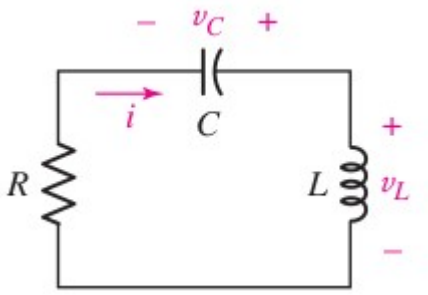
NeSS
Tutorial 7
RLC circuits

Source free series RLC circuit (Natural response analysis)
Q1. Given below, the series RLC circuit in which L = 1 H, R = 2 kohms , C = 1/401 μF, i(0) = 2 mA, and v C (0) = 2 V, find and sketch i(t), t > 0.



Q2. With reference to the circuit shown in Fig. 9.24, find (a) α; (b) ω0 ; (c) i(0+); (d) di/dt| t=0 + ; (e) i(12 ms).

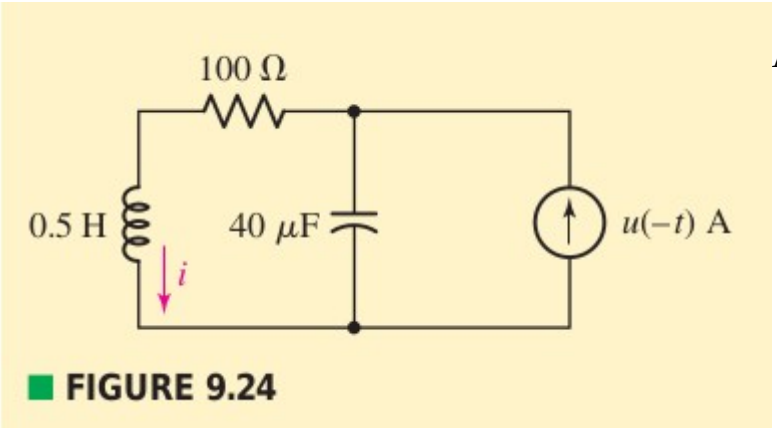


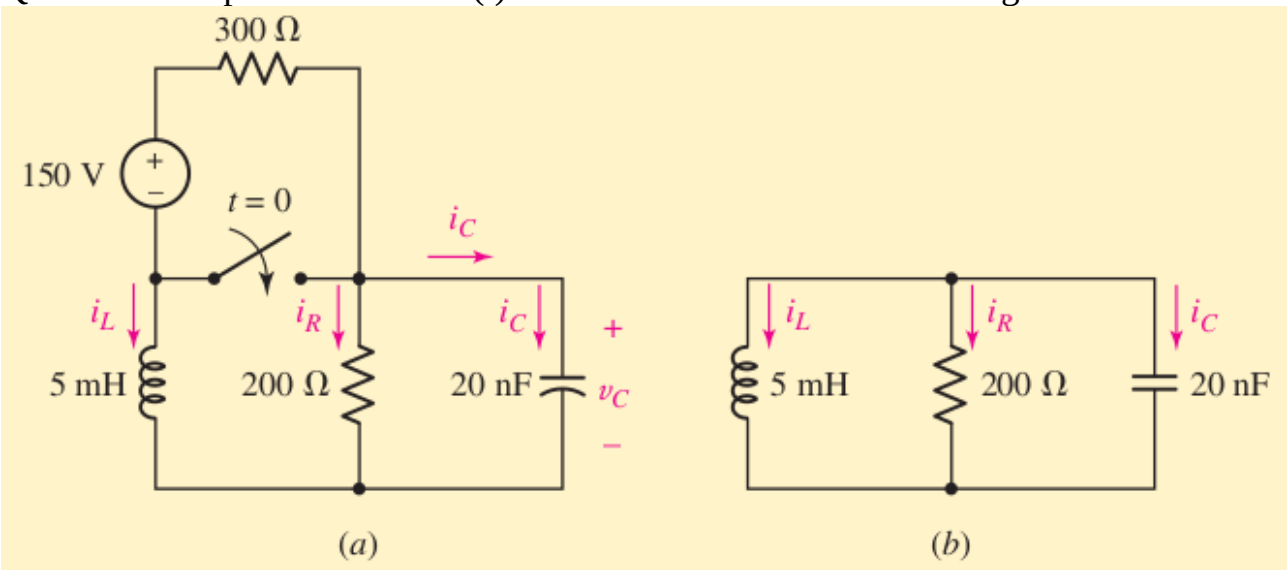
FIGURE 9.24

A

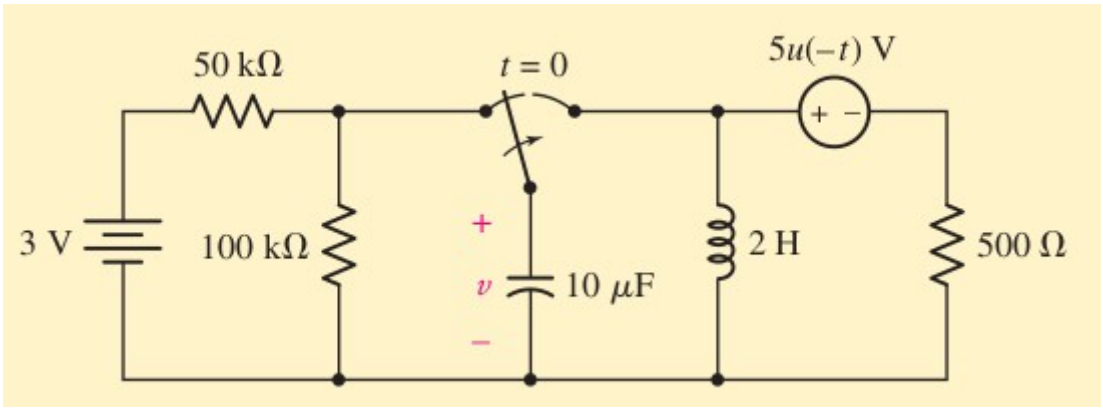
Parallel Source free RLC circuit

Q3. Consider a parallel RLC circuit having an inductance of 10 mH and a capacitance of 100 μF. Determine the resistor values that would lead to overdamped and underdamped responses.

Q4. Find an expression for v C (t) valid for t > 0 in the circuit of Fig. 9.3a.



Q5. The switch in the circuit of Fig. 9.19 has been in the left position for a long time; it is moved to the right at t = 0. Find (a) dv/dt at t = 0 + ; (b) v at t = 1 ms; (c) t 0 , the first value of t greater than zero at which v = 0.



Forced response of RLC circuit for DC input

Q6. Let v s = 10 + 20u(t) V in the circuit of Fig. 9.33. Find (a) iL(0); (b) vC(0); (c) iL,f ; (d) iL(0.1 s).