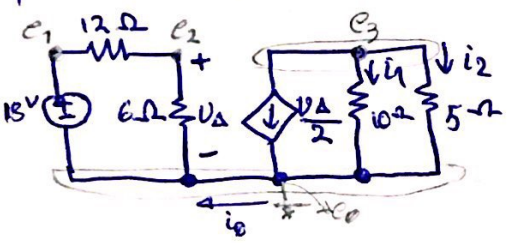
تمرینات سری دوم

علی فرجی پور - 9631407

۱) در مدار شکل زیر i_0 ، i_1 ، i_2 را پیدا کنید.



$e_1 = 18^V$

$e_2)\ \frac{e_1-e_2}{12} + \frac{e_2}{6} = 0 \xrightarrow{e_1=18^V} e_2 = 6^V \xrightarrow{e_2=V_\Delta} V_\Delta = 6^V$

$e_3)\ \frac{V_\Delta}{2} + \frac{e_3}{10} + \frac{e_3}{5} = 0 \Rightarrow e_3 = -10^V$

$i_1 = \frac{e_3}{10} = -1^A$ ، $i_2 = \frac{e_3}{5} = -2^A$

$e_0)\ i_0 - \frac{V_\Delta}{2} - i_1 - i_2 = 0 \Rightarrow i_0 - 3 - (-1) - (-2) = 0$

$\Rightarrow i_0 = 0^A$

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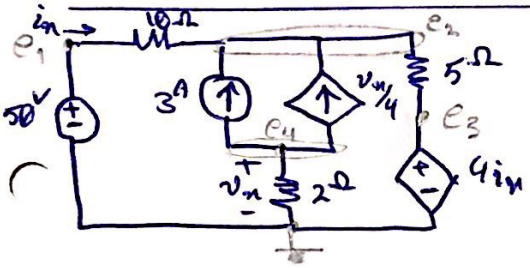
۲) در مدار شکل زیر V_x ، i_x را پیدا کنید.



$e_1 = 50^V$ ، $i_x = \frac{e_2-e_1}{10}$

$e_4)\ 3 + \frac{V_x}{4} + \frac{e_4}{2} = 0 \xrightarrow{e_4=V_x} V_x = -4$

$e_2)\ \frac{e_2-e_1}{10} - 3 - \frac{V_x}{4} + \frac{e_2-e_3}{5} = 0$ ($\frac{V_x}{4} = \frac{-4}{4}$)

$e_3 = 4i_x = 4\left(\frac{e_1-e_2}{10}\right)$

$\Rightarrow e_2 = \frac{1100}{38}^V$

$i_x = \frac{e_1-e_2}{10} = \frac{40}{19} = 2.105^A$

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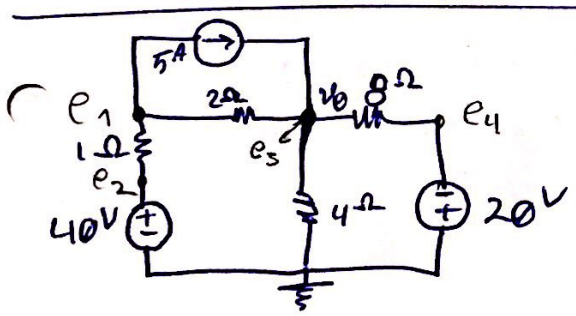
۳) مقدار ولتاژ V_0 را محاسبه کنید.



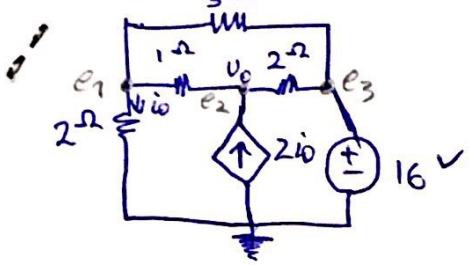
$e_2 = 40^V$ ، $e_4 = -20^V$

$e_1)\ \frac{e_1-e_2}{1} + 5 + \frac{e_1-e_3}{2} = 0 \Rightarrow 3e_1 - e_3 = 70^V$

$e_3)\ \frac{e_3-e_1}{2} - 5 + \frac{e_3-e_4}{8} + \frac{e_3}{4} = 0 \Rightarrow 7e_3 - 4e_1 = 20^V$

$\Rightarrow e_1 = 30^V$ ، $e_3 = 20^V$

$V_0 = e_3 = 20^V$



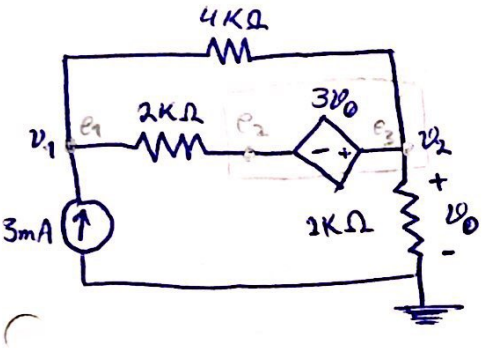
4) در مدار شکل زیر v_0 و i_0 را پیدا کنید.

$e_3 = 16^V$, $i_0 = \frac{e_1}{2}$

e_1) $\frac{e_1}{2} + \frac{e_1 - e_2}{1} + \frac{e_1 - e_3}{3} = 0 \Rightarrow 11e_1 - 6e_2 = 32^V$

e_2) $\frac{e_2 - e_1}{1} - 2i_0 + \frac{e_2 - e_3}{2} = 0 \Rightarrow 3e_2 - 4e_1 = 16^V$ ($i_0 = \frac{e_1}{2}$)

$\Rightarrow e_1 = \frac{64}{3}$, $i_0 = \frac{e_1}{2}$ $\Rightarrow$ $\boxed{i_0 = \frac{32}{3}}$, $\boxed{e_2 = \frac{304}{9} = v_0}$



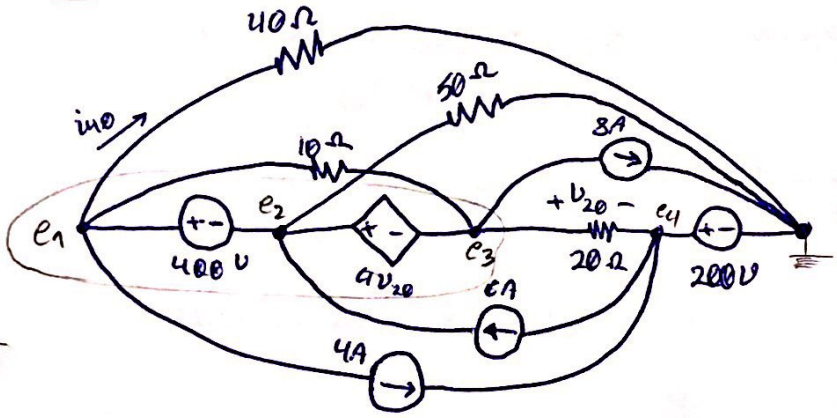
5) مقدار ولتاژهای v_1 , v_2 را به دست آورید.

$e_3 = v_0$, $e_3 - e_2 = 3v_0 \Rightarrow e_2 = -2e_3$

e_1) $-3mA + \frac{e_1 - e_2}{2\times10^3} + \frac{e_1 - e_3}{4\times10^3} = 0 \Rightarrow e_1 + e_3 = 4$

ابرگره e_2 و e_3) $\frac{e_2 - e_1}{2\times10^3} + \frac{e_3 - e_1}{4\times10^3} + \frac{e_3}{10^3} = 0 \Rightarrow e_3 = 3e_1$

$\Rightarrow \boxed{e_1 = 1^V = V_1}$, $\boxed{e_3 = 3^V = v_2}$



6) در مدار شکل زیر v_{20} را پیدا کنید.

$e_4 = 200^V$

$e_1 - e_2 = 400^V$ (I)

$e_2 - e_3 = 4v_{20}$, $\frac{e_3 - e_4}{20} = v_{20}$ $\Rightarrow e_2 - e_3 = 4\left(\frac{e_3 - e_4}{20}\right) \Rightarrow 6e_3 - 5e_2 = 200$ (II)

e_1, e_2, e_3 ابرگره) $\frac{e_1}{40} + 4 - 6 + \frac{e_2}{50} + 8 + \frac{e_3 - e_4}{20} = 0 \Rightarrow 5e_1 + 4e_2 + 10e_3 = 800$ (III)

(I), (II), (III) $\Rightarrow e_3 = -\frac{525}{13}$ $\Rightarrow e_2 = \frac{-3670}{13}$ $\Rightarrow e_1 = \frac{1550}{13}$

$\frac{e_3 - e_4}{20} = v_{20}$ $\Rightarrow v_{20} = \frac{-2125}{260} = -\frac{425}{52}$