

Mathematics Questions by Topic

Motion and Force

Answer 26

Source: K13SM2Q22

Question 26

A particle of mass m kg is acted upon by a variable force, so that its velocity v m/s when the particle is x m from the origin is given by $v = e^{cx}$, where c is a non-zero real constant. The force acting on the particle when $x = \frac{1}{c}$, in newtons, is

- A. mc^2
- B. mec
- C. me
- D. me^2
- E. mce^2

ANSWER E

$$v = e^{cx} \quad \frac{dv}{dx} = ce^{cx}$$

$$F = ma = m \frac{dv}{dx} = mce^{2cx} \quad \text{when } x = \frac{1}{c}$$

$$F = mce^{2c \times \frac{1}{c}} = mce^2$$