Electronic Circuits **Homework 3**

1. A sine wave goes through 5 cycles in 10 μs. What is its period? (8-3)

2. A sine wave has a peak value of 12 V. Determine the following voltage values:
   (a) rms (b) peak-to –peak (c) half-cycle average (8-6)

3. A sinusoidal voltage is applied to the resistive circuit in Figure 1. Determine the following: (a) I_{rms} (b) I_{avg} (c) I_p (d) I_{pp} (e) i at the positive peak (8-21)

Figure 1

4. Find the half-cycle average value of the voltages across $\boldsymbol{R}_1$ and $\boldsymbol{R}_2$ in Figure 2. All values shown are rms. (8-22)

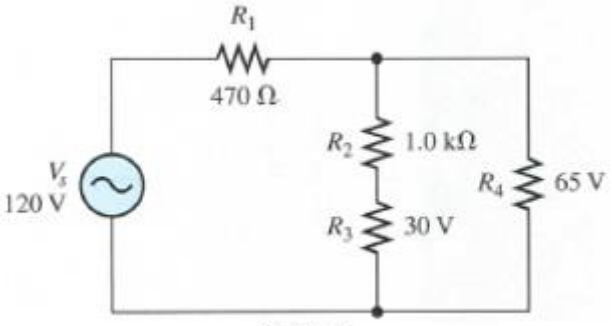

Figure 2

5. (a) Find the capacitance when Q = 50 μC and V = 10 V.
   (b) Find the charge when C = 0.001 μF and V = 1 kV.
   (c) Find the voltage when Q = 2 mC and C = 200 μF. (9-1)

6. What size capacitor is capable of storing 10 mJ of energy with 100V across its plates? (9-5)

7. Find the total capacitance for each circuit in Figure 3. (9-19)

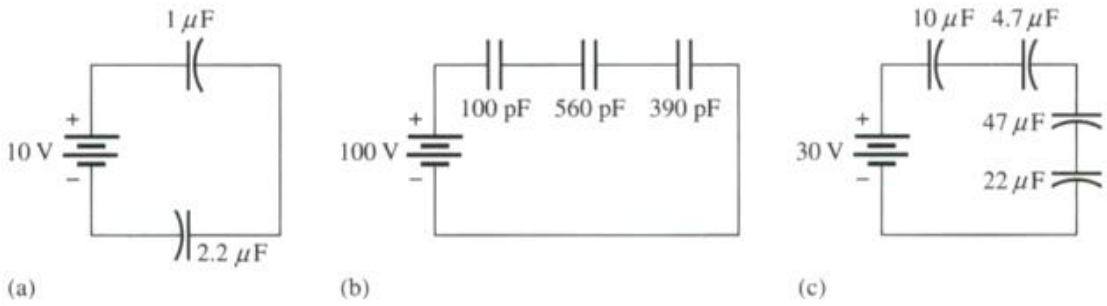

Figure 3

8. The total charge stored by the series capacitors in Figure 4 is 10 μC. Determine the voltage across each of the capacitors. (9-21)

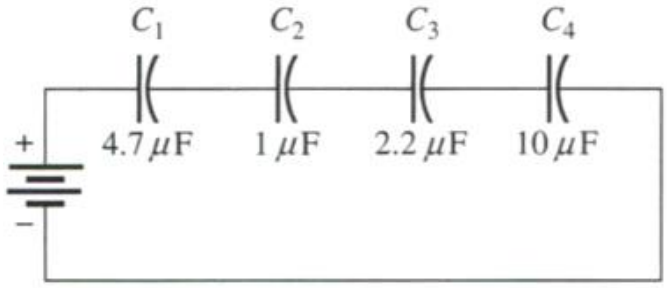

Figure 4

9. Determine C_T for each circuit in Figure 5. (9-22)

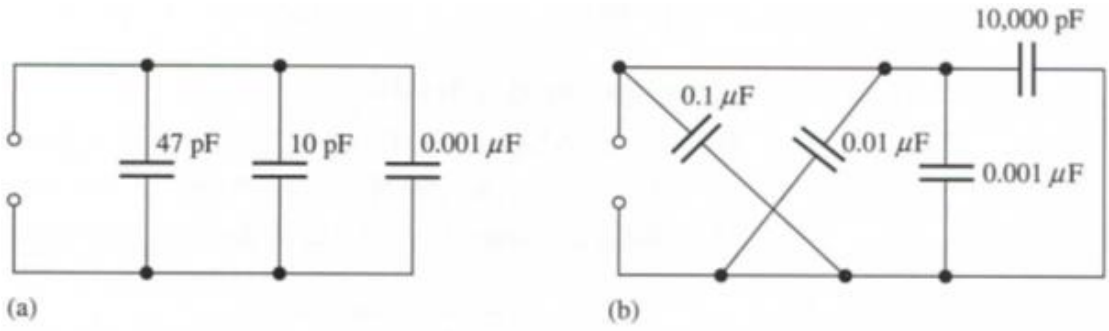

Figure 5

10. Determine the time constant for each of the following series ***RC*** combinations:

(a) $R = 100\Omega$, C = 1μF (b) $R = 10M\Omega$, C = 56pF

(c) $R = 4.7k\Omega$, C = 0.0047μF (d) $R = 1.5M\Omega$, C = 0.01μF (9-25)

11. In the circuit of Figure 6, the capacitor initially is uncharged. Determine the capacitor voltage at the following times after the switch is closed:

(a) 10 μs (b) 20 μs (c) 30 μs (d) 40 μs (e) 50 μs (9-27)

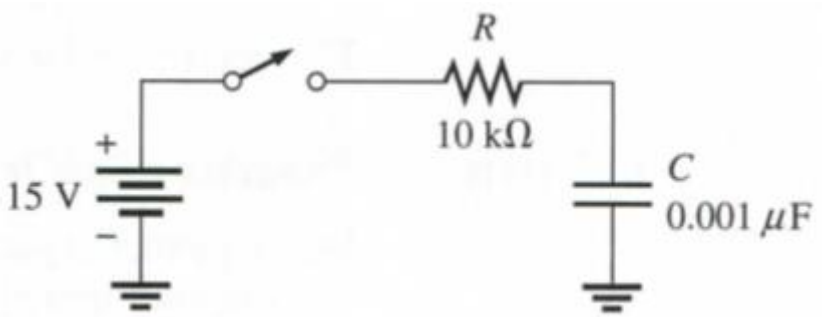

Figure 6

12. Determine X_C for a 0.047 μF capacitor at each of the following frequencies:

(a) 10 Hz (a) 250 Hz (a) 5 kHz (a) 100 kHz (9-31)

13. What is the value of total capacitive reactance in each circuit in Figure 7? (9-32)

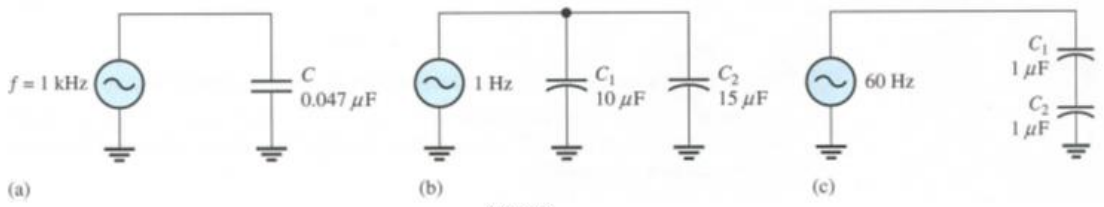

Figure 7

14. In each circuit of Figure 7, what frequency is required to produce an $X_{C(tot)}$ of 100 Ω? An $X_{C(tot)}$ of 1 kΩ? (9-34)

15. Determine the impedance and the phase angle in each circuit in Figure 8. (10-4)

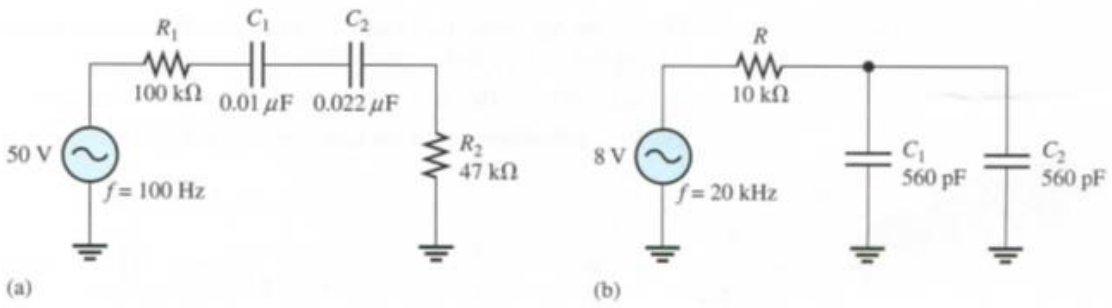

Figure 8

16. For the circuit of Figure 9, determine the impedance for each of the following frequencies: (a) 100 Hz (b) 500 Hz (c) 1.0 kHz (d) 2.5 kHz (10-5)

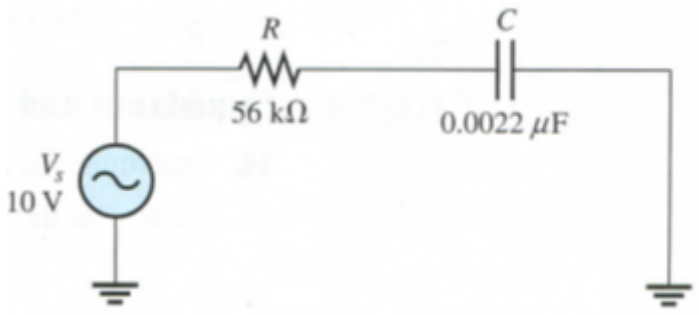

Figure 9

17. Determine the impedance and the phase angle in Figure 10. (10-15)

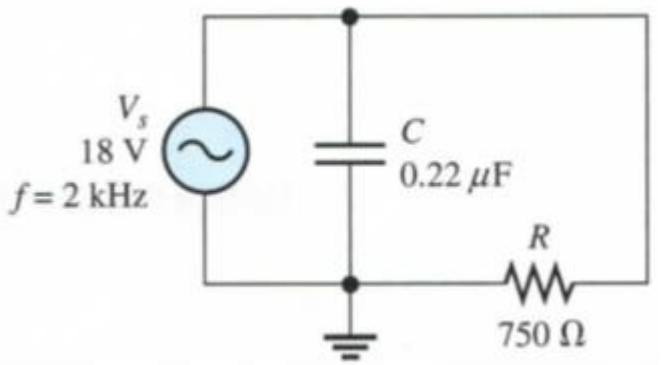

Figure 10

18. For the parallel circuit in Figure 11, find each branch current and the total current. What is the phase angle between the source voltage and the total current? (10-19)

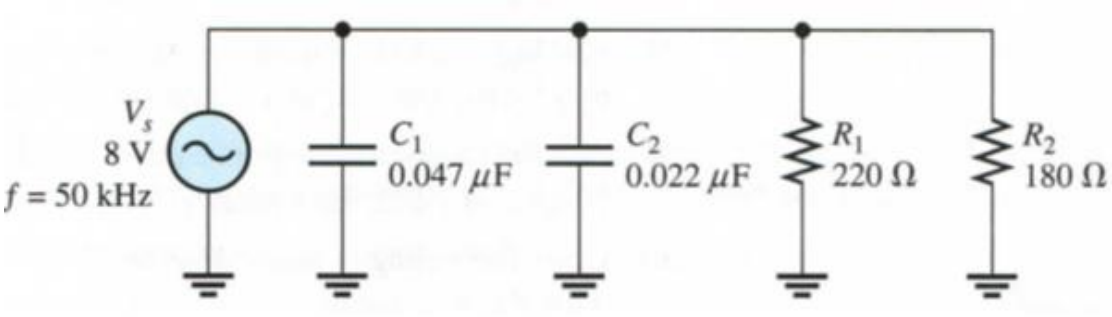

Figure 11

19. Determine the voltages across each element in Figure 12. Find the phase angle of the circuit. (10-23)

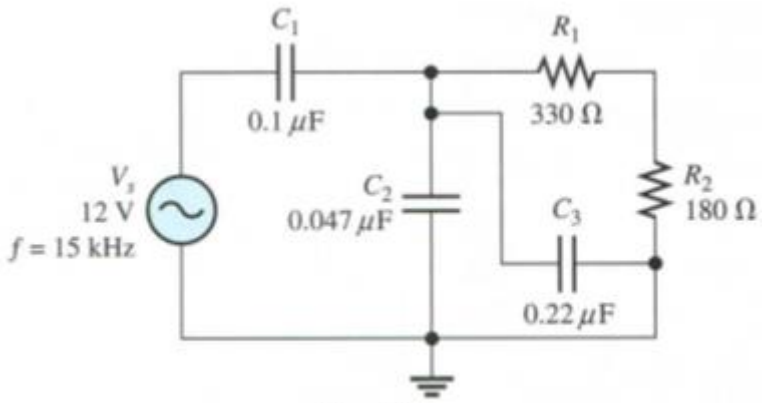

Figure 12

20. Plot the frequency response curve for the circuit in Figure 13 for a frequency range of 0 Hz to 10 kHz in 1 kHz increments. (10-32)

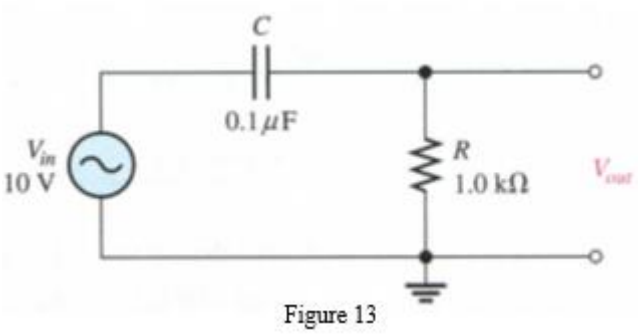

Figure 13