Answer on Question #51849, Physics, Mechanics | Kinematics | Dynamics

Question:

Which of the following is the correct unit of k in the equation of a damped harmonic oscillator given as

$$-bv-kx=ma,$$

where b is the damping factor and all the symbols have their usual meaning?

kgms−2

kgs−1

kgms−1

kgs−2

Answer:

Equation of a damped harmonic oscillator:

$$-bv - kx = ma$$

unit of ma is:

$$[ma] = \left[kg\frac{m}{s^2}\right]$$

therefore unit of kx:

$$[kx] = [ma] = [k][x] = \left[kg\frac{m}{s^2}\right] = \left[\frac{kg}{s^2}\right][m]$$

unit of k is:

$$[k] = \left[\frac{kg}{s^2}\right]$$

Answer: kgs−2