

1. Metoda curenților independenți (fctivi, bucle, coarctă)

2. Metoda pot. nod (temperatura nodală, ramurilor)

$$R_{11}I_1' + R_{12}I_2' + \dots + R_{1n}I_n' = \sum \mathcal{E}_1$$

$$R_{21}I_1' + R_{22}I_2' + \dots + R_{2n}I_n' = \sum \mathcal{E}_2$$

$$R_{m1}I_1' + R_{m2}I_2' + \dots + R_{mn}I_n' = \sum \mathcal{E}_m$$

$$\Rightarrow 1. \Rightarrow L - N + 1 = b(\text{bucle})$$

$$G_{11}V_1 + G_{12}V_2 + \dots + G_{1n}V_n = \sum I_{sc1}$$

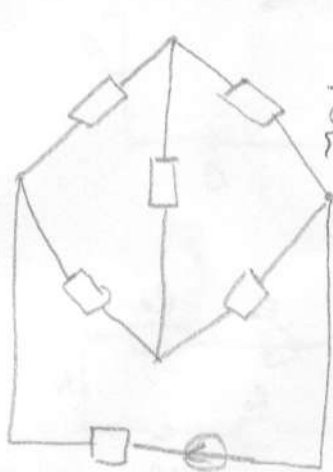
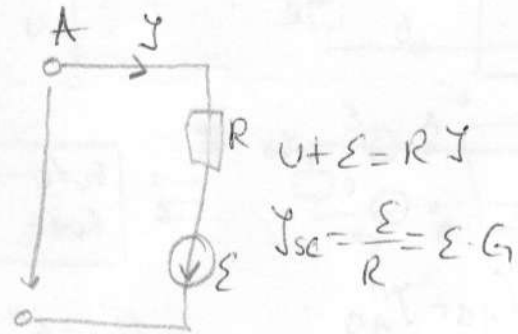
$$G_{21}V_1 + G_{22}V_2 + \dots + G_{2n}V_n = \sum I_{sc2}$$

$$G_{m1}V_1 + G_{m2}V_2 + \dots + G_{mn}V_n = \sum I_{scm}$$

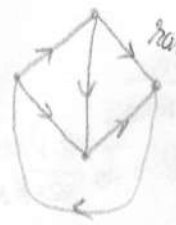
$$\Rightarrow 2. \Rightarrow N - 1 = n(\text{noduri})$$

$$\begin{cases} R_{kk} = \sum R_k \\ R_{kj} = R_{jk} \end{cases}$$

$$\begin{cases} G_{kk} > 0 - \text{suma tuturor conductanțelor la nodul } k \\ G_{kj} = G_{jk} - \text{conductanța cu semn schimbat} \end{cases}$$



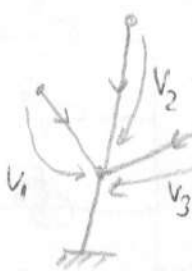
$$\begin{aligned} L &= 6 \\ N &= 4 \\ N-1 &= 3 \\ L-N+1 &= 3 \end{aligned}$$



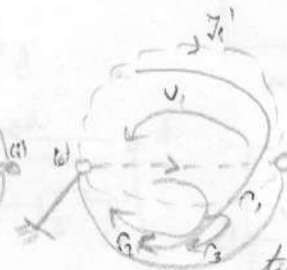
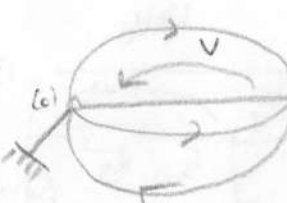
arbor = subgraf care conține toate nodurile și nu formează nici o buclă

curenți de buclă

subgraf (tip arbor)



potențiale nodale (temperatură nodală)

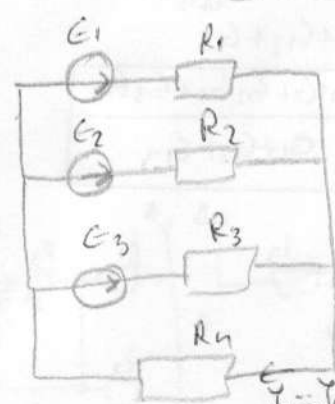


$$G_1 V_1 = \sum I_{sc}$$

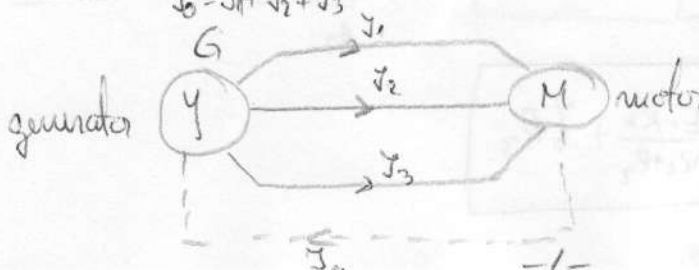
$$V_1 = \frac{E_1 G_1 + E_2 G_2 + E_3 G_3}{G_0 + G_1 + G_2 + G_3}$$

teorema potențialelor punctelor neutre. T lui Millmann

$$I_0 = \frac{V_1}{R_0}$$



$$\begin{aligned} N &= 2 \\ L &= 4 \\ N-1 &= 1 \\ L-N+1 &= 3 \end{aligned}$$

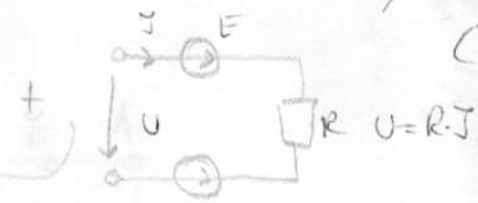
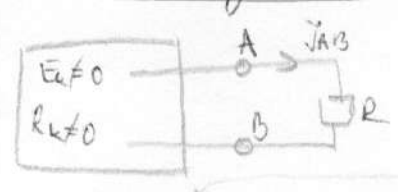


$$\begin{cases} \varepsilon_1 = \varepsilon_m \sin \omega t \\ \varepsilon_2 = \varepsilon_m \sin(\omega t - \frac{2\pi}{3}) \\ \varepsilon_3 = \varepsilon_m \sin(\omega t + \frac{2\pi}{3}) \end{cases} \quad (4)$$

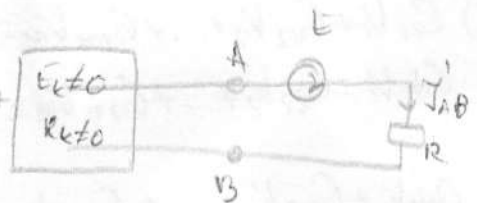
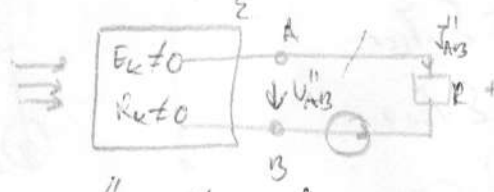
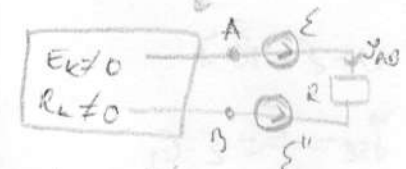
$$e_1 + e_2 + e_3 = 0$$

(L. lui Thevenin U_{AB})

de Teorema generatorului echivalent de tensiune și curent



(L. lui Norton I_0)



$$I_{AB} = I'_{AB} + I''_{AB}$$

$$U''_{AB} - E'' = R \cdot I''_{AB}$$

$$E' = E''$$

$$I_{AB}'' = 0$$

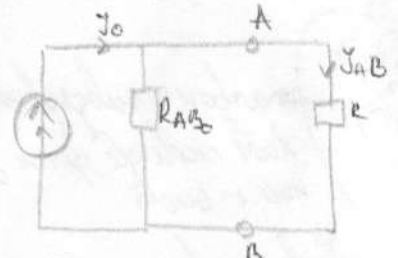
$$U''_{AB} = U_{AB0}$$

$$I_{AB} = \frac{E'}{R + R_{AB0}} \rightarrow \text{măsurarea curentului } I_{AB}$$

$$\Rightarrow I_{AB} = \frac{U_{AB0}}{R + R_{AB0}} - \text{t. generatorului echivalent de tensiune (Thevenin)}$$

$$U_{AB} = \frac{I_{sc AB}}{G + G_{AB0}} - \text{t. gen. ech. de curent (Norton)}$$

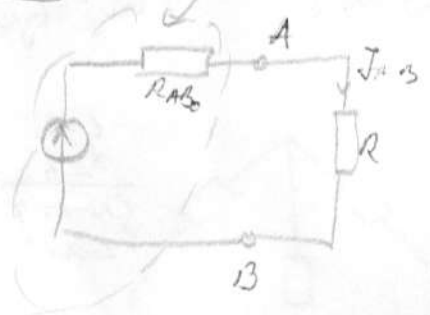
$$I_0 = \frac{U_{AB0}}{R_{AB0}}$$



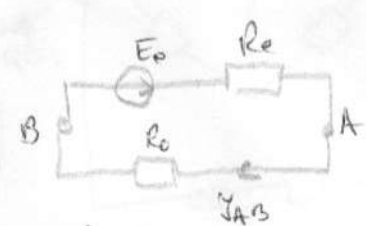
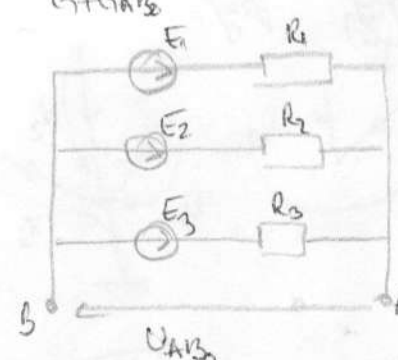
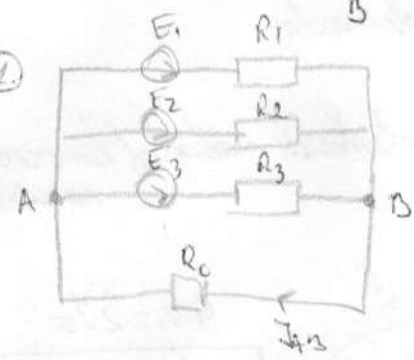
$$I_{AB} = I_0 \cdot \frac{R_{AB0}}{R + R_{AB0}}$$

$$U_{AB} = I_{AB} \cdot R = I_0 \cdot \frac{R \cdot R_{AB0}}{R + R_{AB0}}$$

$$U_{AB} = \frac{I_0}{G + G_{AB0}}$$



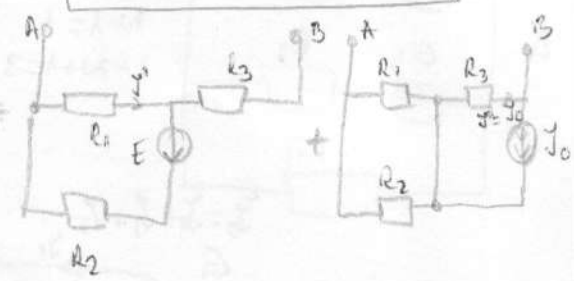
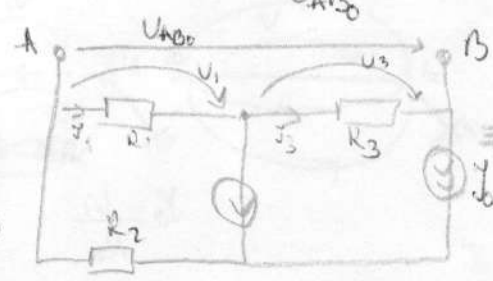
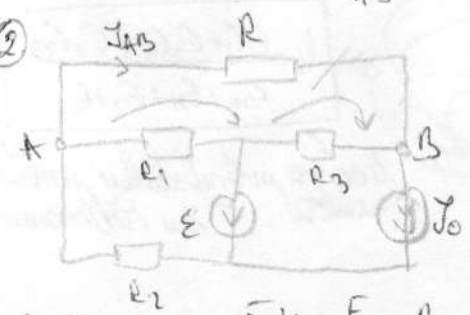
Ex: 1



$$G_e = G_1 + G_2 + G_3$$

$$G_e = \frac{G_1 G_2 + G_2 G_3 + G_3 G_1}{G_1 + G_2 + G_3}$$

2



$$I_1 = \frac{E}{R_1 + R_2}$$

$$U_1 = \frac{E}{R_1 + R_2} \cdot R_1$$

$$U_3 = I_0$$

$$R_{AB} = R_3 + \frac{R_1 R_2}{R_1 + R_2}$$

$$\Rightarrow U_{AB0} = \frac{E \cdot R_1}{R_1 + R_2} + I_0 \cdot R_3$$