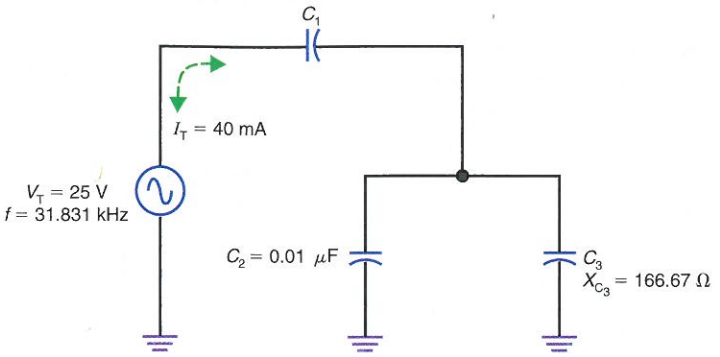
Figure 17–17 Circuit for Critical Thinking Prob. 17–35.



Answers to Self-Reviews

17–1 **a.** 0.1 μF
b. 0.5 μF

17–2 **a.** 200 Ω
b. 800 Ω
c. larger

17–3 **a.** 500 Ω
b. 120 Ω

17–4 **a.** 300 Ω
b. 66.7 Ω

17–5 **a.** 50 Ω
b. 1000 Ω

17–6 **a.** 90°
b. 0 or 360°
c. 90°

Laboratory Application Assignment

In this lab application assignment you will examine how the capacitive reactance, X_C, of a capacitor decreases when the frequency, f, increases. You will also see that more capacitance, C, at a given frequency results in less capacitive reactance, X_C. Finally, you will observe how X_C values combine in series and in parallel.

Equipment: Obtain the following items from your instructor.

- Function generator
- Assortment of capacitors
- DMM

Capacitive Reactance, X_C

Refer to Fig. 17–18*a*. Calculate and record the value of X_C for each of the following frequencies listed below. Calculate X_C as $1/(2\pi fC)$.

$X_C =$ _____ @ $f = 100$ Hz
$X_C =$ _____ @ $f = 200$ Hz
$X_C =$ _____ @ $f = 400$ Hz

Connect the circuit in Fig. 17–18*a*. Set the voltage source to exactly 5 V_{rms}. For each of the following frequencies listed below, measure and record the current, I. (Use a DMM to measure I.) Next, calculate X_C as V/I.

$I =$ _____ @ $f = 100$ Hz; $X_C =$ _____
$I =$ _____ @ $f = 200$ Hz; $X_C =$ _____
$I =$ _____ @ $f = 400$ Hz; $X_C =$ _____

How do the experimental values of X_C compare to those initially calculated? _____
Based on your experimental values, what happens to the value of X_C each time the frequency, f, is doubled? _____

Figure 17–18