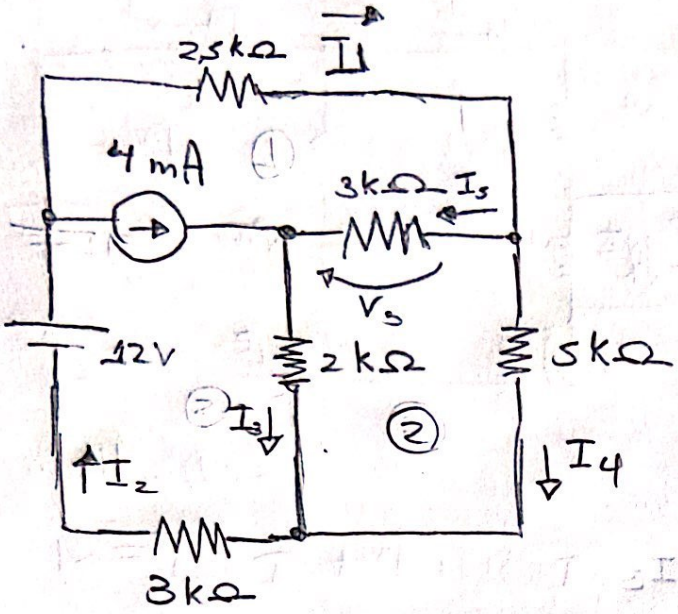
Questão 1

$N = 8$

$B = 4$



① malha externa

② malha direita

$I_5 = I_3 - I_B$

$I_4 = I_2 - I_3$

$I_1 = I_2 - I_b$

$I_b = 4\ mA$

Método da Análise de malha

① $-12 + 2{,}5.10^3 I_1 + 5.10^3 I_4 + 3.10^3 I_2 = 0$

② $5.10^3 I_4 - 2.10^3 I_3 - 3.10^3 . I_5$

$$\begin{cases} -12 + 2{,}5.10^3 (I_2 - I_b) + 5.10^3 (I_2 - I_3) + 3.10^3 I_2 = 0 \\ 5.10^3 (I_2 - I_3) - 2.10^3 (I_3) - 3.10^3 (I_3 - I_b) = 0 \end{cases}$$

$-12 + 2500(I_2) - 2500.4 + 5000(I_2) - 5000 I_3 + 3000 I_2 = 0$

③ $22 = 10{,}5.10^3 I_2 - 5{,}0.10^3 I_3$

$5.10^3 (I_2) - 5.10^3 I_3 - 2.10^3 I_3 - 3.10^3 I_3 + 3.10^3 . 4 = 0$

④ $-12 = -10.10^3 I_3 + 5.10^3 I_2$

$$\begin{matrix} ③ \\ ④ \end{matrix} \begin{matrix} 22 = 10{,}5 I_2 - 5{,}0 I_3 \\ -12 = 5{,}0 I_2 - 10{,}0 I_3 \end{matrix} \Rightarrow \begin{matrix} 22 = 10{,}5 I_2 - 5{,}0 I_3 \\ +6 = -2{,}5 I_2 + 5{,}0 I_3 \end{matrix} \oplus$$

$28 = 8 I_2$

$I_2 = \frac{28}{8}$

$\boxed{I_2 = 3{,}5000\ mA}$

$I_1 = I_2 - I_b$

$I_1 = 3,5 - 4,0$

$\boxed{I_1 = 00,5 \text{ mA}}$

↳ sentido contrário

$I_3 \Rightarrow$ $22 = 10,5 I_2 - 5,0 I_3$

$22 = 10,5.(3,5) - 5,0 I_3$

$14,75 = 5,0 I_3$

$I_3 = 2,95 \text{ mA}$

$I_5 = I_3 - I_b$

$I_5 = 2,95 - 4,0$

$I_5 = -1,05 \text{mA} \rightarrow |I_5| = 1,05 \text{mA}$

$V_3 = R_3 |I_5|$

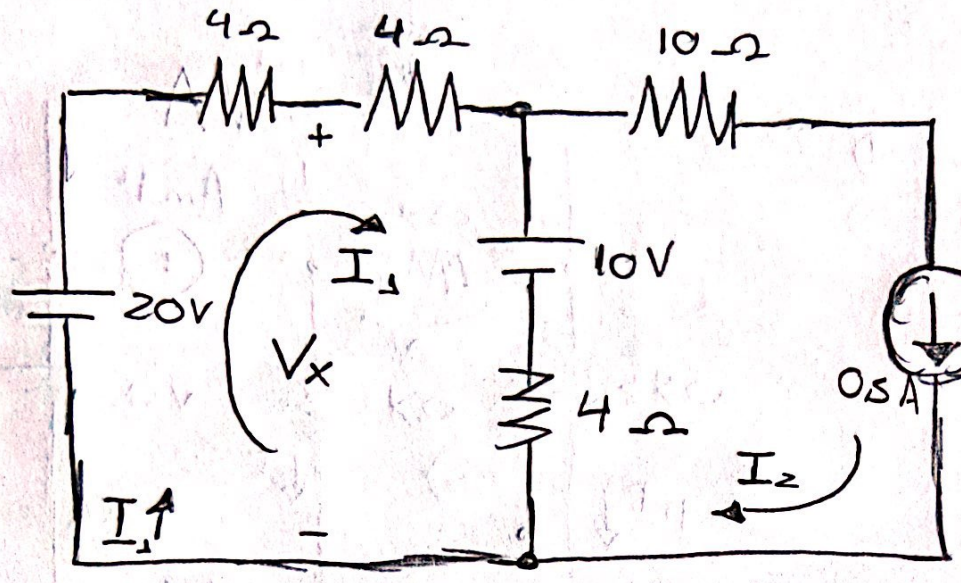
$V_3 = 3.1,05$

$\boxed{V_3 = 3,1500 \text{ V}}$

Questão 2

N = 8

B = 4



$I_2 = 0,5\ A$

Metodo das correntes das malhas

malha 1:

$$-20 + 8I_1 + 10 + 4(I_1 - I_2) = 0$$

$$-20 + 8I_1 + 10 + 4I_1 - 2 = 0$$

$$12I_1 = 12$$

$$\boxed{I_1 = 1,0000\ V}$$

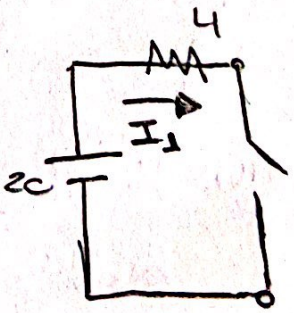
malha 2:

$$-10 + 10I_2 + V_2 + 4(I_2 - I_1) = 0$$

$$-10 + 5 + V_2 + 2 - 4 = 0$$

$$V_2 = 14,0 - 7,0$$

$$\boxed{V_2 = 7,0000\ V}$$

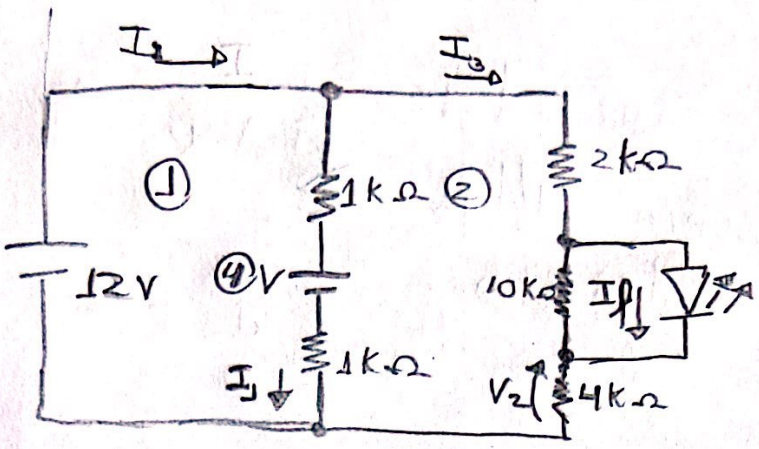


$$V_x = 20 - (4 \cdot 1,0)$$

$$\boxed{V_x = 16,0000\ V}$$

Questão 3

N = 8
B = 4



malha ①:

$12 = 10^3 I_1 + 4 + 10^3 I_1$

$8 = 2.10^3 I_1$

$\boxed{I_1 = 4,0\ mA}$

malha ②:

$2.10^3 I_3 + V_j + 4.10^3 I_3 - 2.10^3 I_1 = 4$ $\qquad V_j = 3V$

$6.10^3 I_3 = 2.10^3 . 4,0.10^{-3} + 1$

$I_3 = \frac{8}{6.10^3} \Rightarrow \boxed{I_3 = 1,5\ mA}$

$I_3 - I_f \Rightarrow 10.10^3 (I_3 - I_f) = V_j$

$I_f = I_3 - \frac{V_j}{10.10^3} \Rightarrow I_f = 1,5\ mA - \frac{3}{10}\ mA$

$I_f = 1,5 - 0,3$

$\boxed{I_f = 1,2\ mA}$

$V_2 = 4.10^3 . I_3$

$V_2 = 4.10^3 . 1,5 . 10^{-3}$

$\boxed{V_2 = 6,0\ V}$