

Chapter 6, Solution 42.

$$i = \frac{1}{L} \int_0^t v dt + i(0) = \frac{1}{5} \int_0^t v(t) dt - 1$$

$$\text{For } 0 < t < 1, \quad i = \frac{10}{5} \int_0^t dt - 1 = 2t - 1 \text{ A}$$

$$\text{For } 1 < t < 2, \quad i = 0 + i(1) = 1 \text{ A}$$

$$\begin{aligned} \text{For } 2 < t < 3, \quad i &= \frac{1}{5} \int_2^t 10 dt + i(2) = 2t \Big|_2^t + 1 \\ &= 2t - 3 \text{ A} \end{aligned}$$

$$\text{For } 3 < t < 4, \quad i = 0 + i(3) = 3 \text{ A}$$

$$\begin{aligned} \text{For } 4 < t < 5, \quad i &= \frac{1}{5} \int_4^t 10 dt + i(4) = 2t \Big|_4^t + 3 \\ &= 2t - 5 \text{ A} \end{aligned}$$

Thus,

$$i(t) = \begin{cases} 2t - 1 \text{ A}, & 0 < t < 1 \\ 1 \text{ A}, & 1 < t < 2 \\ 2t - 3 \text{ A}, & 2 < t < 3 \\ 3 \text{ A}, & 3 < t < 4 \\ 2t - 5, & 4 < t < 5 \end{cases}$$