The University of Sheffield

Department of Electrical and Electronic Engineering

EEE117 Homework 5

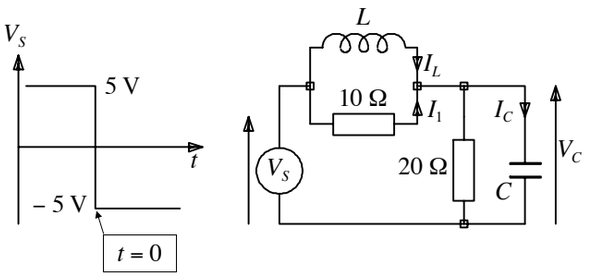

Figure 1

1 The circuit of figure 1 is subjected to a transient, V_S, as shown in figure 1. Assume that V_S is unchanged over all time before $t = 0^-$ and remains at its $t = 0^+$ value for all time after $t = 0^+$.

(i) Work out I_1, I_L, I_C and V_C at $t = 0^-$.

(ii) Draw an equivalent circuit of figure 1 at $t = 0^+$. Remember to replace L by a current source and C by a voltage source. Label the magnitudes and directions of these sources.

(iii) Work out I_1, I_L, I_C and V_C at $t = 0^+$.

(iv) Work out I_1, I_L, I_C and V_C as $t \Rightarrow \infty$.

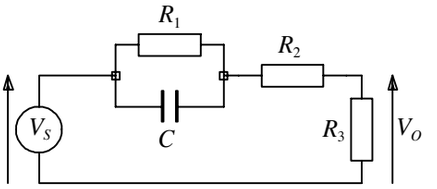

Figure 2

2 For the circuit of figure 2

(i) What is the circuit time constant? *(Remember to replace sources by their internal impedances and then look at the circuit from the capacitor's point of view to identify the resistance seen by the capacitor.)*

(ii) What are the $t = 0^+$ and $t \Rightarrow \infty$ values of V_O expressed in terms of the V_S values and the circuit components?