Sheet (7)... 1st order RL/RC DC transient circuits
Updated Version

1. A series RL circuit with R = 50 ohms and L= 10 H has a constant voltage V = 100 v applied at t = 0 by the closing of a switch. Find
   (a) the equations for i, V_R and V_L ,
   (b) The current at t = 0.5 seconds
   (c) The time at which $V_R = V_L$.
   (d) Find the equations for P_R and P_L.

2. In the series circuit shown in Fig.1 the switch is closed on position 1 at t = 0, thereby applying the 100 volt source to the RL branch, and at t = 500 μsec the switch is moved to position 2. Obtain the equations for the current in both intervals and sketch the transient.

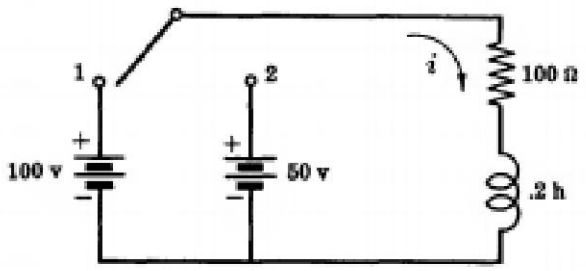

Fig.1

3. Repeat Problem 2 with the polarity of the 50 volt source reversed.

4. A series RC circuit with R = 5000 ohms and C = 20 μf has a constant voltage V = 100 v applied at t = 0 and the capacitor has no initial charge. Find the equations of i, V_R and V_c.

5. The 20μf capacitor in the RC circuit shown in Fig. 2 has an initial charge q = 500 micro coulombs with the polarity shown in the

diagram. At t = 0, the switch is closed, thereby applying the constant voltage V = 50 volts. Find the current transient.

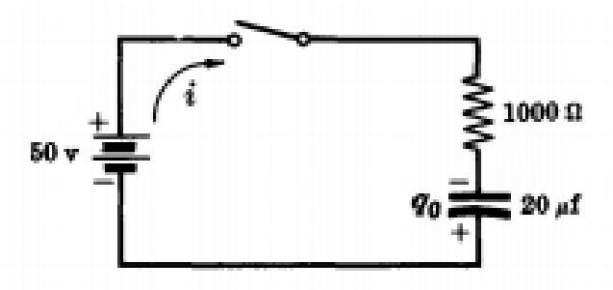

Fig.2

6. In the RC circuit of Fig. 3 the switch is closed on position 1 at t=0 and after 1 TC is moved to position 2. Find the complete current transient.

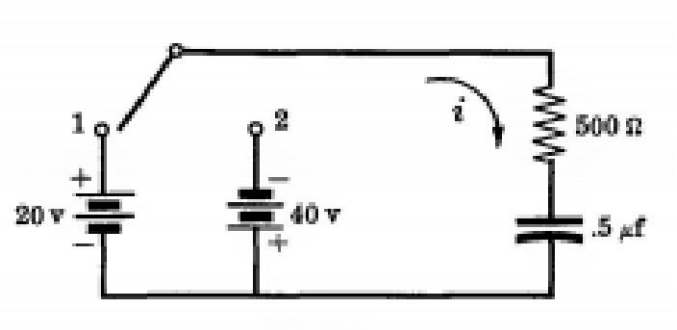

Fig.3

7. Determine the charge transient for Problem 6 and differentiate to obtain the current.

Good Luck

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