

ENSC 220 – Assignment #5 (Nov 4, 2005; due Nov 14, 2005)

1.

The switch in the circuit in Fig. PA has been in position a for a long time. At  $t = 0$  the switch is thrown to position b.

- Calculate  $i$ ,  $v_1$ , and  $v_2$  for  $t \geq 0^+$ .
- Calculate the energy stored in the capacitor at  $t = 0$ .
- Calculate the energy trapped in the circuit and the total energy dissipated in the  $5\text{-k}\Omega$  resistor if the switch remains in position b indefinitely.

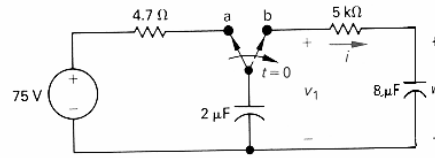


FIGURE PA

2.

The switch in the circuit seen in Fig. PB has been in position a for a long time. At  $t = 0$  the switch moves instantaneously to position b. For  $t \geq 0^+$  find:

- $v_o(t)$ ;
- $i_o(t)$ ;
- $v_g(t)$ ; and
- $v_g(0^+)$ .

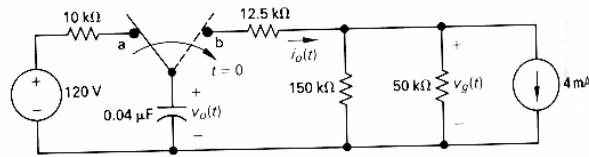
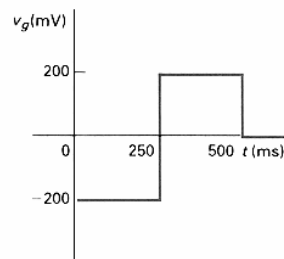


FIGURE PB

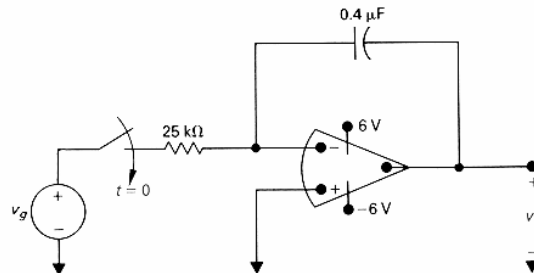
3.

The voltage pulse shown in Fig. PC (a) is applied to the ideal integrating amplifier shown in Fig. PC (b). Derive the numerical expressions

for  $v_o(t)$  for the time intervals (a)  $t < 0$ ; (b)  $0 \leq t \leq 250$  ms; (c)  $250 \text{ ms} \leq t \leq 500$  ms; and (d)  $500 \text{ ms} \leq t \leq \infty$  when  $v_o(0) = 0$ .



(a)



(b)

FIGURE PC

4.

The switch in the circuit in Fig. PD has been in position a for a long time. At  $t = 0$ , the switch moves instantaneously to position b.

- What is the initial value of  $v_a$ ?
- What is the initial value of  $dv_a/dt$ ?
- What is the numerical expression for  $v_a(t)$  for  $t \geq 0$ ?

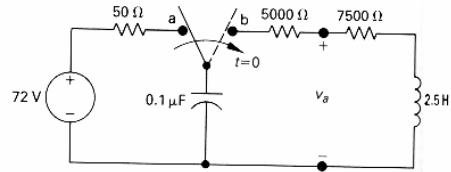


FIGURE PD

5.

The switch in the circuit shown in Fig. PE has been closed for a long time. The switch opens at  $t = 0$ .

- Find  $i_o(t)$  for  $t \geq 0$ .
- Find  $v_o(t)$  for  $t \geq 0$ .

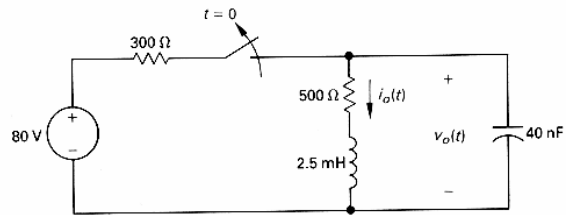


FIGURE PE

6.

The switch in the circuit in Fig. PF has been closed for a long time before opening at  $t = 0$ .

- Find  $i_o(t)$  for  $t \geq 0$ .
- Find  $v_o(t)$  for  $t \geq 0$ .

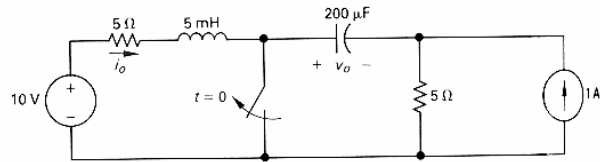


FIGURE PF