Chapter 6, Solution 5.

$$v = \begin{cases} 5000t, & 0 < t < 2ms \\ 20 - 5000t, & 2 < t < 6ms \\ -40 + 5000t, & 6 < t < 8ms \end{cases}$$

$$i = C\frac{dv}{dt} = \frac{4x10^{-6}}{10^{-3}} \begin{cases} 5, & 0 < t < 2ms \\ -5, & 2 < t < 6ms \\ 5, & 6 < t < 8ms \end{cases} = \begin{cases} 20\ mA, & 0 < t < 2ms \\ -20\ mA, & 2 < t < 6ms \\ 20\ mA, & 6 < t < 8ms \end{cases}$$

Chapter 6, Solution 6.

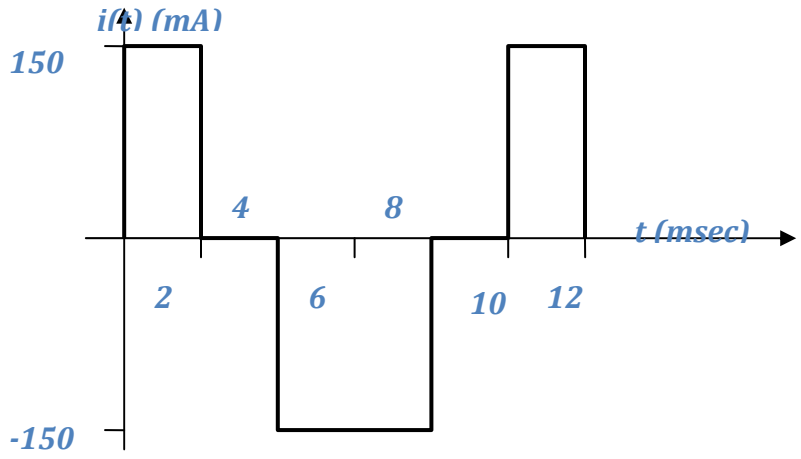
$i = C\dfrac{dv}{dt} = 30x10^{-6}$ x slope of the waveform.

For example, for $0 < t < 2$,

$$\frac{dv}{dt} = \frac{10}{2x10^{-3}}$$

$$i = C\frac{dv}{dt} = 30x10^{-6} x \frac{10}{2x10^{-3}} = 150mA$$

Thus the current i is sketched below.



Chapter 6, Solution 10

$$i = C\frac{dv}{dt} = 2x10^{-3}\frac{dv}{dt}$$

$$v = \begin{cases} 16t, & 0 < t < 1\mu s \\ 16, & 1 < t < 3\ \mu s \\ 64 - 16t, & 3 < t < 4\mu s \end{cases}$$

$$\frac{dv}{dt} = \begin{cases} 16x10^{6}, & 0 < t < 1\mu s \\ 0, & 1 < t < 3\ \mu s \\ -16x10^{6}, & 3 < t < 4\mu s \end{cases}$$

$$i(t) = \begin{cases} 32\ kA, & 0 < t < 1\mu s \\ 0, & 1 < t < 3\ \mu s \\ -32\ kA, & 3 < t < 4\mu s \end{cases}$$

Chapter 6, Solution 11.

$$v = \frac{1}{C}\int_0^t i\,dt + v(0) = 10 + \frac{1}{4x10^{-3}}\int_0^t i(t)dt$$

For 0<t <2, i(t)=15mA, V(t)= 10+ $v = 10 + \frac{10^3}{4x10^{-3}}\int_0^t 15dt = 10 + 3.76t$

v(2) = 10+7.5 =17.5

For 2 < t <4, i(t) = –10 mA

$$v(t) = \frac{1}{4x10^{-3}}\int_2^t i(t)dt + v(2) = -\frac{10x10^{-3}}{4x10^{-3}}\int_2^t dt + 17.5 = 22.5 + 2.5t$$

v(4)=22.5-2.5x4 =12.5

For 4<t<6, i(t) = 0, $v(t) = \frac{1}{4x10^{-3}}\int_2^t 0\,dt + v(4) = 12.5$

For 6<t<8, i(t) = 10 mA

$$v(t) = \frac{10x10^{3}}{4x10^{-3}} \int_{4}^{t} dt + v(6) = 2.5(t-6) + 12.5 = 2.5t - 2.5$$

Hence,

$$v(t) = \begin{cases} 10 + 3.75t\,\text{V}, & 0 < t < 2\text{s} \\ 22.5 - 2.5t\,\text{V}, & 2 < t < 4\text{s} \\ 12.5\,\text{V}, & 4 < t < 6\text{s} \\ 2.5t - 2.5\,\text{V}, & 6 < t < 8\text{s} \end{cases}$$

which is sketched below.