

- 1.13** The voltage across an element is $12e^{-2t}$ V. The current entering the positive terminal of the element is $2e^{-2t}$ A. Find the energy absorbed by the element in 1.5 s starting from $t = 0$.

SOLUTION:

$$V(t) = 12e^{-2t} \text{ V}$$

$$i(t) = 2e^{-2t} \text{ A}$$

$$W = ? , 0 - 1.5 \text{ s}$$

$$W = \int_{t_1}^{t_2} v i \, dt$$

$$W = \int_0^{1.5} (12e^{-2t})(2e^{-2t}) \, dt$$

$$W = \int_0^{1.5} 24e^{-4t} \, dt$$

$$W = \frac{24e^{-4t}}{-4} \Big|_0^{1.5}$$

$$W = -6e^{-4t} \Big|_0^{1.5} = -6e^{-4(1.5)} + 6e^{-4(0)}$$

$$W = 5.99 \text{ J}$$