

6.12 The voltage across a $2\text{-}\mu\text{F}$ capacitor is given by the waveform in Fig. P6.12. Compute the current waveform.

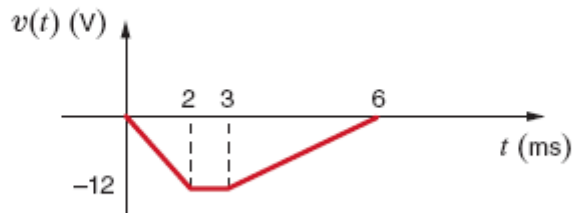


Figure P6.12

SOLUTION:

$$t < 0, \quad v = 0, \quad i = 0$$

$$0 < t < 2 \text{ ms}, \quad v = -6000t \text{ V}$$

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

$$i = 2 \mu(-6000)$$

$$i = -12 \text{ mA}$$

$$2 \text{ ms} < t < 3 \text{ ms}, \quad v = -12 \text{ V}$$

$$i = 0$$

$$3 \text{ ms} < t < 6 \text{ ms}, \quad v = -24 + 4000t \text{ V}$$

$$i = 2 \mu[4000] = 8 \text{ mA}$$

$$t > 6 \text{ ms}, \quad v = 0, \quad i = 0$$

$$i(t) = \begin{cases} 0 & t < 0 \\ -12 \text{ mA} & 0 < t < 2 \text{ ms} \\ 0 & 2 \text{ ms} < t < 3 \text{ ms} \\ 8 \text{ mA} & 3 \text{ ms} < t < 6 \text{ ms} \\ 0 & t > 6 \text{ ms} \end{cases}$$