HOMEWORK SET 9

Issued: November 1, 2004 Due: November 8, 2004

Problem 1.

For the circuit shown in Fig. 1, calculate $v_o(t)$ for $t \geq 0$, given $i_L(0) = 2$ A.

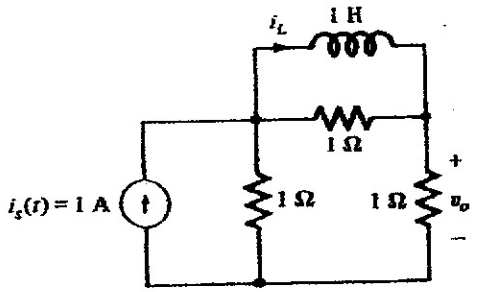


Figure 1

Problem 2.

For the circuit shown in Fig. 2 given $v_s = 10$ V, $R_1 = 2$ kΩ, $R_2 = 2$ kΩ, $C = 1$ μF and $i_C = 5$ mA at $t = 1$ ms,

(*a*) Calculate and sketch $v_R(t)$ for $t \geq 1$ ms.

(*b*) Repeat (*a*) with $R_2 = -1$ kΩ.

(*c*) For part (*a*), what is the elapsed time for which v_R changes from 8 to 6 V?

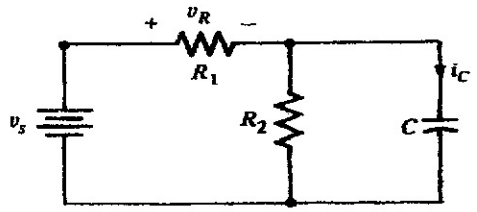
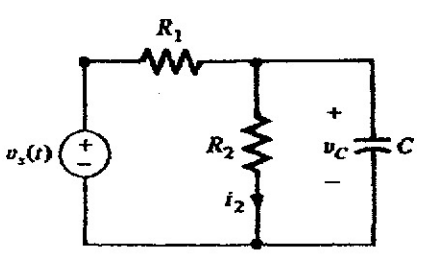


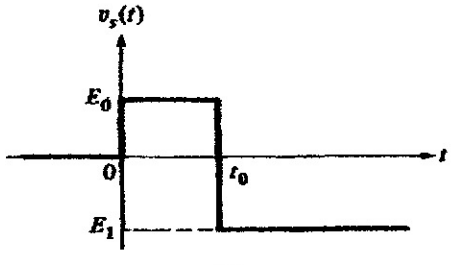
Figure 2

Problem 3.

The *RC* circuit in Fig. 3(a) is driven by the stepwise signal shown in Fig. 3(b). Assuming $v_C(0) = 2E_0$, calculate and sketch $i_2(t)$ for $t \geq 0$.



(*a*)



(*b*)

Figure 3

Problem 4.

Calculate and sketch $v(t)$, $t \geq 0$ for the circuit shown in Fig. 4(a) with $i_s(t)$ as in Fig. 4(b). Assume $v_C(0) = 0$.

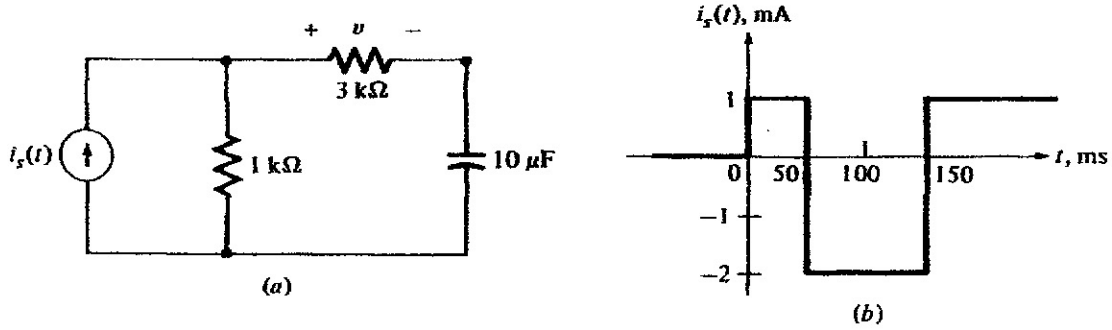


Figure 4

Problem 5.

The circuit in Fig. 5(a) is to be used as a flip-flop. The v-i characteristic of the nonlinear resistor is given in Fig. 5(b). In order to switch from Q_1 to Q_3 a triggering signal, Fig 5(c) is applied. Determine the minimum duration of the pulse required for successful switching.

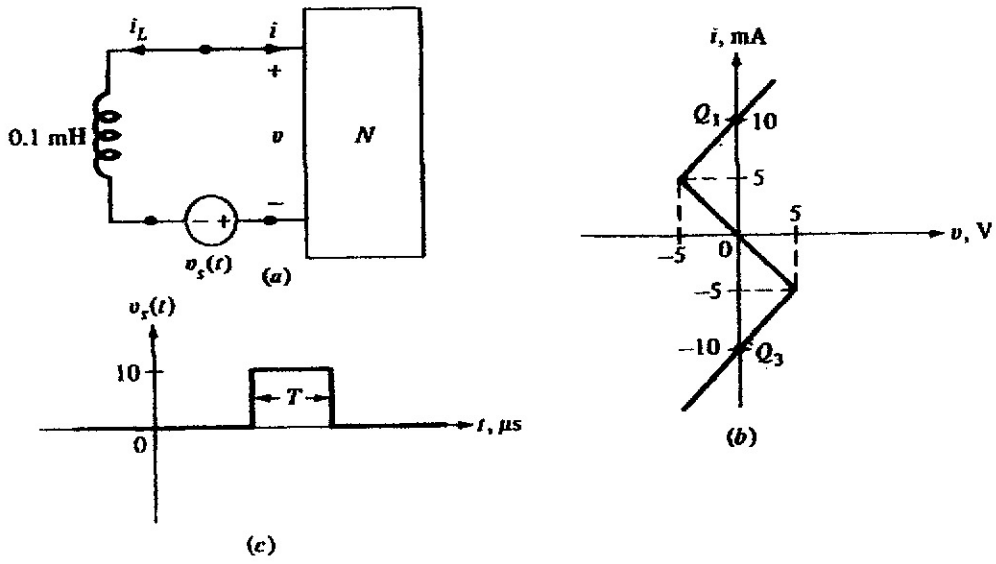


Figure 5