

TEMĂ CURS 5

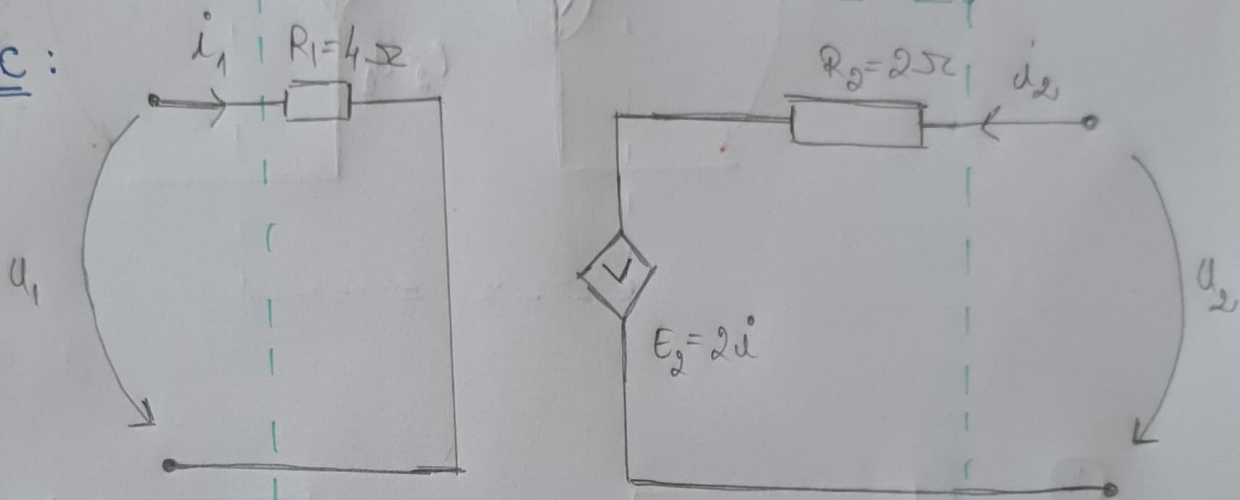
$$U = IR, G = \frac{1}{R}$$

① a)
$$\begin{bmatrix} u_1 \\ u_2 \end{bmatrix} = \begin{bmatrix} 4 & 0 \\ -2 & 2 \end{bmatrix} \begin{bmatrix} \dot{u}_1 \\ \dot{u}_2 \end{bmatrix}$$

$$\begin{cases} R_1 = 4\Omega, & R_2 = 2\Omega \\ E_1 = 0 & E_2 = -2\dot{u} \end{cases}$$

$$\begin{bmatrix} u_1 \\ u_2 \end{bmatrix} = \begin{bmatrix} 4\dot{u}_1 \\ -2\dot{u}_1 + 2\dot{u}_2 \end{bmatrix} \Rightarrow \begin{cases} u_1 = 4\dot{u}_1 \\ u_2 = -2\dot{u}_1 + 2\dot{u}_2 \end{cases}$$

STCC:

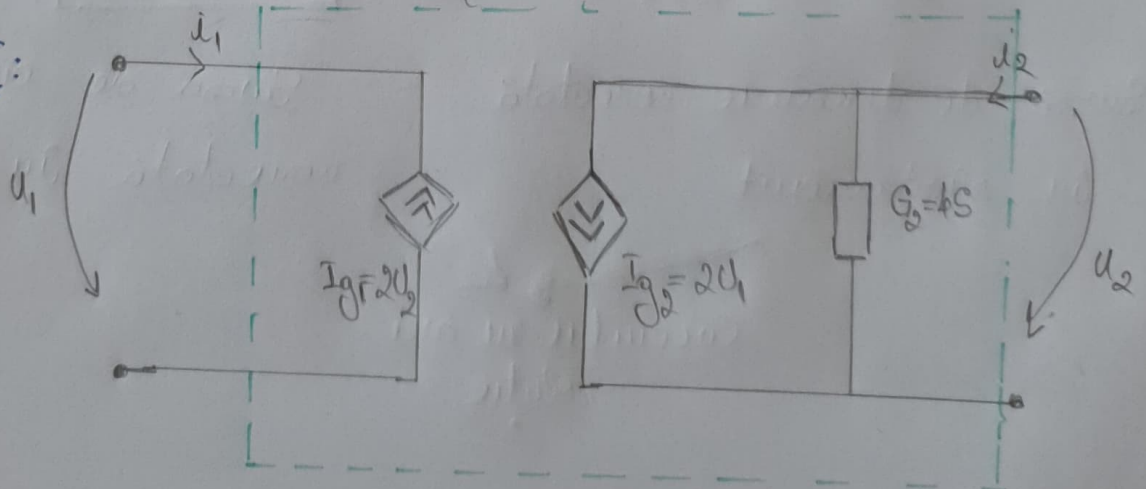


b)
$$\begin{bmatrix} \dot{u}_1 \\ \dot{u}_2 \end{bmatrix} = \begin{bmatrix} 0 & -2 \\ 2 & 4 \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \end{bmatrix}$$

$$\begin{cases} \dot{u}_1 = -2u_2 \\ \dot{u}_2 = 2u_1 + 4u_2 \end{cases}$$

$$\begin{cases} R_1 = 0\Omega, & I_{g1} = -2u_2 \\ G_2 = 4S, & I_{g2} = 2u_1 \end{cases}$$

SCCT:



$$\underline{G_1 = 0.5} \quad \underline{I_{g1} = -I_2}$$

$$E_2 = U_1, \quad R = 0.5 \Omega$$

Diagram for Example 1: Two coupled loops. The left loop contains a voltage source U_1 and a current i_1 . The right loop contains a voltage source U_2 and a current i_2 . The mutual inductance is $M_{12} = -\frac{1}{2}$. The induced EMF in the second loop is $E_2 = U_1$.

2V
E

2A

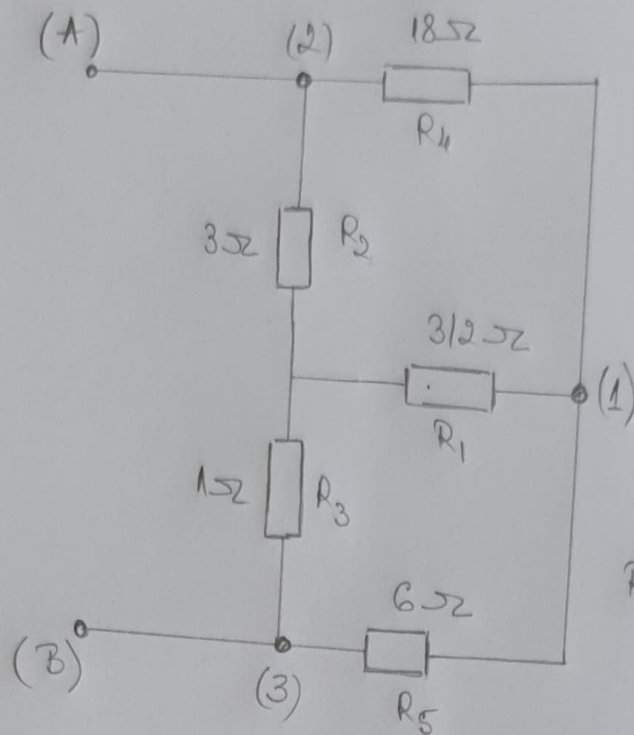
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⊕

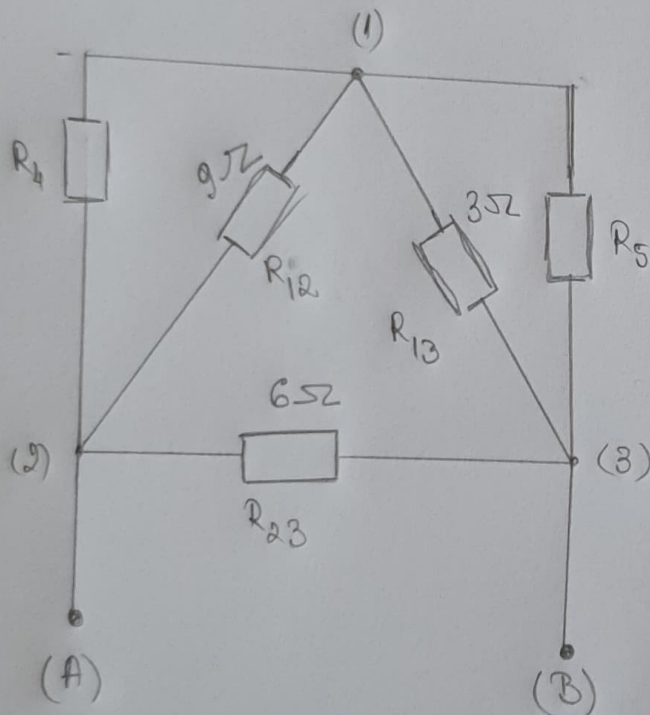
Sursa de curent
conectată în gol

Circuit me over
solution

③ $R_{AB} = ?$



$$R_1 R_2 + R_2 R_3 + R_3 R_1 = \frac{9}{2} + 3 + \frac{3}{2} = 9 \Omega$$



$$R_{12} = \frac{R_1 R_2 + R_1 R_3 + R_2 R_3}{R_2} = \frac{9}{3} = 3 \Omega$$

$$R_{12} = \frac{R_1 R_2 + R_1 R_3 + R_2 R_3}{R_3} = \frac{9}{1} = 9 \Omega$$

$$R_{32} = \frac{R_1 R_2 + R_1 R_3 + R_2 R_3}{R_1} = \frac{9}{\frac{3}{2}} = \frac{18}{3} = 6 \Omega$$

$$R_{124} = \frac{R_4 \cdot R_{12}}{R_4 + R_{12}} = \frac{6 \cdot 9}{6 + 9} = \frac{54}{15} = \frac{18}{5} \Omega$$

$$R_{135} = \frac{R_5 \cdot R_{13}}{R_5 + R_{13}} = \frac{6 \cdot 3}{6 + 3} = \frac{18}{9} = 2 \Omega$$

$$R_{e1} = R_{124} + R_{135} = \frac{18}{5} + 2 = \frac{28}{5} \Omega$$

$$R_e = \frac{R_{e1} \cdot R_{23}}{R_{e1} + R_{23}} = \frac{\frac{28}{5} \cdot 6}{\frac{28}{5} + 6} = \frac{168}{58} = \frac{84}{29} \Omega$$

