SUPERNODE

R1 = 1 Ω

R2 = 3 Ω

R3 = 1 Ω

R4 = 4 Ω

R5 = 1 Ω

Va = -2 V

Vb = 2 V

Ia = 3 A

b = 1 V/A

⊗ KCL @ 3: $\dfrac{v_3 - v_1}{1} + \dfrac{v_3 - v_4}{1} + \dfrac{v_3}{3} = 0$ ⟹ $-3v_1 + 7v_3 - 3v_4 = 0$ (1)

⊗ KCL @ SN: $\dfrac{v_1 - v_3}{1} + \dfrac{v_4 - v_3}{1} + \dfrac{v_5}{1} - 3 = 0$ ⟹ $v_1 - 2v_3 + v_4 + v_5 = 3$ (2)

⊗ SN Va: $v_1 = v_2 - 2$ ⟹ $v_1 = v_2 - 2$ (3)

⊗ SN Vb: $v_4 = v_5 + 2$ ⟹ $v_5 = v_4 - 2$ (4)

⊗ SN bix: $v_2 = v_4 + 1 \cdot \dfrac{v_3}{3}$ ⟹ $v_3 = 3v_2 - 3v_4$ (5)

(4),(5) IN (1): $-3v_2 + 6 + 21v_2 - 21v_4 - 3v_4 = 0$ ⟹ $18v_2 - 24v_4 = -6$

⟹ $3v_2 - 4v_4 = -1$ (6)

(3),(4),(5) IN (2): $v_2 - 2 - 6v_2 + 6v_4 + v_4 + v_4 - 2 = 3$ ⟹ $-5v_2 + 8v_4 = 7$ (7)

(6)×2 + (7): $6v_2 - 5v_2 = -2 + 7$ ⟹ $\boxed{v_2 = 5V}$

$\boxed{v_1 = 3V}$ FROM (3)

$\boxed{v_4 = 4V}$ FROM (6)

$\boxed{v_5 = 2V}$ FROM (4)

$\boxed{v_3 = 3 \checkmark}$ FROM (5)

CHECK KCL