Home Assignment 1

IE1206 Embedded Electronics

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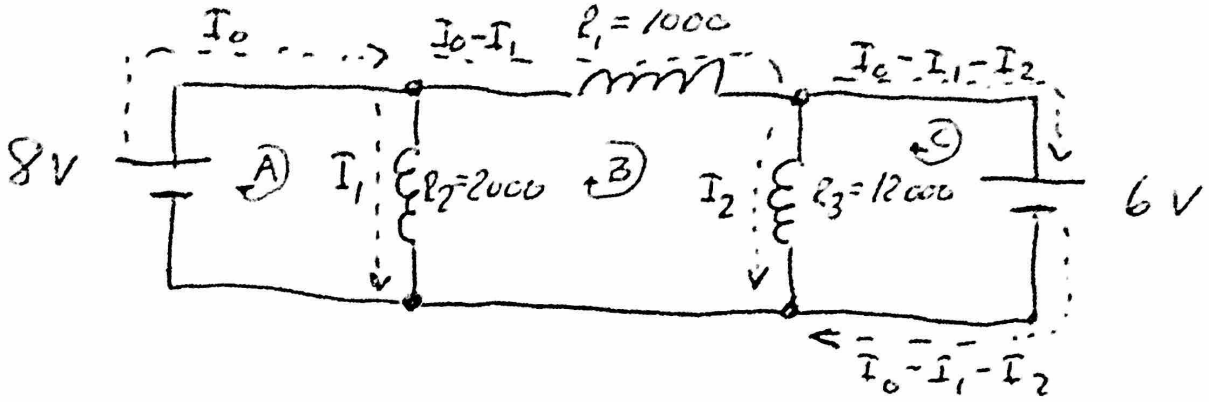
PROBLEM 1.



(A) $-2000 I_1 + 8 = 0 \rightarrow 8 = 2000 I_1 \rightarrow I_1 = \frac{8}{2000} = \underline{\underline{0{,}004\ A}}$

(B) $-1000(I_0 - I_1) - 12000 I_2 + 2000 I_1 = 0$

$1000 I_0 + 1000 I_1 - 12000 I_2 + 2000 I_1 \rightarrow 1000 I_1 + 3000 I_1 - 12000 I_2$

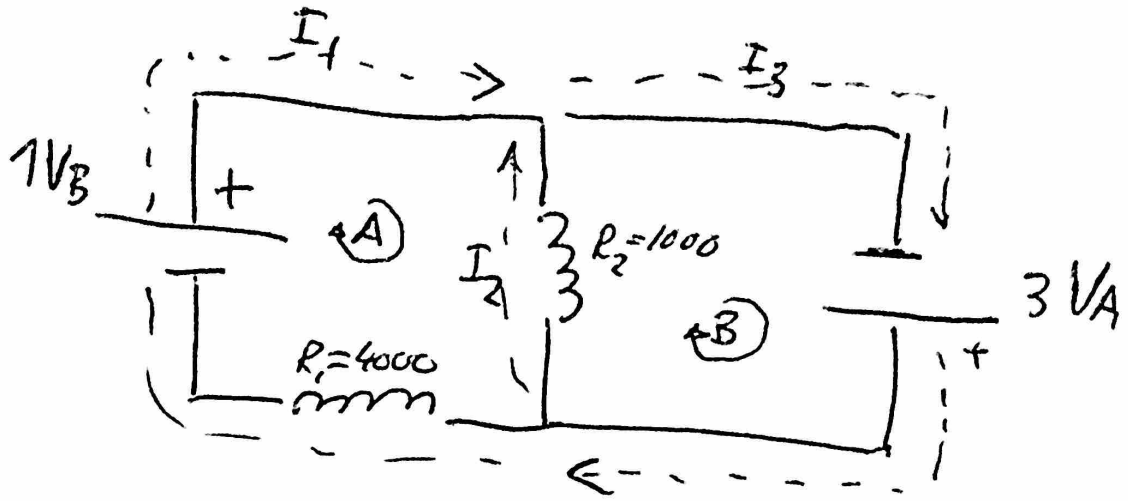
$1000 I_0 + 3000 \cdot 0{,}004 - 12000 I_2 \rightarrow 1000 I_0 + 12 - 12000 I_2$

$1000 I_0 + 12 - 12000 \cdot 0{,}0005 = 0$

$1000 I_0 + 12 - 6 \rightarrow \frac{6}{1000} = I_0 = \underline{\underline{0{,}006\ A}}$

(C) $-6 + 12000 I_2 = 0 \rightarrow I_2 = \frac{6}{12000} = \underline{\underline{0{,}0005\ A}}$

PROBLEM 2



A $\quad 1000\,I_2 - 4000\,I_1 + 1V_B = 0$

$1000 \cdot 0{,}003 - 4000 I_1 + 1V_B$

$3 - 4000 I_1 + 1 = \frac{4}{4000}$

$I_1 = 0{,}001\ A$

B $\quad 3V_A - 1000\,I_2 = 0$

$I_2 = \frac{3}{1000}$

$I_2 = 0{,}003\ A$

C $\quad 3V_A - 4000\,I_1 + 1 = 0$

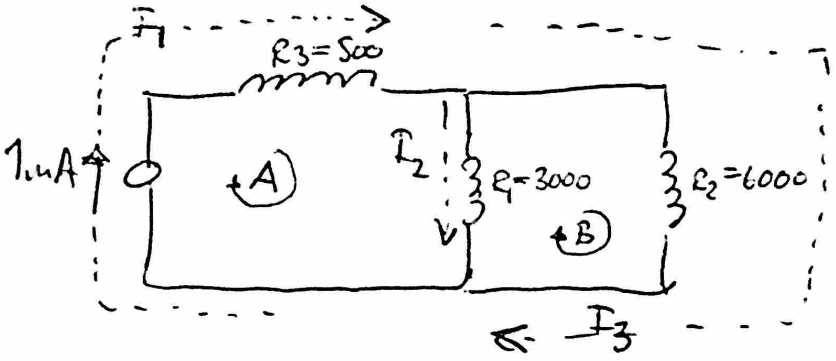
$3 + 1 = 4000\,I_1$

$4 = 4000\,I_1$

$I_1 = \frac{4}{4000}$

$I_1 = 0{,}001\ A$

PROBLEM 3



KCL $I_1 - I_2 - I_3 = 0$

$0{,}001 - I_2 = I_3$

$0{,}001 - 0{,}006 = I_3$

$I_3 = 0{,}0004 \rightarrow 0{,}4\ mA$

(B) $-R_2 \cdot I_3 + R_1 \cdot I_2 = 0$

$-6000(0{,}001 - I_2) + 3000 I_2 = 0$

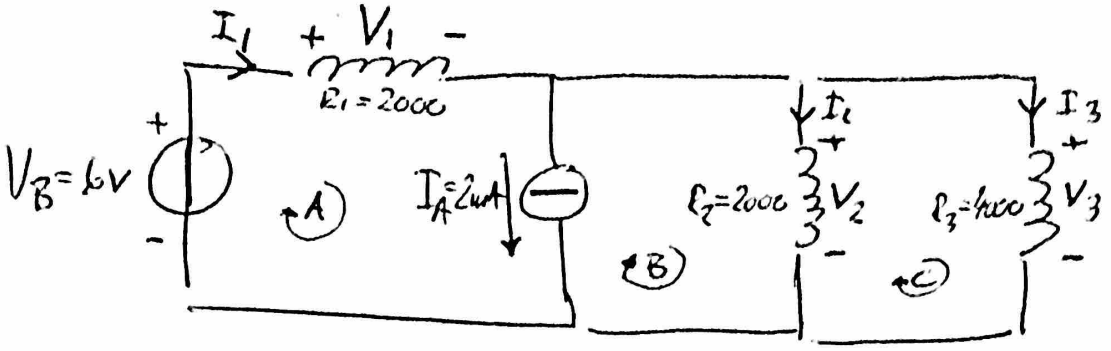
$-6 + 6000 I_2 + 3000 I_2 = 0$

$-6 + 9000 I_2 = 0$

$I_2 = \frac{6}{9000}$

$I_2 = 0{,}0006 \rightarrow 0{,}6\ mA$

PROBLEM 4



(A) $V_B - V_1 + V_A = 0$

$V_B + V_A = V_1$

$6 + 4 = V_1$

$V_1 = 10\ V$

(B) $-V_2 + V_A = 0$

$V_A = V_2$

$V_A = I_2 \cdot R_2$

$V_A = 0{,}002 \cdot 2000$

$V_A = 4\ V$

(C) $-V_3 + V_2 = 0$

$V_2 = V_3$

$4 = V_3$

$I_1 = \frac{V_1}{R_1}$

$I_1 = \frac{10}{2000}$

$I_1 = 0{,}005\ A$

$I_2 = \frac{V_2}{R_2}$

$I_2 = \frac{4}{2000}$

$I_2 = 0{,}002\ A$

$I_3 = \frac{V_3}{R_3}$

$I_3 = \frac{4}{4000}$

$I_3 = 0{,}001\ A$

a) $P_1 = V_1 \cdot I_1 \rightarrow 10 \cdot 0{,}001 = 0{,}001 \rightarrow 10\ mW$

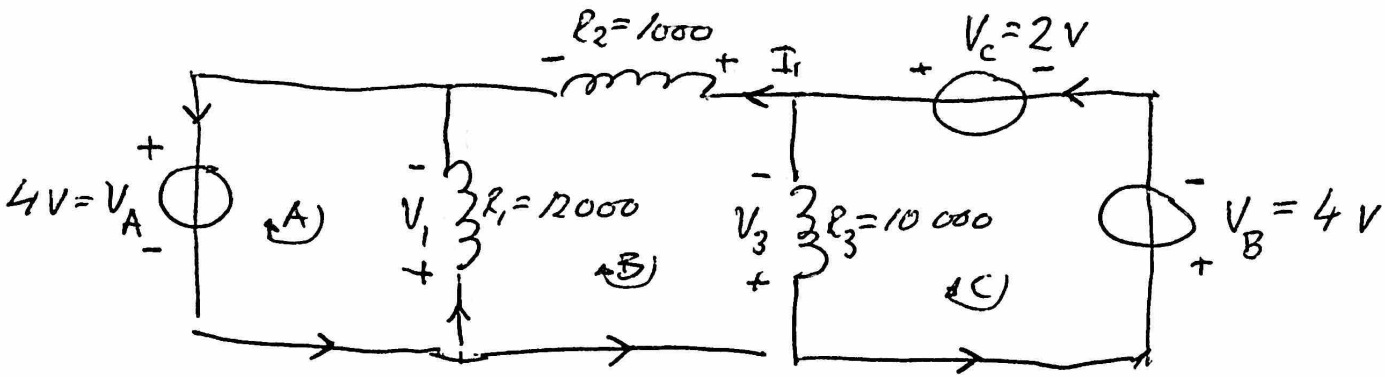
$P_2 = V_2 \cdot I_2 \rightarrow 4 \cdot 0{,}002 = 0{,}008 \rightarrow 8\ mW$

$P_3 = V_3 \cdot I_3 \rightarrow 4 \cdot 0{,}001 = 0{,}004 \rightarrow 4\ mW$

b) $P_A = V_A \cdot I_A \rightarrow 4 \cdot 0{,}002 = 0{,}008 \rightarrow 8\ mW$

$P_B = V_B \cdot I_1 \rightarrow 6 \cdot 0{,}001 = 0{,}006 \rightarrow 6\ mW$

PROBLEM 6



(A) $-V_A - V_1 = 0 \rightarrow -4 = V_1$

(B) $-V_2 - V_3 + V_1 = 0 \rightarrow -V_2 - 2 + (-4) = 0 \rightarrow V_2 = -2 - 4 \quad V_2 = -6V$

(C) $V_c - V_B + V_3 = 0 \rightarrow 2 - 4 + V_3 = 0 \rightarrow V_3 = 4 - 2 \quad V_3 = 2V$

$$I_1 = \frac{V_2}{R_2} \rightarrow I_1 = \frac{-6}{1000} \quad I_1 = -0,006 A$$

$$I_1 = -6 mA$$