

- 1.14** The waveform for the current flowing into a circuit element is shown in Fig. P1.14. Calculate the amount of charge which enters the element between (a) 0 and 3 seconds, (b) 1 and 5 seconds, and (c) 0 and 6 seconds.

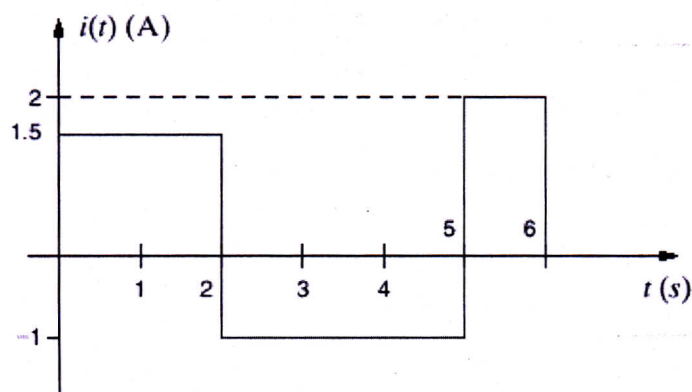


Figure P1.14

SOLUTION:

$$a) \quad q(t) = \int_{-\infty}^t i(x) dx$$

$$q(t) = \int_0^3 i(x) dx$$

$$q(t) = \int_0^2 1.5 dx + \int_2^3 -1 dx$$

$$q(t) = 1.5x \Big|_0^2 + -x \Big|_2^3$$

$$q(t) = 1.5(2) + [(-3) - (-2)]$$

$$q(t) = 3 - 3 + 2 = 2C$$

$$b) \quad q(t) = \int_1^5 i(x) dx$$

$$q(t) = \int_1^2 1.5 dx + \int_2^5 -1 dx$$

$$q(t) = 1.5x \Big|_1^2 + (-x) \Big|_2^5$$

$$q(t) = [1.5(2) - 1.5(1)] + [-5 - (-2)]$$

$$q(t) = 1.5 - 5 + 2 = 1.5C$$

$$c) \quad q(t) = \int_0^6 i(x) dx$$

$$q(t) = \int_0^2 1.5 dx + \int_2^5 -1 dx + \int_5^6 2 dx$$

$$q(t) = 1.5x \Big|_0^2 + (-x) \Big|_2^5 + 2x \Big|_5^6$$

$$q(t) = 1.5(2) + [-5 - (-2)] + [2(6) - 2(5)]$$

$$q(t) = 3 - 3 + 12 - 10$$

$$q(t) = 2C$$