1($\overset{3-}{21}$ Hayt) $V_x = ?$

500mA
7.3 Ω
2 Ω
2.5V
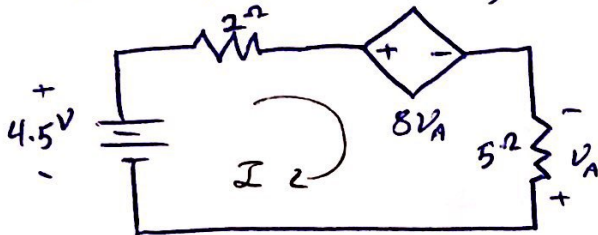1 Ω
2 Ω
V_x $\uparrow$ i_x
I_1
I_2
I_3

I_1) $-2.3 + 7.3 I_1 + 1(I_1 - I_2) = 0$

I_2) $1(I_2 - I_1) + 2I_2 + 2(I_2 - I_3) = 0$

I_3) $2(I_3 - I_2) + V_x = 0$

$\Rightarrow I_2 = 1.85^A$, $I_3 = 4.375^A$, $\boxed{V_x = -8.75^V}$

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2 (3-26)) Power absorbed by each element ?

2 Ω
4.5V
$8V_A$
5 Ω
V_A
I

I) $-4.5 + 2I + 8V_A - V_A = 0$

$\Rightarrow I = \dfrac{4.5 - 7V_A}{2}$ (I)

I) $-4.5 + 2I + 8V_A + 5I = 0$

$\Rightarrow I = \dfrac{4.5 - 8V_A}{7}$ (II)

(I), (II) $\Rightarrow V_A = \dfrac{22.5}{33} = \dfrac{15}{22}$ $\Rightarrow I = -\dfrac{6}{44} = -\dfrac{3}{22}$

4.5^V) $P = V \cdot I = 4.5 \times (-\dfrac{3}{22}) = -\dfrac{13.5}{22}$ w

2Ω) $P = V \cdot I = (R \cdot I) \cdot I = 2 \times (-\dfrac{3}{22})^2 = \dfrac{18}{484} = \dfrac{9}{242}$ w

$8V_A$) $P = V \cdot I = 8V_A \times I = 8 \times \dfrac{15}{22} \times (-\dfrac{3}{22}) = -\dfrac{360}{484} = \dfrac{-90}{121}$ w
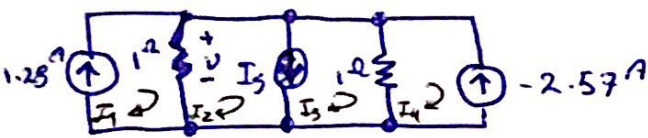
5Ω) $P = V \cdot I = (R \cdot I) \cdot I = 5 \times (-\dfrac{3}{22})^2 = \dfrac{45}{484}$

$= (-V_A) \cdot I = \dfrac{-15}{22} \times \dfrac{-3}{22} = \dfrac{45}{484}$

3 ($3-40$ Hayt)) $I_S = ?$ $\Rightarrow V = 0$

$I_1 = 1.28^A$, $I_2 - I_3 = I_5$, $I_4 = 2.57^A$

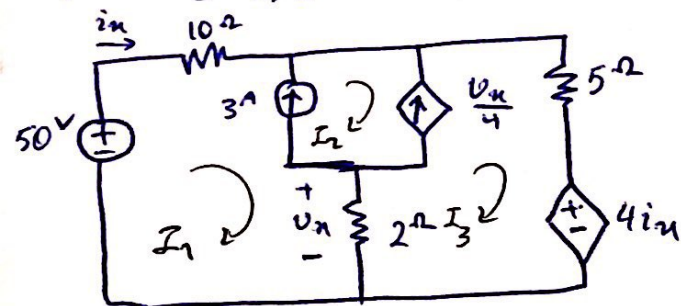چون درخانه‌هایی که شامل منبع جریان هستند نمی‌توان KVL نوشت، آنها را درنظر نمی‌گیریم.

$I_2 = 1.28^A \Leftarrow I_1 - I_2 = 0$ ؛ V، مقاومت 1^Ω سمت چپ مغناست. اگر $V = 0$ باشد، پس جریان عبوری (ازمقاومت 1^Ω سمت چپ)

$2,3) 1(I_2 - I_1) + 1(I_3 - I_4) = 0 \Rightarrow I_3 = I_4 = 2.57^A$ $\left.\begin{array}{l} \\ I_5 = I_2 - I_3 \end{array}\right\} \Rightarrow I_5 = 1.28 - 2.57 = -1.29^A$

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4) V_x، i_x، $I(د,م)$، شکل زیر پیدا کنید.

بدون درنظر گرفتن منابع جریان (یکطرفه) : $I_1 = i_x$

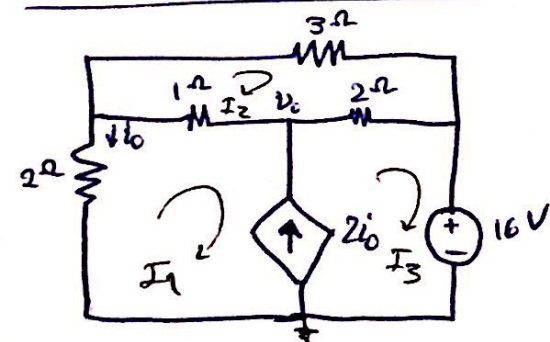$-50 + 10 i_x + 5 i_x + 4 i_x = 0 \Rightarrow i_x = \dfrac{50}{19}$

$\xrightarrow{I_1 = i_x} i_x = \dfrac{50}{19}$

$I_2 - I_1 = 3^A \Rightarrow I_2 = \dfrac{107}{19}$ A

$I_3 - I_2 = \dfrac{V_x}{4}$, $2^\Omega) I_2 - I_3 = \dfrac{V_x}{2}$

$\xrightarrow{+} I_1 - I_2 = \dfrac{3 V_x}{4} \Rightarrow \dfrac{50}{19} - \dfrac{107}{19} = \dfrac{3 V_x}{4} \Rightarrow V_x = -4$

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5) درمدار شکل زیر V_0 , i_0 را پیدا کنید. $I_1 = -i_0$, $I_3 - I_1 = 2 i_0$

$\Rightarrow I_3 = i_0$
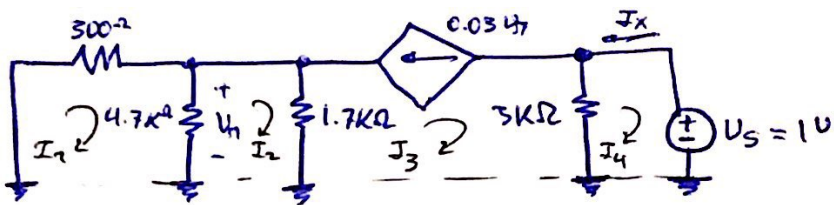
$1,3)\ 2 I_1 + 1(I_1 - I_2) + 2(I_1 - I_2) + 16 = 0$

$\Rightarrow 3 I_2 - 5 I_1 = 16$ ①

$2)\ 3 I_2 + 2(I_2 - I_3) + 1(I_2 - I_1) = 0 \xrightarrow{I_3 = I_1}$

$\Rightarrow 6 I_2 - 3 I_1 = 0 \Rightarrow I_2 = \dfrac{1}{2} I_1$ ②

$①,② \Rightarrow \boxed{I_1 = -\dfrac{32}{7} = i_0}$

$2^\Omega)\ V = RI \Rightarrow V_0 - 16 = 2(I_3 - I_2)$

$\xrightarrow[I_2 = \frac{1}{2} I_1]{I_3 = -I_1} V_0 - 16 = \dfrac{96}{7} \Rightarrow \boxed{V_0 = \dfrac{208}{7} V}$

Top circuit labels: 300Ω, $4.7k\Omega$, V_π, $1.7k\Omega$, $0.03V_\pi$, $3k\Omega$, I_x, $V_s = 10$, currents I_1, I_2, I_3, I_4

6) مطلوب تعيين I_x ، إبتدائياً.

$I_3 = -0.03 V_\pi$ ، $I_4 = -I_x$

1) $300\,I_1 + V_\pi = 0 \implies I_1 = -\dfrac{V_\pi}{300}$

2) $4.7K(I_2 - I_1) + 1.7K(I_3 - I_2) = 0 \implies I_2 = \dfrac{V_\pi}{750}$

$300\,I_1 = 4.7K(I_2 - I_1)$ ← مقاومتي 300Ω ، $4.7k\Omega$ على التوازي وجهدهما واحد بالطبع

$\implies 300 \times \left(-\dfrac{V_\pi}{300}\right) = 4700\left(\dfrac{V_\pi}{750} + \dfrac{V_\pi}{300}\right) \implies V_\pi = 0 \implies \boxed{I_1 = I_2 = I_3 = 0^A}$

4) $3K\,I_4 + 1 = 0 \implies I_4 = -\dfrac{1}{3000} A \xRightarrow{I_4 = -I_x} I_x = \dfrac{1}{3000}$
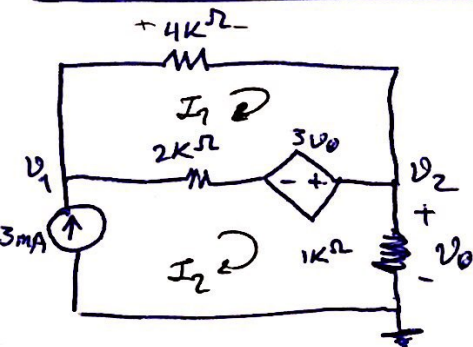
Middle circuit labels: $+4K\Omega-$, I_1, $2K\Omega$, $3V_\theta$, V_1, V_2, $3mA$, I_2, $1K\Omega$, V_θ

$I_2 = 3mA$

7) مطلوب، وتعيين جهدي V_1 ، V_2 {بنفس السياق أدناه}.

I_1) $4K\,I_1 + 3V_\theta + 2K(I_1 - I_2) = 0$

$\implies I_1 = \dfrac{2 - V_\theta}{2000}$

$1K\Omega$) $V = RI \implies V_\theta = 1k \times 3mA = 3V \implies I_1 = \dfrac{-1}{2000}$

$4K\Omega$) $V = RI \implies V_2 - V_2 = 4k \times \dfrac{-1}{2000} = -2 \implies$ $\implies \boxed{V_2 = 3V}$

$\implies V_1 = 1V$

Bottom circuit labels: 12Ω, $18V$, 6Ω, V_Δ, $\dfrac{V_\Delta}{2}$, 10Ω, 5Ω, I_1, I_2, i_1, i_2, i_3, i_0

$I_2 = -\dfrac{V_\Delta}{2}$

8) مطلوب تعيين i_0 ، i_1 ، i_2 ، إبتدائياً.
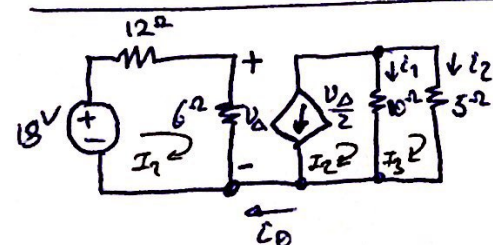
I_1) $-18 + 12\,I_1 + 6\,I_1 = 0 \implies I_1 = 1^A$

6Ω) $V = RI \implies V_\Delta = 6 \times 1 = 6V \implies \boxed{I_2 = -3^A = i_1}$

I_3) $10(I_3 - I_2) + 5\,I_3 = 0 \implies \boxed{I_3 = 2^A = i_2}$ ملاحظة هامة: $i_0 = 0$

9) با استفاده از تحلیل جریان آرام، جریان i_0 از مدار زیر را بدست آورید.
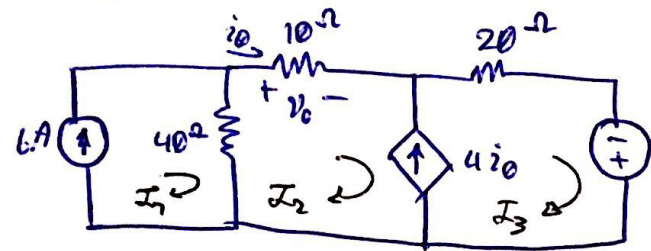
$$I_3 - I_2 = 4i_0 \quad , \quad I_1 = 6\,\text{A}$$
$$I_2 = i_0$$
$$\overline{I_3 = 5i_0}$$

I_2, I_3) $40I_2 + 10I_2 + 20I_3 = 0 \implies i_0 = 0$ ①

[قطع $6\,\text{A}$] $I_3 - I_2 = 4i_0$, I_3) $10I_2 + 10I_2 + 20I_3 - 30 = 0 \implies i_0 = 0.2\,\text{A}$ ②

$$I_2 = i_0$$
$$\overline{I_3 = 5i_0}$$

①, ② $\implies i_0 = 0 + 0.2 = 0.2\,\text{A}$

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