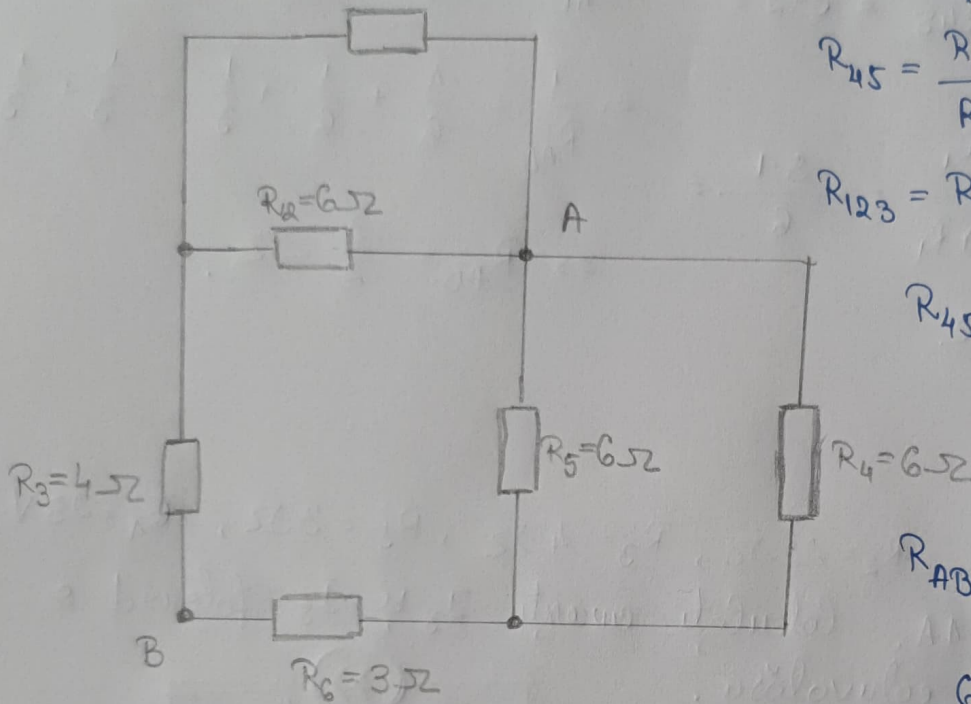


# TEMĂ SEMINAR 3

①.  $R_{AB} = ?$

$$R_1 = 3\Omega$$



$$R_{12} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{3 \cdot 6}{9} = 2\Omega$$

$$R_{45} = \frac{R_4 \cdot R_5}{R_4 + R_5} = \frac{6 \cdot 6}{12} = 3\Omega$$

$$R_{123} = R_{12} + R_3 = 2 + 4 = 6\Omega$$

$$R_{456} = R_{45} + R_6 = 3 + 3 = 6\Omega$$

$$R_{AB} = \frac{R_{123} \cdot R_{456}}{R_{123} + R_{456}} = \frac{6 \cdot 6}{12} = 3\Omega$$

$R_{AB} = ?$ ,  $R_{AC} = ?$ ,  $R_{AD} = ?$

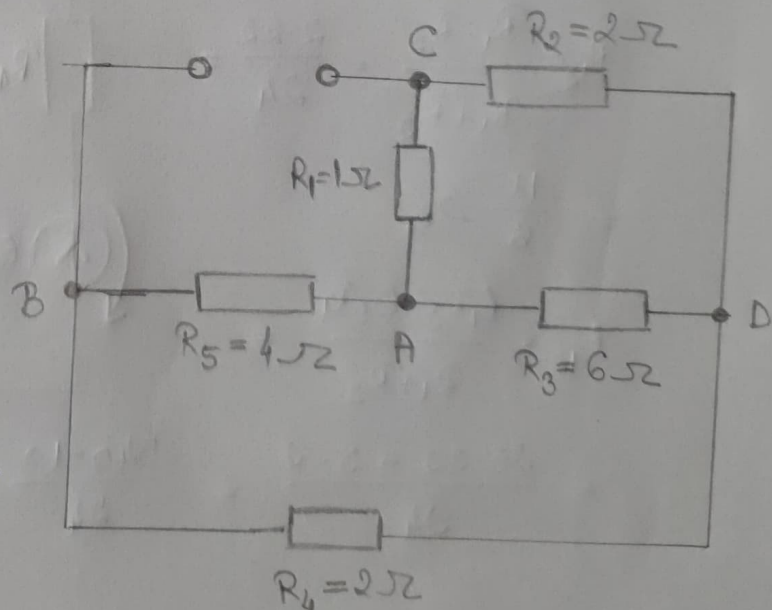
$R_{AB}$ :

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

$$R_{123} = \frac{R_{12} \cdot R_3}{R_{12} + R_3} = \frac{3 \cdot 6}{9} = 2\Omega$$

$$R_{1234} = R_{123} + R_4 = 2 + 2 = 4\Omega$$

$$R_{AB} = \frac{R_5 \cdot R_{1234}}{R_5 + R_{1234}} = \frac{4 \cdot 4}{8} = 2\Omega$$



$R_{AC}$ :

$$R_{45} = R_4 + R_5 = 4 + 2 = 6 \Omega$$

$$R_{345} = \frac{R_3 \cdot R_{45}}{R_3 + R_{45}} = \frac{6 \cdot 6}{6 + 6} =$$

$$= \frac{36}{12} = 3 \Omega$$

$$R_{2345} = R_2 + R_{345} = 3 + 2 =$$

$$= 5 \Omega$$

$$R_{AC} = \frac{R_{2345} \cdot R_1}{R_{2345} + R_1} = \frac{5 \cdot 1}{6} =$$

$$\Rightarrow R_{AC} = \frac{5}{6} \Omega$$

$R_{AD}$ :

$$R_{12} = R_1 + R_2 = 1 + 2 = 3 \Omega$$

$$R_{45} = R_4 + R_5 = 4 + 2 = 6 \Omega$$

$$R_{45} = R_4 + R_5 = 4 + 2 = 6 \Omega$$

$$\frac{1}{R_{AD}} = \frac{1}{R_3} + \frac{1}{R_{45}} + \frac{1}{R_{12}} \Rightarrow$$

$$\Rightarrow \frac{1}{R_{AD}} = \frac{1}{6} + \frac{1}{6} + \frac{1}{3} = \frac{1}{3} + \frac{1}{3} = \frac{2}{3} \Rightarrow$$

$$\Rightarrow R_{AD} = \frac{3}{2} \Omega$$

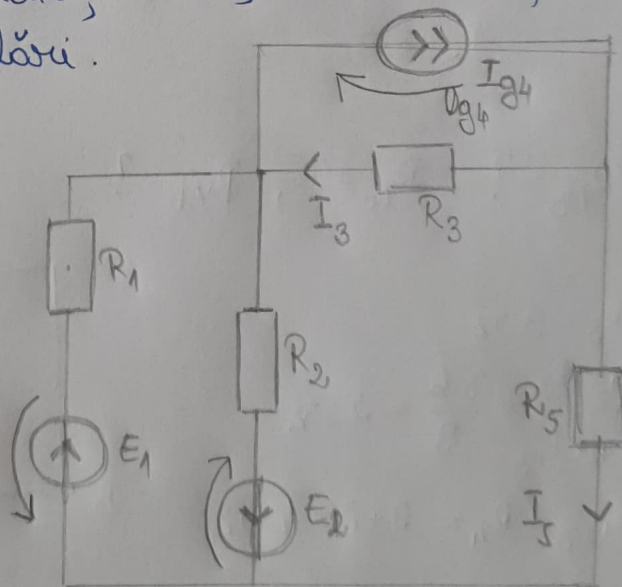
②  $R_1 = 2 \Omega$ ,  $R_2 = 22 \Omega$ ,  $R_3 = 4 \Omega$ ,  $R_5 = 3 \Omega$ ,  $E_1 = 25V$ ,  $E_2 = 5V$ ,  $I_{g4} = 1A$ . Calculați curenții  $I_3$  și  $I_5$  folosind o succesiune de echivalări.

$$R_{12} = \frac{R_1 \cdot R_2}{R_1 + R_2} = \frac{2 \cdot 22}{24} =$$

$$= \frac{11}{6} \Omega$$

$$E_{12} = \frac{E_1 R_2 - E_2 R_1}{R_1 + R_2} =$$

$$= \frac{25 \cdot 22 - 5 \cdot 2}{24} = \frac{540 - 10}{24} = \frac{530}{24} = \frac{265}{12} V$$



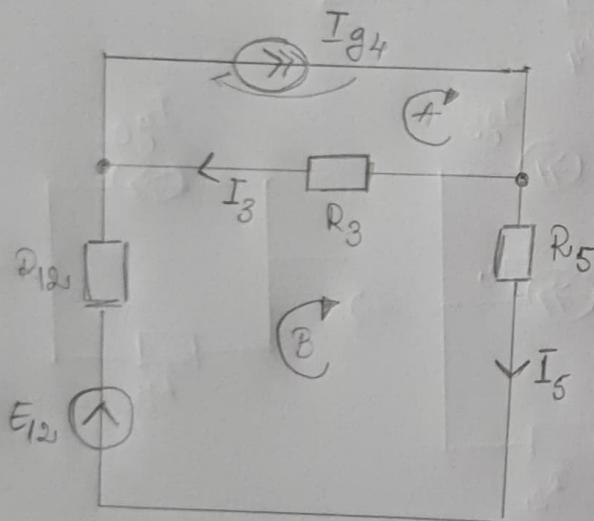
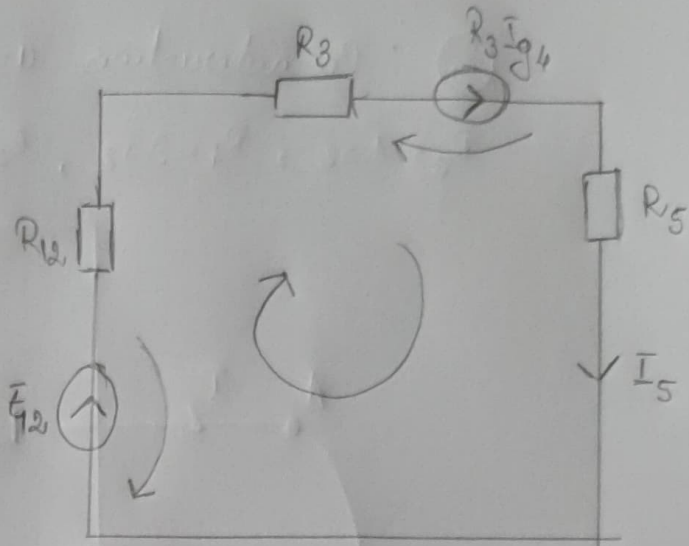


$$I_5(R_3 + R_5 + R_{12}) - R_3 I_{g4} - E_{12} = 0 \Rightarrow$$

$$\Rightarrow I_5 = \frac{R_3 I_{g4} + E_{12}}{R_3 + R_5 + R_{12}} =$$

$$= \frac{4 + \frac{265}{12}}{4 + 3 + \frac{11}{6}} = \frac{\frac{48 + 265}{12}}{\frac{42 + 11}{6}} =$$

$$= \frac{\frac{313}{12}}{\frac{53}{6}} = \frac{313 \cdot 6}{12 \cdot 53} = \frac{313}{106} \Rightarrow I_5 \approx 3 \text{ A}$$



$$B: I_5(R_5 + R_{12}) - E_{12} - I_3 R_3 = 0 \Rightarrow$$

$$\Rightarrow I_5 = \frac{E_{12} + I_3 R_3}{R_5 + R_{12}} =$$

$$\frac{\frac{265}{12} +}{\frac{11}{6} +}$$

$$I_3 = \frac{I_5(R_5 + R_{12}) - E_{12}}{R_3} =$$

$$= \frac{3 \left( 3 + \frac{11}{6} \right) - \frac{265}{12}}{4} =$$

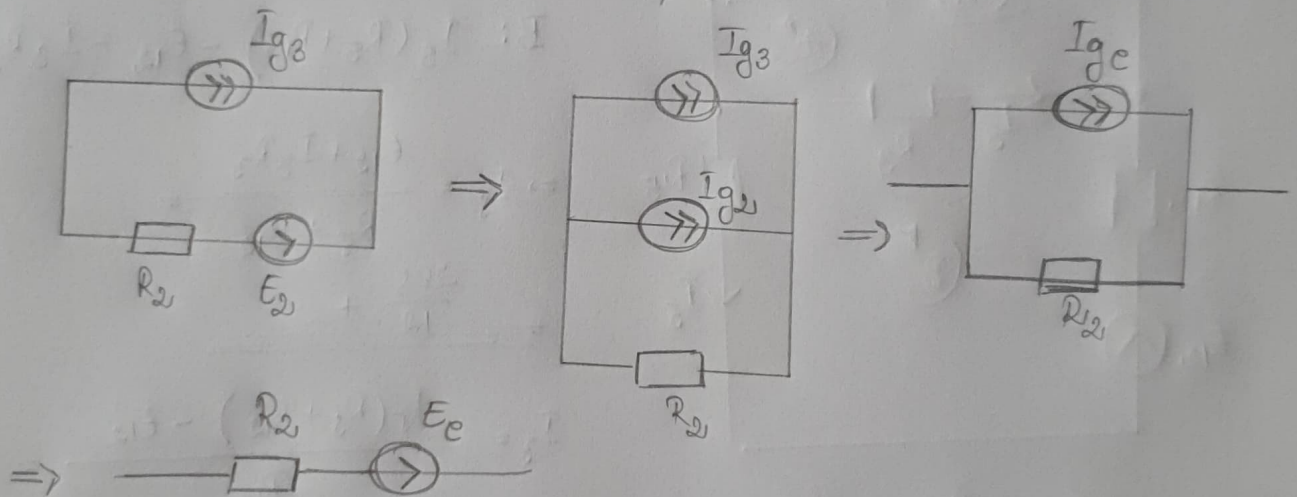
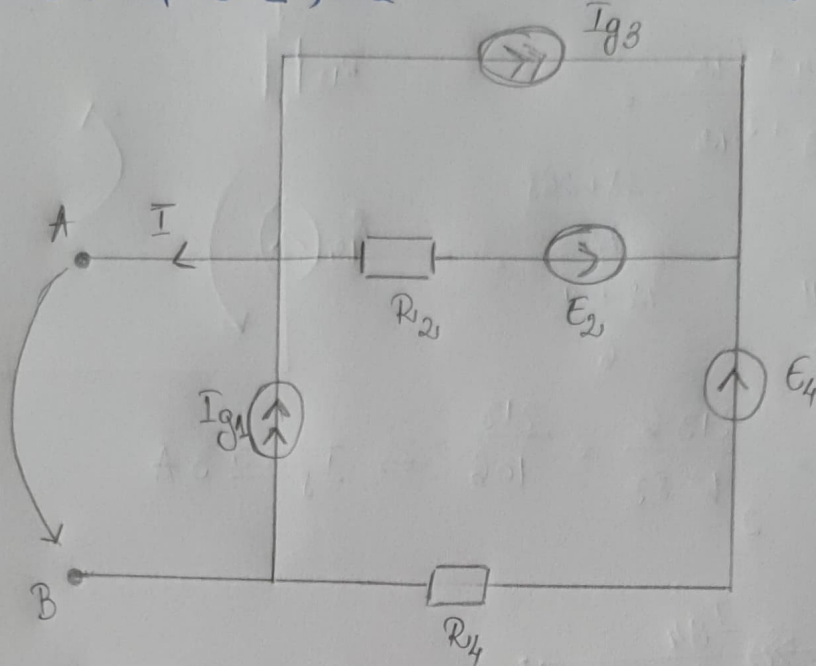
$$9 + \frac{33}{6} - \frac{265}{12} = \frac{108 + 66 - 265}{48} =$$

$$= \frac{174 - 265}{48} = \frac{-91}{48} \approx -2 \text{ A}$$

$$I_5 \approx 3 \text{ A}, \quad I_3 \approx -2 \text{ A}$$

③. Característica u-i = ?

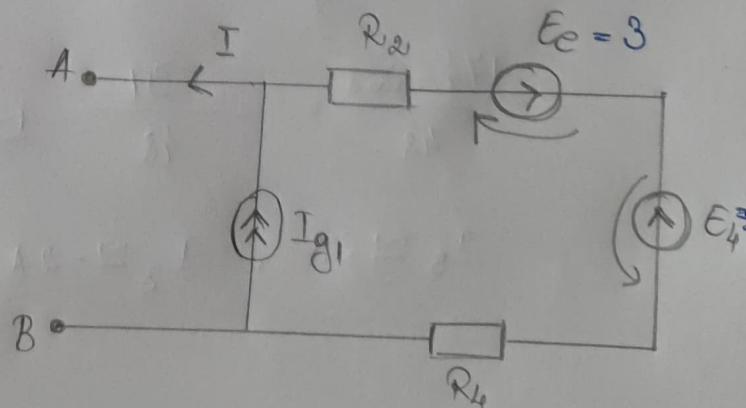
$R_2 = 1\Omega$ ,  $R_4 = 3\Omega$ ,  $E_2 = 2V$ ,  $E_4 = 3V$ ,  $I_{g1} = 3A$ ,  $I_{g3} = 1A$ .

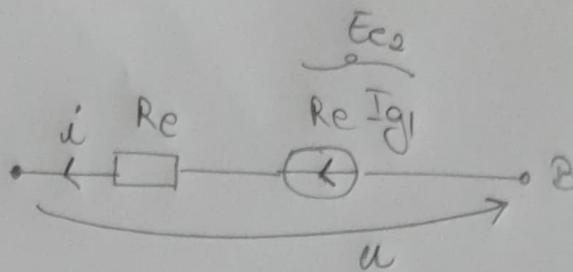
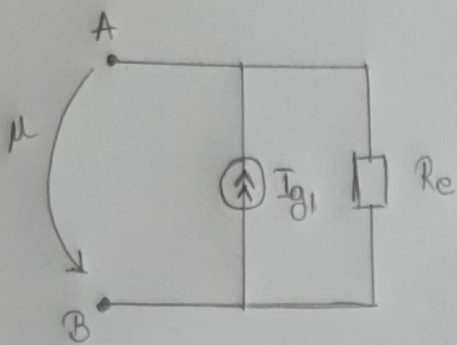


$$I_{ge} = \frac{E_2}{R_2} + I_{g3} = \frac{2}{1} + 1 = 3A$$

$$E_c = R_2 \cdot I_{ge} = 3V$$

$$R_e = R_2 + R_4 = 1 + 3 = 4\Omega$$

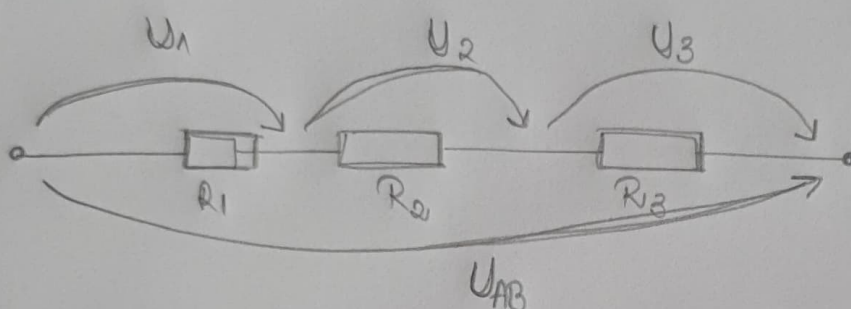




$$u = E_{g2} - R_e \cdot i \Rightarrow i = \frac{E_{g2} - u}{R_e} \Rightarrow$$

$$\Rightarrow i = \frac{12 - u}{4} \Rightarrow i = 3 - \frac{1}{4} u$$

④  $R_1 = 2\Omega, R_2 = 3\Omega, R_3 = 5\Omega, U_{AB} = 20V, U_2 = ?$



$$U_2 = U \cdot \frac{R_2}{R_e} = 20 \cdot \frac{3}{10} = 6V$$

$$U_{AB} = U_1 + U_2 + U_3 \Rightarrow U_{AB} = R_1 I + R_2 I + R_3 I =$$

$$\Rightarrow I = \frac{U_{AB}}{R_1 + R_2 + R_3} = \frac{20}{10} = 2A \Rightarrow U_2 = IR_2 = 3 \cdot 2 = 6V$$

$R_1 = 4\Omega, R_2 = 8\Omega, R_3 = 12\Omega, I = 11A, I_2 = ?$

$$G_1 = \frac{1}{4}S, G_2 = \frac{1}{8}S, G_3 = \frac{1}{12}S$$

$$I_2 = I \cdot \frac{G_2}{G_1 + G_2 + G_3} =$$

$$= 11 \cdot \frac{\frac{1}{8}}{\frac{1}{4} + \frac{1}{8} + \frac{1}{12}} = 11 \cdot \frac{12^2}{8 \cdot 6} = \frac{11}{4} A$$

