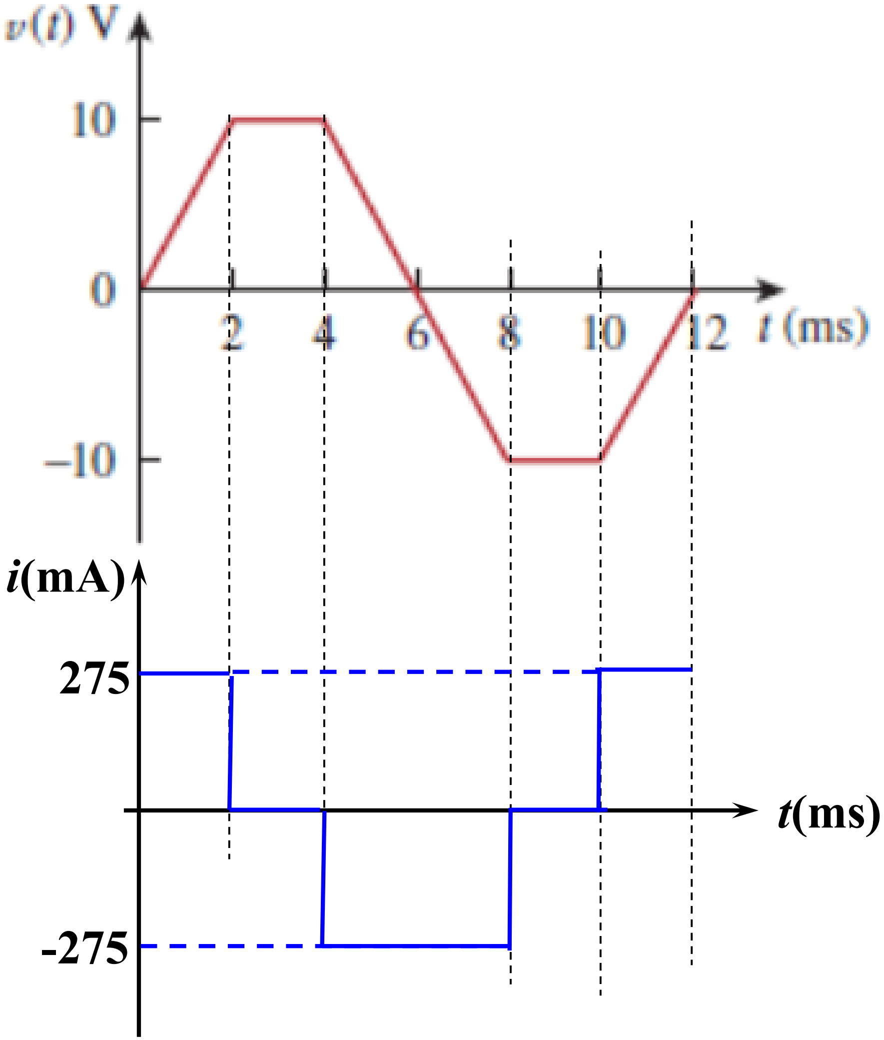
Problem 6.6 P240

The voltage waveform in Fig. 6.46 is applied across a 55-μF capacitor. Draw the current waveform through it.

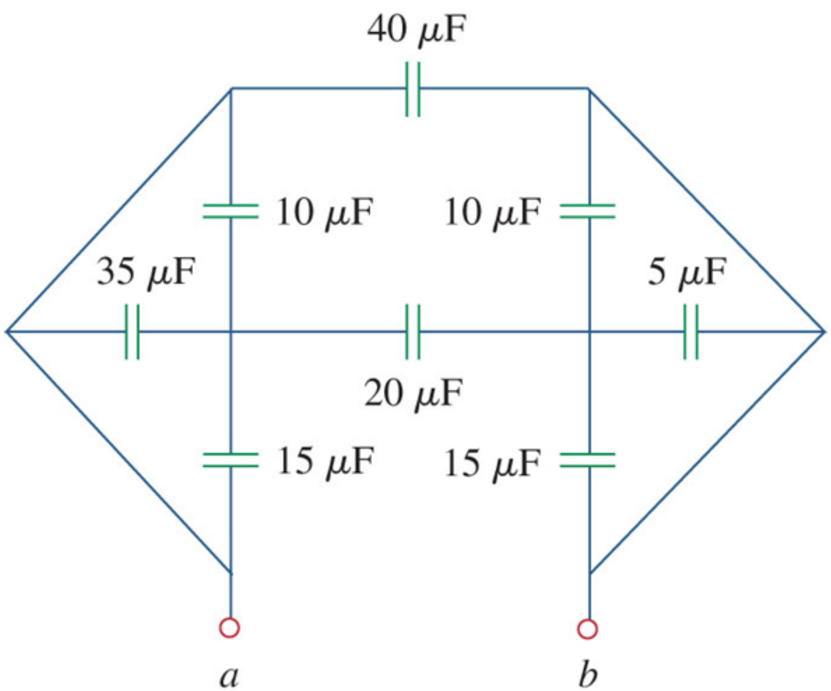


$$i = C \cdot \frac{dv}{dt}$$

$$\Rightarrow i = \begin{cases} 55\times10^{-6} \times \frac{10}{2\times10^{-3}} = 275\times10^{-3} & (0 \le t \le 2) \\ 0 & (2 < t \le 4) \\ 55\times10^{-6} \times \left(-\frac{20}{4\times10^{-3}}\right) = -275\times10^{-3} & (4 < t \le 8) \\ 0 & (8 < t \le 10) \\ 275\times10^{-3} & (10 < t \le 12) \end{cases}$$

Problem 6.22 P242

Obtain the equivalent capacitance of the circuit in Fig. 6.56.



$10 \| 35 \| 15 = 60\mu F$

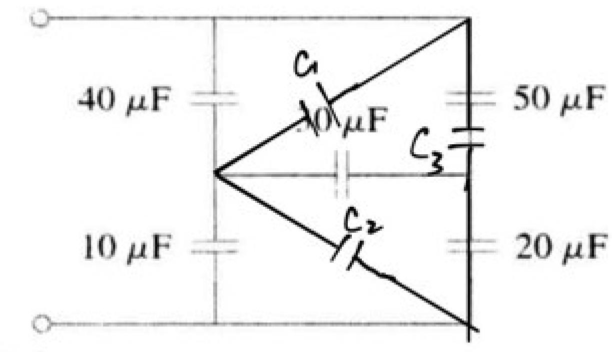
$5 \| 10 \| 15 = 30\mu F$

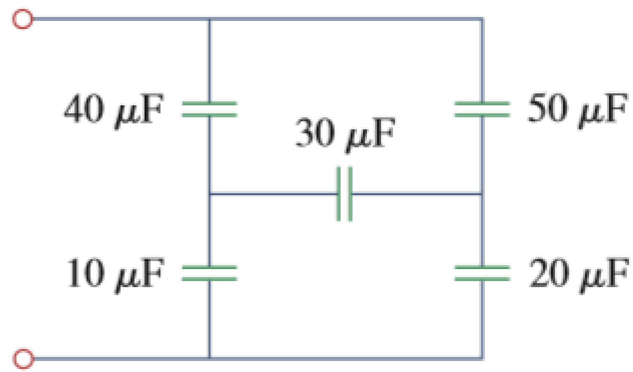
$$\frac{1}{\frac{1}{60}+\frac{1}{20}+\frac{1}{30}} = 10\mu F$$

$10\mu F \| 40\mu F = 50\mu F$ $\therefore C_{eq} = 50\mu F$

Problem 6.28 P243

Obtain the equivalent capacitance of the network shown in Fig. 6.60.





$$C_1 = \frac{\frac{1}{20}\times\frac{1}{30}+\frac{1}{20}\times\frac{1}{50}+\frac{1}{30}\times\frac{1}{50}}{\frac{1}{20}} = 15\,\mu F$$

$$C_2 = \frac{\frac{1}{20}\times\frac{1}{30}+\frac{1}{20}\times\frac{1}{50}+\frac{1}{30}\times\frac{1}{50}}{\frac{1}{50}} = 6\,\mu F$$

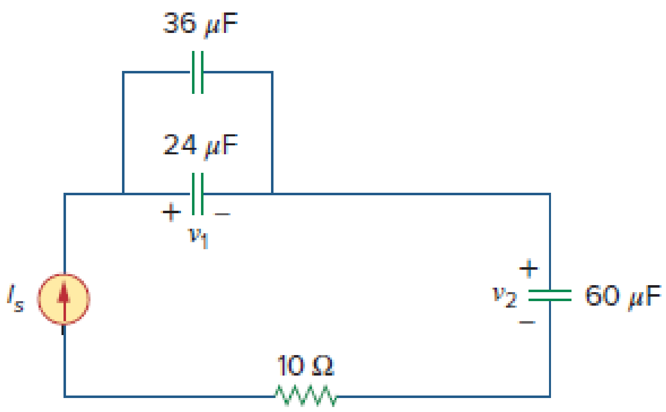
$$C_3 = \frac{\frac{1}{20}\times\frac{1}{30}+\frac{1}{20}\times\frac{1}{50}+\frac{1}{30}\times\frac{1}{50}}{\frac{1}{30}} = 10\,\mu F$$

$15\,\mu F \,//\, 40\,\mu F = 55\,\mu F$ $\quad$ $10\,\mu F \,//\, 6\,\mu F = 16\,\mu F$

$$\frac{55\times 16}{55+16} \,//\, 10 = \frac{1590}{71}\,\mu F \qquad \therefore C_{eq} = \frac{1590}{71}\,\mu F$$

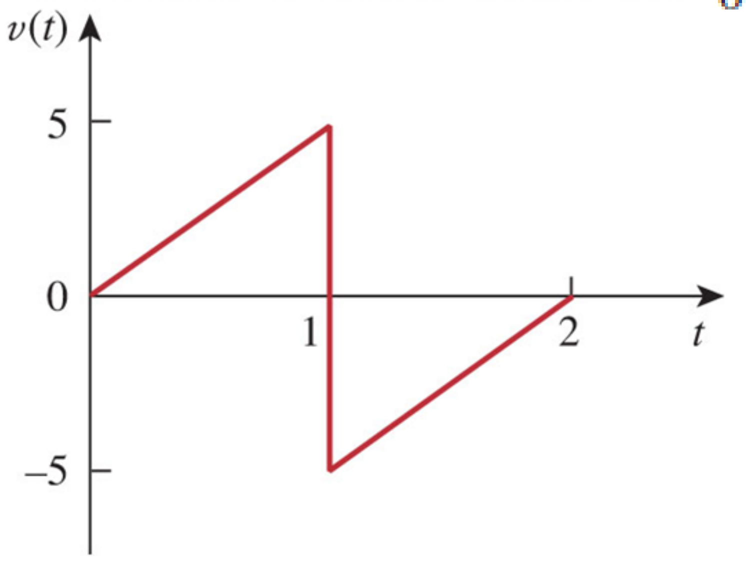
Problem 6.32 P243

6.32 In the circuit in Fig. 6.64, let $i_s = 4.5e^{-2t}$ mA and the voltage across each capacitor is equal to zero at $t = 0$. Determine v_1 and v_2 and the energy stored in each capacitor for all $t > 0$.



Promblem 6.45 P244

If the voltage waveform in Fig. 6.68 is applied to a 25-mH inductor, find the inductor current $i(t)$ for $0 < t < 2$ seconds. Assume $i(0) = 0$.



Promblem 6.54 P245

Find the equivalent inductance looking into the terminals of the circuit in Fig. 6.76.