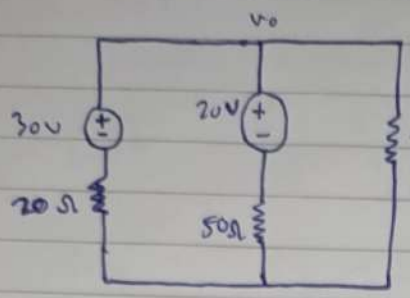
3. Hitung tegangan V_o



$$: \frac{V_o - 30}{20} + \frac{V_o - 20}{50} + \frac{V_o - 0}{40} = 0 \quad \times 200$$

$$= 10(V_o - 30) + 4(V_o - 20) + 5(V_o - 0) = 0$$

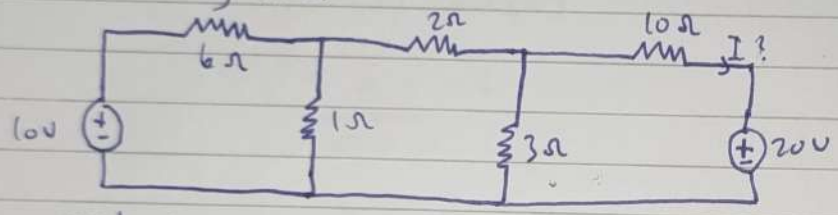
$$= 10V_o - 300 + 4V_o - 80 + 5V_o = 0$$

$$19V_o - 380 = 0$$

$$19V_o = 380$$

$$V_o = 20\ V$$

4. Hitung nilai i



Node A

$$\frac{V_a - 10}{6} + \frac{V_a - 0}{1} + \frac{V_A - V_B}{2} = 0 \quad \times 6$$

$$V_a - 10 + 6V_A + 3(V_a - V_b) = 0$$

$$V_a - 10 + 6V_a + 3V_a - 3V_b = 0$$

$$10V_A - 3V_b - 10 = 0$$

$$10V_a - 3V_b = 10 \quad (1)$$

Node B

$$\frac{V_b - 20}{10} + \frac{V_b - 0}{3} + \frac{V_b - V_a}{2} = 0$$

$$3(V_b - 20) + 10V_b + 15(V_b - V_a) = 0$$

$$3V_b - 60 + 10V_b + 15V_b - 15V_a = 0$$

$$-15V_a + 28V_b - 60 = 0$$

$$-15V_a + 28V_b = 60 \quad (2)$$

$$10V_a - 3V_b = 10 \quad | \times 3 \quad | \quad 30V_a - 9V_b = 30$$

$$-15V_a + 28V_b = 60 \quad | \times 2 \quad | \quad -30V_a + 56V_b = 120 \ +$$

$$47V_b = 150$$

$$V_b = 3,19\ V$$

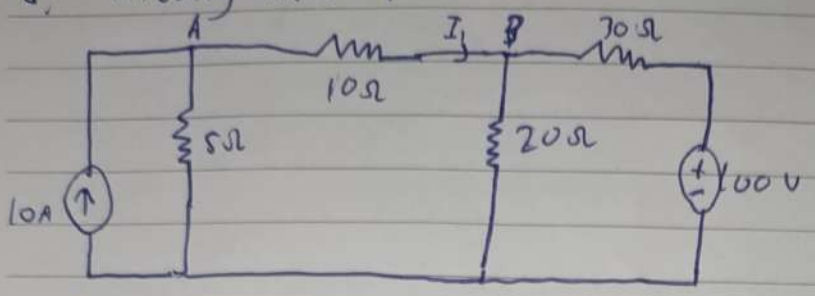
$$I = \frac{V_b - 20}{10}$$

$$= \frac{3,19 - 20}{10}$$

$$= -0,1681\ A$$

Date

8. Hitung nilai I



Node A

$$\frac{-10 + V_a - 0}{5} + \frac{V_a - V_b}{10} = 0 \quad \times 10$$

$$-100 + 2V_a + V_a - V_b = 0$$

$$3V_a - V_b - 100 = 0$$

$$3V_a - V_b = 100$$

Node B

$$\frac{V_b - 100}{30} + \frac{V_b - 0}{20} + \frac{V_b - V_a}{10} = 0 \quad \times 60$$

$$2(V_b - 100) + 3V_b + 6(V_b - V_a) = 0$$

$$2V_b - 200 + 3V_b + 6V_b - 6V_a = 0$$

$$11V_b - 6V_a - 200 = 0$$

$$-6V_a + 11V_b = 200$$

Substitusi

$$3V_a - V_b = 100$$

$$2V_a - 99,9 = 100$$

$$3V_a = 199,9$$

$$V_a = 48,13$$

$$3V_a - V_b = 100 \quad | \times 2 | \quad 6V_a - 2V_b = 200$$

$$-6V_a + 11V_b = 200 \quad | \quad -6V_a + 11V_b = 200 +$$

$$9V_b = 400$$

$$V_b = 99,9V$$

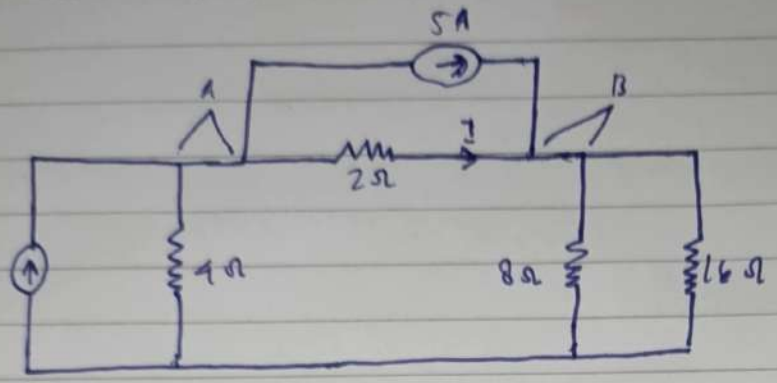
$$I = \frac{V_a - V_b}{10}$$

$$= \frac{48,13 - 99,9}{10}$$

$$= \frac{3,73}{10}$$

$$= 0,373A$$

6.



Node A

$$-10+5+\frac{V_a-0}{4}+\frac{V_a-V_b}{2}=0$$

$$-5+\frac{V_a}{4}+\frac{V_a-V_b}{2}=0 \quad \times 4$$

$$-20+V_a+2(V_a-V_b)=0$$

$$V_a+2V_a-2V_b=20$$

$$3V_a-2V_b=20$$

Node B

$$-5+\frac{V_b-0}{16}+\frac{V_b-0}{8}+\frac{V_b-V_a}{2}=0 \quad \times 16$$

$$-80+V_b+2V_b+8(V_b-V_a)=0$$

$$-8V_a+11V_b=80$$

$$\begin{array}{l|c|l} 3V_a-2V_b=20 & 8 & 24V_a-16V_b=160 \\ -8V_a+11V_b=80 & 3 & -24V_a+33V_b=240 \; + \end{array}$$

$$17V_b=400$$

$$V_b=23,53$$

$$3V_a-2V_b=20$$

$$3V_a-2(23,53)=20$$

$$3V_a-47,06=20$$

$$3V_a=67,06$$

$$V_a=22,35$$

$$I=\frac{V_b-V_a}{2}$$

$$=\frac{23,53-22,35}{2}$$

$$=0,59\,A$$