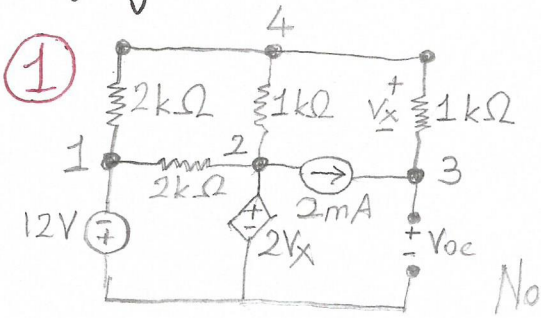
Ertuğrul KANTAR
05190000086
Ertuğrul

Ödev 3

① 

$V_1 = -12V$ (I) $V_2 = 2V_x \rightarrow \frac{V_2}{2} = V_x$ (II)

$V_x = V_4 - V_3$ (III) $V_{oc} = V_3$

Node-3 $\rightarrow \frac{V_3 - V_4}{1k} - \frac{2}{1k} = 0 \rightarrow V_3 - V_4 - 2 = 0$ (IV)

Node-4 $\rightarrow \frac{V_4 - V_1}{2k} + \frac{V_4 - V_2}{1k} + \frac{V_4 - V_3}{1k} = 0 \rightarrow$

$\rightarrow V_4 - V_1 + 2V_4 - 2V_2 + 2V_4 - 2V_3 = 0$

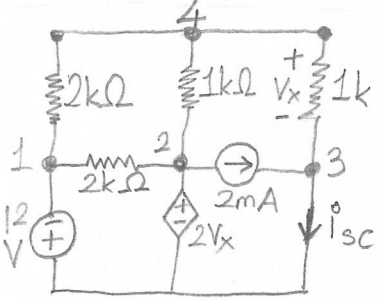
$5V_4 - V_1 - 2V_2 - 2V_3 = 0$ (V)

Denklem Çözümleri: (III) ve (II) $\rightarrow \frac{V_2}{2} - V_4 + V_{oc} = 0$ ①

(IV) $\rightarrow V_{oc} - V_4 - 2 = 0$ ②

(V) ve (I) $\rightarrow 5V_4 + 12 - 2V_2 - 2V_{oc} = 0$ ③

Denklemler çözülürse, $V_2 = -4V$ $V_4 = -\frac{16}{3}V$ $\boxed{V_{oc} = -\frac{10}{3}V}$ ★



$V_1 = -12V$ (I) $\frac{V_2}{2} = V_x$ (II) $V_x = V_4 - V_3$ (III)

(II) ve (III) $\rightarrow V_2 = 2V_4 - 2V_3$ ①

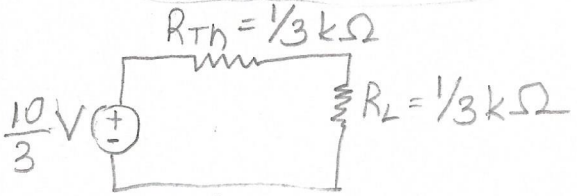
Node-3 $\rightarrow \frac{V_3 - V_4}{1k} - \frac{2}{1k} + i_{sc} = 0 \rightarrow V_3 - V_4 - 2 + 1k \cdot i_{sc} = 0$ ②

Node-4 $\rightarrow \frac{V_4 + 12}{2k} + \frac{V_4 - V_2}{1k} + \frac{V_4 - V_3}{1k} = 0 \rightarrow 5V_4 - 2V_2 - 2V_3 + 12 = 0$ ③

$V_3 = 0$ ④ → Hocam bunu sonra fark ettim... ★

①, ②, ③, ④ ten $V_2 = -24$ $V_4 = -12$ $\boxed{i_{sc} = -10\,mA}$

$R_{Th} = \frac{\frac{-10}{3}}{\frac{-10}{1000}} = 333.3\,\Omega = \frac{1}{3}k\Omega$



$P_L = \frac{(5/3)^2}{\frac{1000}{3}} = \frac{1}{120}\,W = 8{,}33\,mW$

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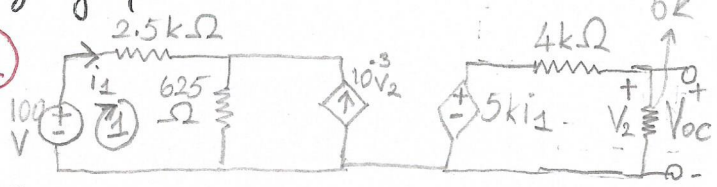
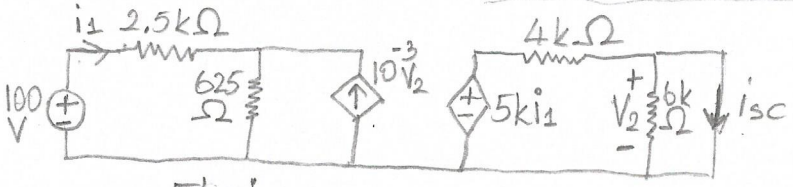
Soluşul

② 

Mesh-I → $2500 i_1 + 625(i_1 + 10^{-3} V_2) - 100 = 0$ ①

$\frac{5000 i_1}{10k} \cdot 6k = V_{oc}$ ②

① ve ② Çözüldüğünde, $\boxed{V_{oc} = 60\,V}$ $i_1 = 20\,mA$



$V_2 = 0$

$i_1 = \frac{100}{2,5k + 625} = 32\,mA$

$i_{sc} = \frac{5k \cdot i_1}{4k} = \frac{5}{4} \cdot 32\,mA = \underline{40\,mA}$

$R_{Th} = \frac{60}{\frac{40}{1000}} = 1500\,\Omega$ ⟶