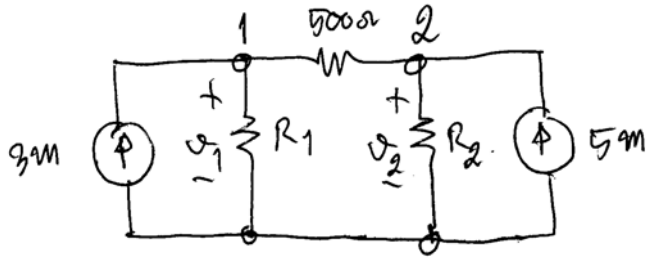
ตัวอย่าง #4

① จง R_1, R_2 ที่ทำให้ $v_1 = 1$, $v_2 = 2$ volt



ที่ Node #1; $\frac{v_1}{R_1} + \frac{v_1 - v_2}{500} = 0.003$ —①

#2; $-\frac{v_1 - v_2}{500} + \frac{v_2}{R_2} = 0.005$ —②

แทน $v_1 = 1V, v_2 = 2V$ ในสมการ ① และ ②

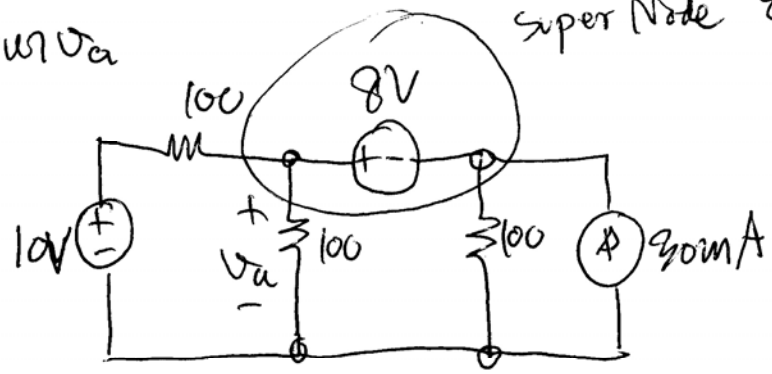
จาก ① $\frac{1}{R_1} + \frac{(1-2)}{500} = 0.003$

$$R_1 = \frac{1}{0.003 + \frac{1}{500}} = 200\Omega$$

จาก ② $\frac{-1+2}{500} + \frac{2}{R_2} = 0.005$

$$R_2 = \frac{2}{0.005 - \frac{1}{500}} = 667\Omega$$

Q หาค่า V_a



Super Node $\Sigma V = 0$

KCL supernode

$$\frac{V_a - 10}{100} + \frac{V_a}{100} + \frac{V_a - 8}{100} = 0.03A$$

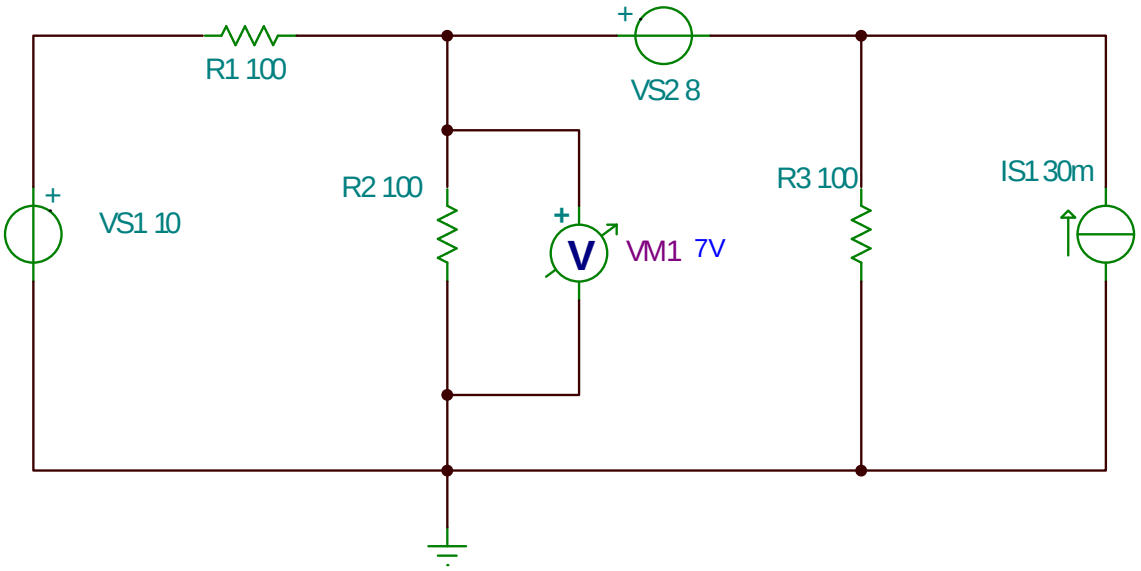
$$\frac{V_a}{100} - \frac{10}{100} + \frac{V_a}{100} + \frac{V_a}{100} - \frac{8}{100} = 0.03A$$

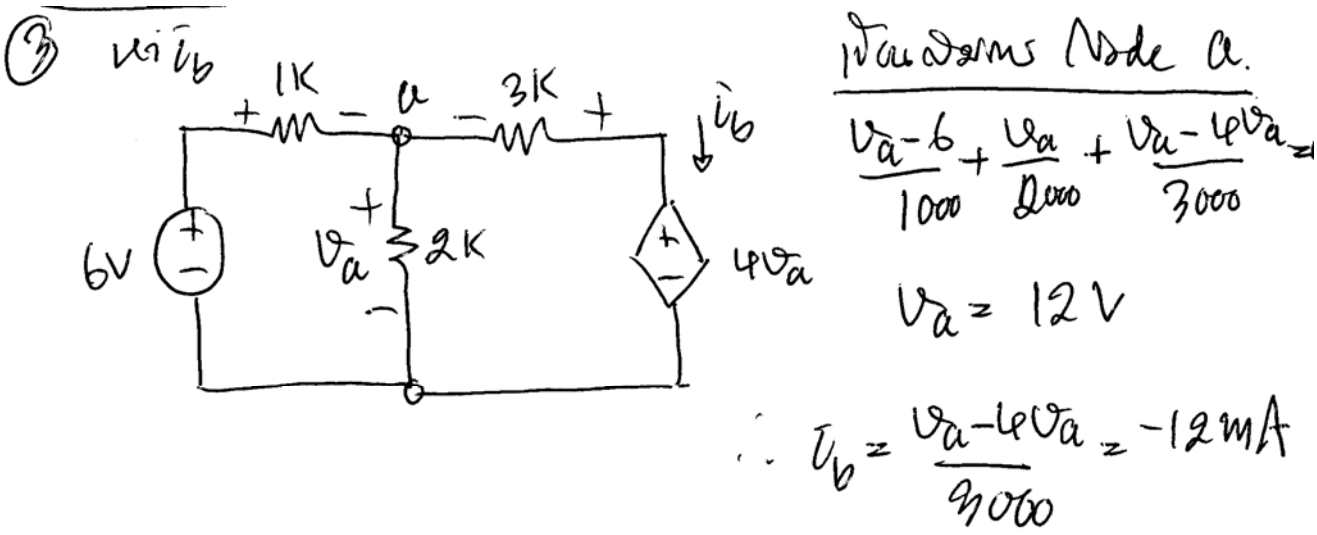
$$\frac{3V_a}{100} = 0.03 + \frac{10}{100} + \frac{8}{100}$$

$$V_a = \frac{100(0.03 + \frac{10}{100} + \frac{8}{100})}{3}$$

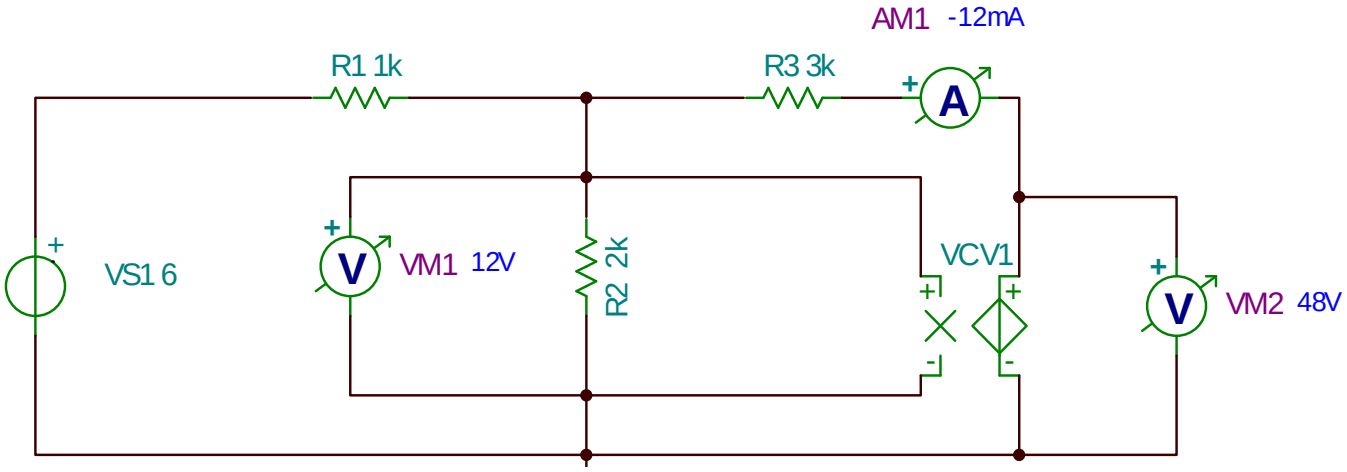
$$= \frac{3 + 10 + \frac{3}{8}}{3} = 7 \text{ Volt}$$

Sim by Tina

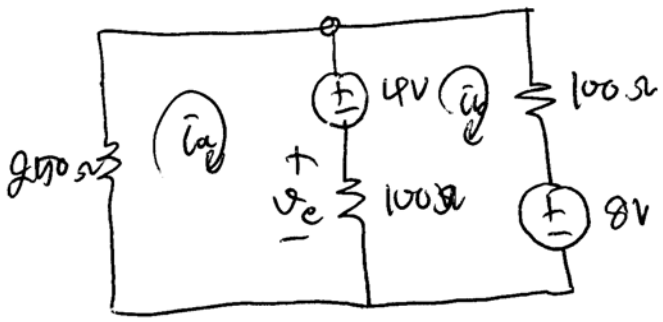



③ หา i_b
1K
a
3K
i_b
6V
v_a
2K
$4v_a$
ใช้ Node a
$\frac{v_a-6}{1000}+\frac{v_a}{2000}+\frac{v_a-4v_a}{3000}=0$
$v_a = 12\,V$
$\therefore i_b = \frac{v_a-4v_a}{3000} = -12\,mA$

Sim by Tina


AM1 -12mA
R1 1k
R3 3k
A
VS1 6
V
VM1 12V
R2 2k
VCV1
V
VM2 48V

ข้อ 4) จงหา i_a และ i_b วิเคราะห์ด้วย KVL



Mesh #1 ⇒ KVL

$$350 i_a - 100 i_b + 4V = 0$$

$$350 i_a - 100 i_b = -4 \quad \text{—①}$$

Mesh #2 ⇒ KVL:

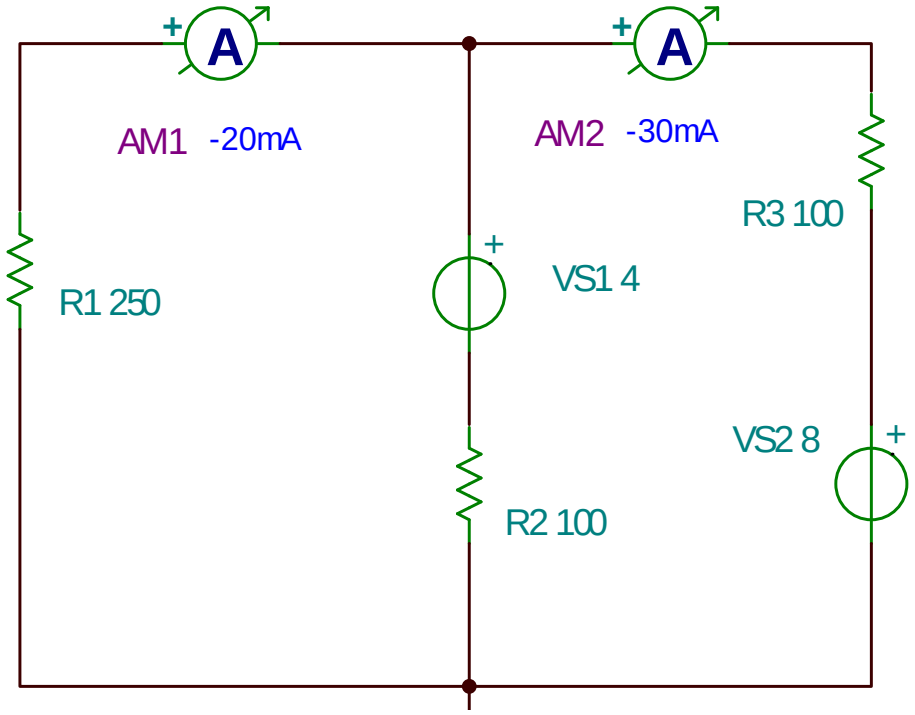
$$-100 i_a + 200 i_b - 4 + 8 = 0$$

$$-100 i_a + 200 i_b = -4 \quad \text{—①}$$

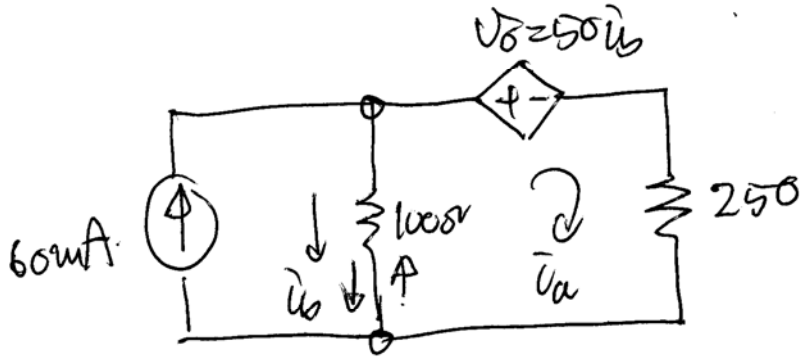
$$\begin{bmatrix} 350 & -100 \\ -100 & 200 \end{bmatrix} \begin{bmatrix} i_a \\ i_b \end{bmatrix} = \begin{bmatrix} -4 \\ -4 \end{bmatrix}$$

$$\begin{bmatrix} i_a \\ i_b \end{bmatrix} = \begin{bmatrix} 350 & -100 \\ -100 & 200 \end{bmatrix}^{-1} \begin{bmatrix} -4 \\ -4 \end{bmatrix} = \begin{bmatrix} -0.02 \\ -0.03 \end{bmatrix}$$

Sim By Tina



ข้อ 5 หาค่า v_o



$i_b = 60mA - i_a$ ——(1)

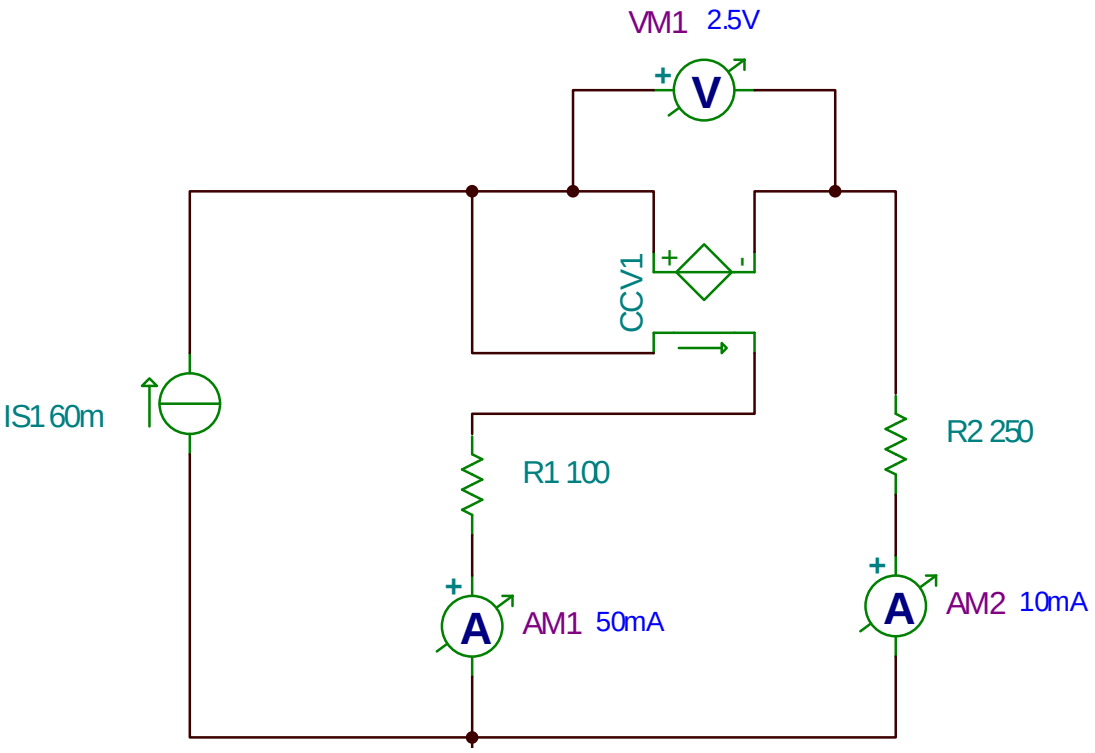
KVL mesh บน :

$-100(0.06 - i_a) + 50(0.06 - i_a) + 250 i_a = 0$

$i_a = 10mA$

แล้ว $v_o = 50 i_b = 50(0.06 - 0.01)$

$= 2.5$ Volt


VM1 2.5V
V
+
CCV1
+
-
IS1 60m
R1 100
R2 250
+
A
AM1 50mA
+
A
AM2 10mA