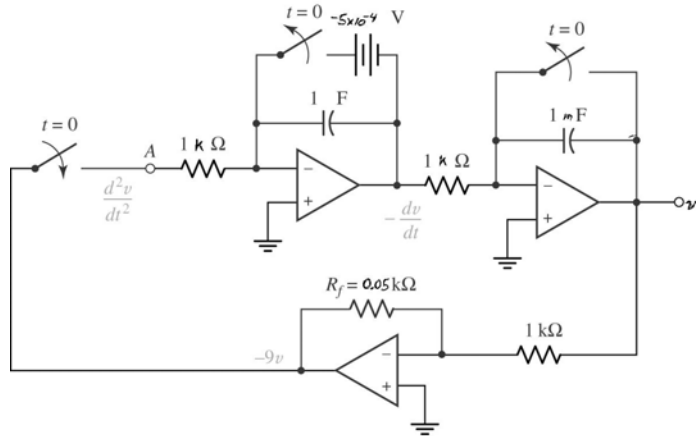


## CHAPTER 9 ENGINEERING CIRCUIT ANALYSIS SELECTED ANSWERS

1. (a)  $175 \times 10^3 \text{ s}^{-1}$ ; (b) 22.4 krad/s; (c) overdamped.
3. (a)  $5 \times 10^8 \text{ s}^{-1}$ ; (b) 32 Trad/s; (c)  $-0.5 \pm j32 \text{ Grad/s}$ ; (d) underdamped
5. 1.44 H; 14 mF; 4.9  $\Omega$
7. (a) 100 aF; (b) 1 M $\Omega$ ; (c) 5 Gs-1; (d)  $-5 \times 10^9 + j70.71 \times 10^{12} \text{ s}^{-1}$ ,  
 $-5 \times 10^9 - j70.71 \times 10^{12} \text{ s}^{-1}$ ; (e)  $7.1 \times 10^{-5}$
9. (a) 800 rad/s (b)  $954 \times 10^3 \text{ s}^{-1}$ ; (c) 95300%
11. (a) 158 m $\Omega$ ; (b)  $i(t) = 4.169e^{-158.5t} - 0.169e^{-6.31 \times 10^4 t} \text{ A}$
13. (a)  $-20e^{-10t} + 60e^{-40t} \text{ V}, t > 0$ ; (b)  $160e^{-10t} - 120e^{-40t} \text{ A}$
15. (a)  $v(t) = -18[e^{-0.069t} - e^{-0.181t}] \text{ V}$ ; (b) 8.6 s, -6.1 V
17.  $2.025e^{-50t} - 0.025e^{-450t} \text{ A}, t > 0$
19.  $v(t) = 170e^{-8t} - 42e^{-2t}, t > 0$
21. (a) 50 V; (b) -2 A; (c)  $v_c(t) = -25e^{-2000t} + 75e^{-6000t}, t > 0$ ; (e) 270  $\mu\text{s}$ ; (f) 2 ms
23.  $R < 160 \text{ ohms}$
25. (a) 1.6 m $\Omega$ ; (b)  $i_L(t) = e^{-3.2 \times 10^5 t} (3.2 \times 10^6 t + 10)$
27. (a) 8 mH; (b) 930 mA; (c) 24 ms
29. 160 ohms
31.  $8.11 \times 10^{13} \text{ cm}$
33.  $e^{-4000t} (-2 \cos 2000t + 4 \sin 2000t) \text{ A}, t > 0$
35. (a)  $e^{-5000t} (200 \cos 10^4 t + 100 \sin 10^4 t) \text{ V}, t > 0$ ;  
(b)  $10 - e^{-5000t} (10 \cos 10^4 t - 7.5 \sin 10^4 t) \text{ mA}, t > 0$
37.  $0.6e^{-100t} \sin 1000t \text{ mA}, t > 0$
39.  $R = 10.4 \text{ ohms}$ ; 2.15 s

**CHAPTER 9 ENGINEERING CIRCUIT ANALYSIS SELECTED ANSWERS**

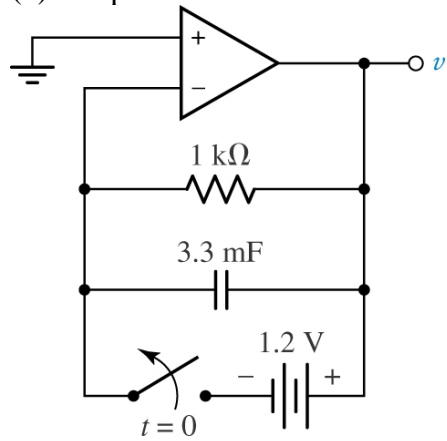
41. (a,b)  $e^{-t} (4 \cos 5t + 0.8 \sin 5t)$  A; (c) 4.7 s
43.  $e^{-4t} (10 \cos 2t + 20 \sin 2t)$  A,  $t > 0$
45.  $(2.25e^{-200t} - 0.25e^{-6000t}) u(t) + 2u(-t)$  V
47. (a)  $0.5e^{-10t}$  A,  $t > 0$ ; (b)  $100e^{-10t}$  V  $t > 0$
49. 4.7 kV
51. 1.5 ohms; 23 J
53.  $v_C(t) = e^{-2500t} [100 \cos(1.6 \times 10^5 t) + 1.6 \sin(1.6 \times 10^5 t)]$  V
55.  $v_C(t) = e^{-0.21t} [13 \cos 18t + 0.14 \sin 18t]$  V for  $t > 0$  and 13 V,  $t < 0$
57.  $i_L(t) = 10 - e^{-4t} (20 \sin 2t + 10 \cos 2t)$  A,  $t > 0$
59.  $e^{-4000t} (2 \cos 2000t - 4 \sin 2000t)$  A,  $t > 0$
61.  $12 - e^{-t} (t + 2)$  V,  $t > 0$
63. (a)  $2.5e^{-500t} - 22.5e^{-1500t}$  mA,  $t > 0$ ; (b)  $25e^{-500t} + 22.5e^{-1500t}$  mA,  $t > 0$
65. (a) 30 V; (b) 51 V; (c) 44 V; (d) 44 V
67. (a) 0; (b) 0; (c) 920 mA; (d) -1.03 A
69. 1003 ohms
71. one possible solution:



CHAPTER 9 ENGINEERING CIRCUIT ANALYSIS SELECTED ANSWERS

73. (a)  $\frac{dv}{dt} = -\frac{1}{3.3}v$

(b) one possible solution:



75. (a)  $\frac{di_L}{dt} = -4i_L$

(b) one possible solution:

