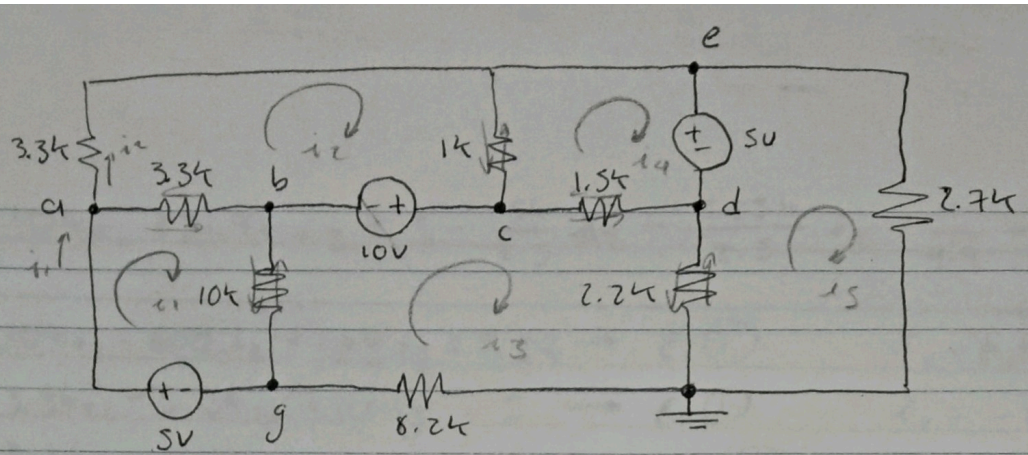


Malla i_1: $3.34(i_1 - i_2) + 10(i_1 - i_3) - 5V = 0$

$13.34 i_1 - 3.34 i_2 - 10 i_3 = 5 \longrightarrow Ec\ (1)$

Malla i_2: $3.34 i_2 + 14(i_2 - i_4) + 10 + 3.34(i_2 - i_1) = 0$

$-3.34 i_1 + 7.64 i_2 - 14 i_4 = -10 \longrightarrow Ec\ (2)$

Malla i_3: $10(i_3 - i_1) - 10 + 1.54(i_3 - i_4) + 2.74(i_3 - i_5) + 8.24 i_3 = 0$

$-10 i_1 + 21.9 i_3 - 1.54 i_4 - 2.74 i_5 = 10 \longrightarrow Ec\ (3)$

Malla i_4: $14(i_4 - i_2) + 5 + 1.54(i_4 - i_3) = 0$

$-14 i_2 - 1.54 i_3 + 2.54 i_4 = -5 \longrightarrow Ec\ (4)$

Malla i_5: $-5 + 2.74 i_5 + 2.74(i_5 - i_3) = 0$

$-2.24 i_3 + 4.94 i_5 = 5 \longrightarrow Ec\ (5)$

Re Ec (5)

$4.94 i_5 = 5 + 2.24 i_3$

$i_5 = \frac{5}{4.94} + \frac{2.2}{4.9} i_3$

Re Ec (4)

$2.54 i_4 = -5 + 14 i_2 + 1.54 i_3$

$i_4 = -\frac{5}{2.54} + \frac{1}{2.5} i_2 + \frac{1.5}{2.5} i_3$

$13.34 i_1 - 3.34 i_2 + 10 i_3 = 5 \longrightarrow Ec\ (1)$

$-3.34 i_1 + 7.64 i_2 - 14\left(-\frac{5}{2.54} + \frac{1}{2.5} i_2 + \frac{1.5}{2.5} i_3\right) = -10$

$-3.34 i_1 + 7.64 i_2 + \frac{5}{2.5} - \frac{14}{2.5} i_2 - \frac{1.54}{2.5} i_3 = -10$

$-3.34 i_1 + 7.24 i_2 - \frac{1.54}{2.5} i_3 = -12 \longrightarrow Ec\ (6)$

$-10 i_1 + 21.9 i_3 - 1.54\left(-\frac{5}{2.54} + \frac{1}{2.5} i_2 + \frac{1.5}{2.5} i_3\right)$

$-2.74\left(\frac{5}{4.94} + \frac{2.2}{4.9} i_3\right) = 10$

$$-10k i_1 + 21.9k i_3 + 3 - \frac{1.5k}{2.5} i_2 - \frac{2.25k}{2.5} i_3 - \frac{11}{4.4} - \frac{9.84k}{4.9} i_3 = 10$$

$-10k i_1 - 600 i_2 + 704 i_3 = 9.24 \rightarrow$ Ec (7) $\quad i_1 = 0.57mA$

$13.34 i_1 - 3.34 i_2 - 10k i_3 = 5 \rightarrow$ Ec (1) $\quad i_2 = -1.34mA$

$-3.34 i_1 + 7.74 i_2 - 600 i_3 = -12 \rightarrow$ Ec (6) $\quad i_3 = 0.7mA$

$$i_5 = \frac{5}{4.94} + \frac{2.2}{4.9}(0.7mA) = 1.33mA$$

$$i_4 = -\frac{5}{2.54} + \frac{2}{5}\cdot(-1.34mA) + \frac{3}{5}(0.7mA) = -7.11mA$$

$V_{R_1} = (8.74) i_3 = (8.74)(0.7mA) = 5.74V$

$V_{R_2} = 10k(i_3 - i_1) = 10k(0.13mA) = 1.3V$

$V_{R_3} = 1.5k(i_3 - i_4) = 1.5k(2.81mA) = 4.21V$

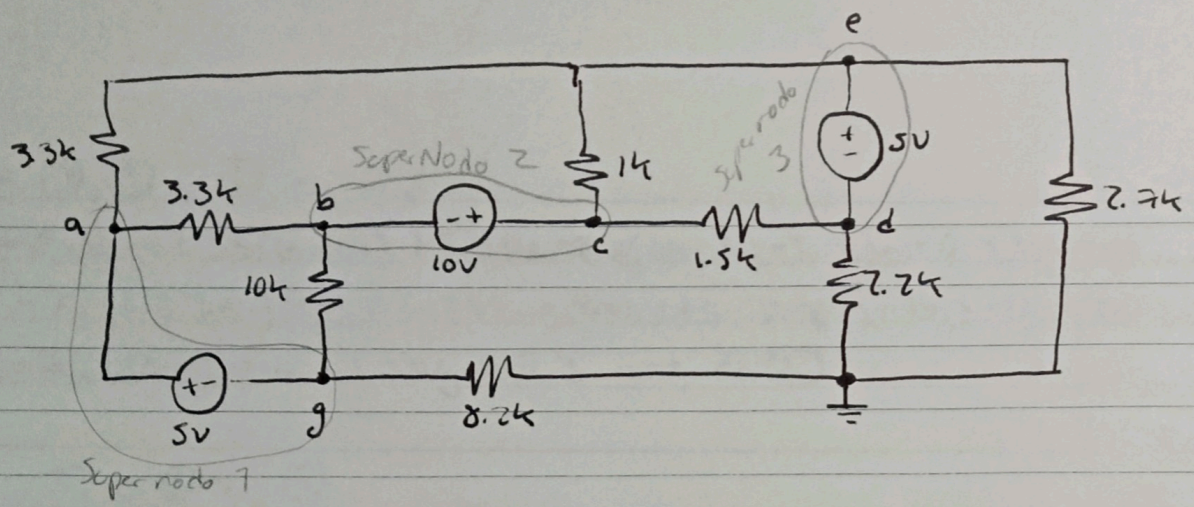
$V_{R_4} = 2.2k(i_5 - i_3) = 2.2k(0.63mA) = 1.38V$

$V_{R_5} = 3.3k(i_1 - i_2) = 3.3k(1.91mA) = 6.3V$

$V_{R_6} = 1k(i_2 - i_4) = 1k(0.77mA) = 0.77V$

$V_{R_7} = (2.7k) i_5 = 2.7k(1.33mA) = 3.59V$

$V_{R_8} = (3.3k) i_2 = 3.3k(-1.34mA) = -4.4V$



Supernodo 1: $\frac{V_a-V_e}{3.3k}+\frac{V_a-V_b}{3.3k}+\frac{V_g-V_b}{10k}+\frac{V_g}{8.2k}=0$

$V_a-V_e+V_a-V_b+0.33V_g-0.33V_b+0.4V_g=0$

$2V_a-1.3V_b-V_e+0.47V_g=0 \longrightarrow \mathcal{E}_c$ (1)

Supernodo 2: $\frac{V_b-V_a}{3.3k}+\frac{V_b-V_g}{10k}+\frac{V_c-V_e}{1k}+\frac{V_c-V_d}{1.5k}=0$

$V_b-V_a+0.33V_b-0.33V_g+3.3V_c-3.3V_e+2.2V_c-2.2V_d=0$

$-V_a+1.33V_b+5.5V_c-2.2V_d-3.3V_e-0.33V_g=0 \longrightarrow \mathcal{E}_c$ (2)

Supernodo 3: $\frac{V_d-V_c}{1.5k}+\frac{V_d}{2.7k}+\frac{V_e}{2.7k}+\frac{V_e-V_c}{1k}+\frac{V_e-V_a}{3.3k}=0$

$2.2V_d-2.2V_c+1.5V_d+2.7V_e+3.3V_e-3.3V_c+V_e-V_a=0$

$-V_a-5.5V_c+3.7V_d+5.5V_e=0 \longrightarrow \mathcal{E}_c$ (3)

$V_a-V_g=5$

$V_a=5+V_g \longrightarrow \mathcal{E}_c$ (4)

$V_c-V_b=10$

$V_b=V_c-10 \longrightarrow \mathcal{E}_c$ (5)

$V_e-V_d=5$

$V_e=5+V_d \longrightarrow \mathcal{E}_c$ (6)

$V_d=V_e-5$

Sust (4) y (5) en (7)

$2(5+V_g)-1.3(V_c-10)-V_e+0.47V_g=0$

$10+2V_g-1.3V_c+13-V_e+0.47V_g=0$

$-1.3V_c-V_e+2.47V_g=-23 \longrightarrow \mathcal{E}_c$ (7)

Sust. ④, ⑤ y ⑥ en ⑦

$-5-V_g+1.33(V_c-10)+5.5V_c-2.2(V_e-5)-3.3V_e-0.33V_g=0$

$-5-V_g+1.33V_c-13.3+5.5V_c-2.2V_e+11-3.3V_e-0.33V_g=0$

$6.83V_c-5.5V_e-1.33V_g=7.3 \longrightarrow$ Ec ⑧

Sust ④ y ⑥ en ③

$-5-V_g-5.5V_c+3.7(V_e-5)+5.5V_e=0$

$-5-V_g-5.5V_c+3.7V_e-18.5+5.5V_e=0$

$-5.5V_c+9.2V_e-V_g=23.5 \longrightarrow$ Ec ⑨

$-1.3V_c-V_e+2.47V_g=-23$

$6.83V_c-5.5V_e-1.33V_g=7.3$

$-5.5V_c+9.2V_e-V_g=23.5$

$V_c = 7.44\ V$

$V_e = 3.78\ V$

$V_g = -6.6\ V$

$V_a = 5-6.6V = -1.6V$

$V_b = 7.44-10 = -7.56V$

$V_d = 3.78-5 = 1.72V$