A 12 V automotive battery is charged with a constant current of 1.5 A for 3 hrs. Determine the work done on the battery.

SOLUTION:

The work done on the battery is,

$$W_{\text{on battery}} = \int_{t=0}^{t=T} \dot{W}\, dt = \int_{t=0}^{t=T} VI\, dt = VIT = \left(12 \text{ V}\right)\left(1.5 \text{ A}\right)\left(3 \text{ hr} \cdot 3600 \,{}^{\text{s}}\!\big/_{\text{hr}}\right),$$

$$\boxed{\therefore W_{\text{on battery}} = 0.2 \text{ kJ}}.$$

battery