Answer on Question #58155-Engineering-Mechanical Engineering

Area under a velocity time graph is distance travelled. Find, from the following formula x=t^3 + t^2 - 2t + 4

The distance travelled when an object moves through a toroidal magnet for x ms

x ms in this case = 0.4

Solution

The distance travelled when an object moves through a toroidal magnet is

$$d = \int_0^4 x(t)dt = \int_0^4 (t^3 + t^2 - 2t + 4)dt = \left(\frac{t^4}{4} + \frac{t^3}{3} - t^2 + 4t\right)_0^4 = \left(\frac{4^4}{4} + \frac{4^3}{3} - 4^2 + 4 \cdot 4\right) - (0)$$
$$= \frac{256}{3}\, m \approx 85.3\, m.$$

Answer: $\frac{256}{3}\, m \approx 85.3\, m.$