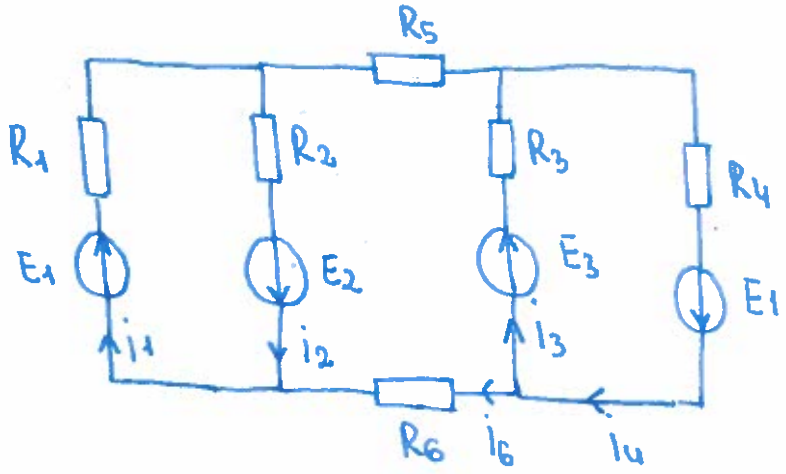
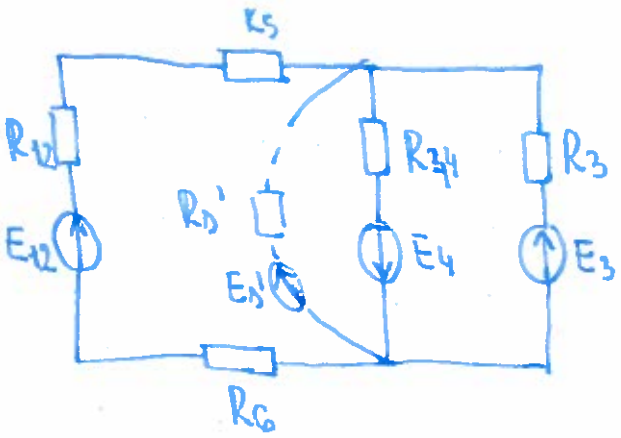
BE SEMINAR 2



R (Ω)	I (A)	E (V)
$R_1 = 10\Omega$	$I_1 = 9$	$E_1 = 135$
$R_2 = 10\Omega$	$I_2 = 7$	$E_2 = 25$
$R_3 = 10\Omega$	$I_3 = 7$	$E_3 = 85$
$R_4 = 10\Omega$	$I_4 = 9A$	$E_4 = 75$
$R_5 = 10\Omega$	$I_5 = 2$	
$R_6 = 5\Omega$	$I_C = 2$	



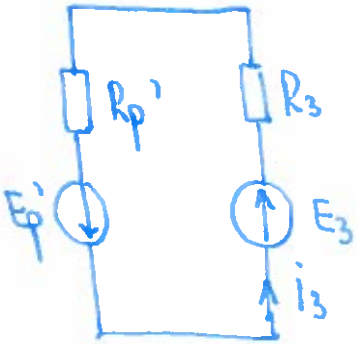
$$R_{12} = \frac{R_1}{2} = 5\,\Omega$$

$$E_{12} = \frac{E_1 G_1 - E_2 G_2}{G_1 + G_2} = \frac{E_1 R_2 - E_2 R_1}{R_1 + R_2}$$

$$= \frac{135 \cdot 10 - 25 \cdot 10}{2 \cdot 10} = 55\,V$$

$$R_1' = R_5 + R_6 + R_{12} = 5 + 5 + 10 = 20\,\Omega$$

$$E_1' = E_{12} = 55\,V$$

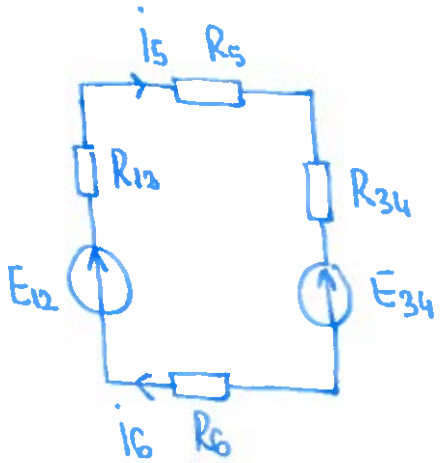


$$R_p' = \frac{R_1' \cdot R_4}{R_1' + R_4} = \frac{20 \cdot 10}{30} = \frac{20}{3}\,\Omega$$

$$E_p' = \frac{-E_1' G_1' + E_4 G_4}{G_1' + G_4} = \frac{-E_1' R_4 + E_4 R_1'}{R_4 + R_1'}$$

$$E_p' = \frac{-55 \cdot 10 + 75 \cdot 20}{30} = \frac{95}{3}$$

$$i_3 = \frac{E_3 + E_p'}{R_p' + R_3} = \frac{85 + \frac{95}{3}}{10 + \frac{20}{3}} = \frac{350}{50} = 7\,A$$



$$i_5 = i_6 = \frac{E_{12} - E_{34}}{R_{12} + R_5 + R_6 + R_{34}} = \frac{55 - 5}{5 + 15 + 5} = 50\,V = E_e$$

$$R_{12} + R_5 + R_6 + R_{34} = 25\,\Omega$$

$$i_5 = i_6 = \frac{E_e}{R_e} = \frac{50}{25} = 2\,A$$

$I_2 = ?$

$i_4 = ?$

I_2 From the downside node, KCL says:

$$I_2 + I_6 = I_1 \Rightarrow I_2 = I_1 - I_6 = 9 - 2 = 7\,A$$

i_4 $$i_4 = i_6 + i_3 = 2 + 7 = 9\,A$$

$U_{AB} = -R_1 i_1 + E_1$

$= R_2 i_2 - E_2$

$U_{BA} = R_1 i_1 - E_1$

$= E_2 - R_2 i_2$

$U_{AB} =$

$U_{BA} =$

$U_{CD} =$

$U_{DC} =$

$U_{BC} =$

$U_{CB} =$