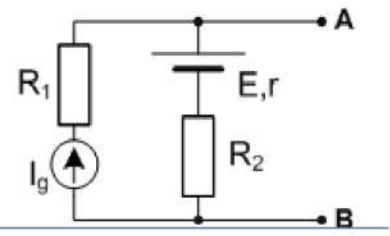
КОШАЧКО:

$$I_1 = I_1' + I_1'' + I_1''' = \frac{1}{5} + \frac{1}{15} - \frac{1}{3} = -\frac{16}{15} \text{ A}$$

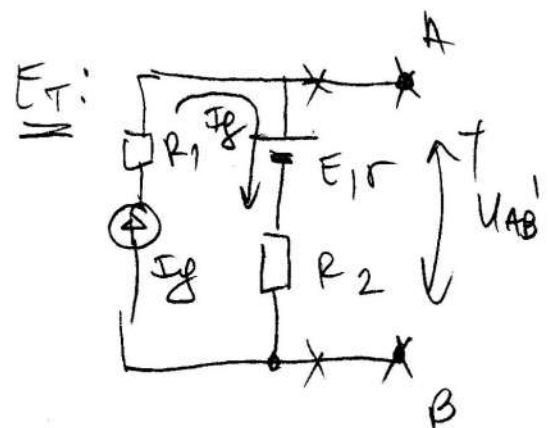
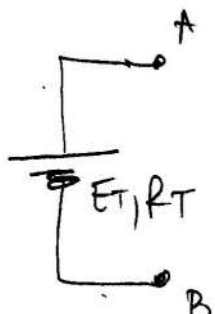
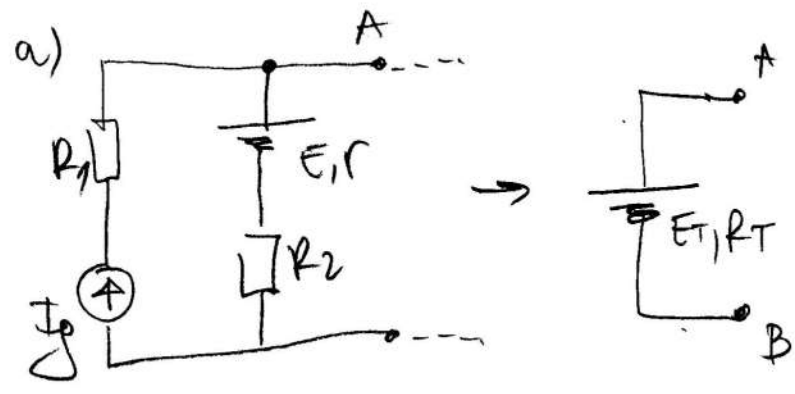
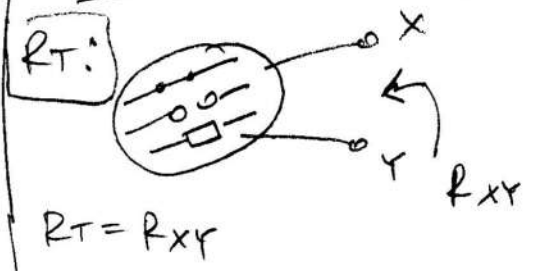
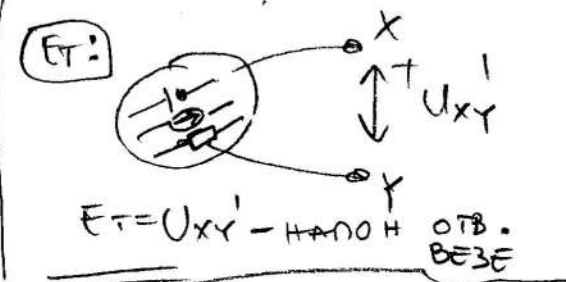
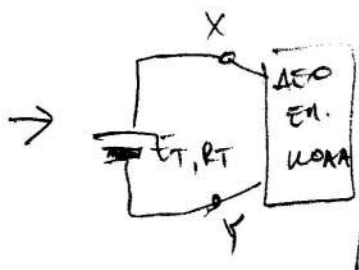
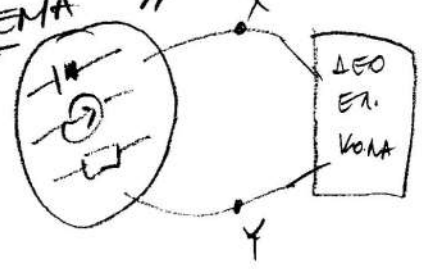
$$I_2 = I_2' + I_2'' + I_2''' = \frac{1}{5} + \frac{1}{15} + \frac{2}{3} = \frac{14}{15} \text{ A}$$

$$U_{BD} = U_{BD}' + U_{BD}'' + U_{BD}''' = -2 + \frac{4}{3} + \frac{40}{3} = \frac{38}{3} \text{ V}$$

4. Za deo složenog električnog kola sa slike, levo od tačaka A i B, odrediti i nacrtati ekvivalentni Tevenenov generator. Poznato je: $R_1 = 2\Omega$, $R_2 = 1\Omega$, $E = 3\text{V}$, $r = 0.5\Omega$, $I_g = 1\text{A}$

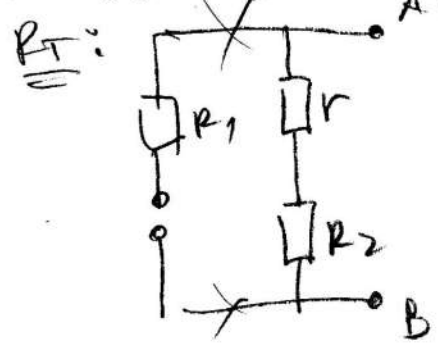
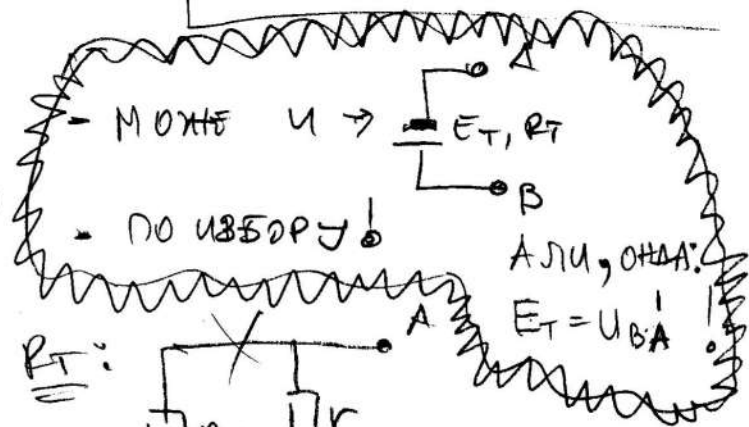


TEOREMA OBA TEOREMA



$$U_{AB} = R_2 I_g + r I_g + E = 4,5 \text{ V}$$

$$E_T = 4,5 \text{ V}$$



$$R_T = R_{AB} = r + R_2$$

$$R_T = 1,5 \text{ V}$$