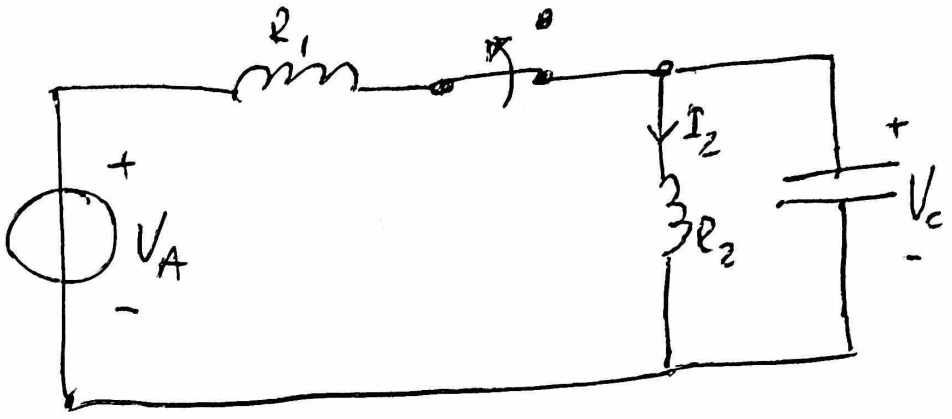
PROBLEM 5

$V_A = 5\,V$

$R_1 = 1000\,\Omega$

$R_2 = 4000\,\Omega$

$C = 2{,}5\,nF$



(A) $V_c(0) = V_A \cdot \frac{R_2}{R_1 + R_2} \Rightarrow 5 \cdot \frac{4000}{5000} = 4\,V$

$V_c(\infty) = 0$

$I_2(t=0) = \frac{V_c}{R_2} \Rightarrow \frac{4}{4000} = 0{,}001 = 1\,mA$

$P_c(0) = I_2 \cdot V_c \Rightarrow 0{,}001 \cdot 4 = 0{,}004 = 4\,mW$

(B) $R_{TH} = \frac{R_1 \cdot R_2}{R_1 + R_2} \Rightarrow \frac{1000 \cdot 4000}{1000 + 4000} = 800\,\Omega$

$\tau = R_{TH} \cdot C \Rightarrow 800 \cdot 0{,}0000000025 = 0{,}000002 = 2\,\mu s$

$V_c(t) = V_c(\infty) + (V_c(0) - V_c(\infty)) \cdot e^{-\frac{t}{\tau}}$

$V_c(t=10\mu s) = 0 + (4 - 0) \cdot e^{-\frac{0{,}00001}{0{,}000002}} = 0{,}027 = 27\,mV$

$I_2(t=10\mu s) = \frac{0{,}027}{4000} = 0{,}00000675 = 6{,}7\,\mu A$

$P_c(10\mu s) = I_2 \cdot V_c \Rightarrow 0{,}0000067 \cdot 0{,}027 = 0{,}00000018$

$P_c = 0{,}18\,\mu W$