

### Answer on Question #58154-Engineering-Mechanical Engineering

The electric current  $i$  flowing in a device varies with time  $t$ . The equation linking the two variables is as follows.

$$i=2\sin(5t)$$

The area under the graph represents the charge  $q$  that has passed over any given time interval.

Calculate the area and hence the charge by integrating the equation between  $t=t_1$  and  $t=t_2$

$$t_1=0.4$$

$$t_2=0.5$$

**Solution**

$$\begin{aligned}\Delta Q &= \int_{t_1}^{t_2} i(t)dt = \int_{0.4}^{0.5} 2\sin(5t)dt = \frac{2}{5} \int_{0.4}^{0.5} \sin(5t)d(5t) = \frac{2}{5} (-\cos 5t)_{0.4}^{0.5} = \frac{2}{5} (\cos 2 - \cos 2.5) \\ &= 0.154 \text{ C.}\end{aligned}$$

**Answer: 0.154 C.**