
Sheet (7)... Transient circuits

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.

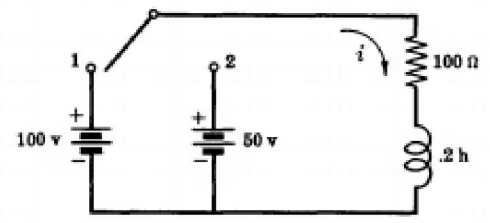

Fig.1

3. A series RL circuit with R = 50 ohms and L = 0.2 H has a sinusoidal voltage source v = 150 sin (500t + Ø) applied at a time when Ø = 0. Find the complete current.

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. 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.

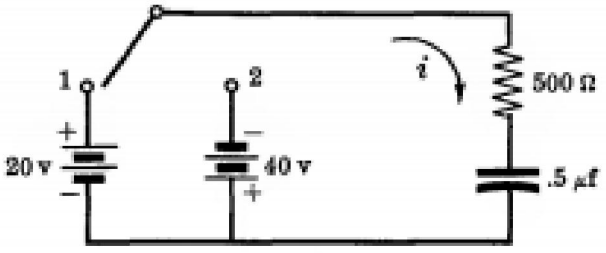

Fig.3

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6. In the two-mesh network shown in Fig.4 the switch is closed at t = 0. Find the transient mesh currents i1 and i2 shown in the diagram, and the transient capacitor voltage Vc.

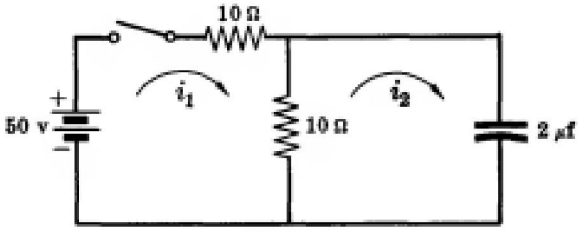

Fig.4

7. A series RC circuit with R = 100 ohms and C = 25 μf has a sinusoidal voltage source v = 250 sin (500t + Ø) applied at a time when Ø = 0°. Find the current, assuming there is no initial charge on the capacitor.

8. A series RLC circuit with R = 3000 ohms, L = 10 h and C = 200 μf has a constant voltage V = 50 volts applied at t = 0. Find the current transient and the maximum value of the current if the capacitor has no initial charge.

Good Luck