

Q A spring whose force constant is 80 N/m , hangs vertically supporting a 1 kg mass at rest. Find the distance by which the mass should be pulled down so that on being released it may pass the equilibrium position with a velocity of 1 m/s .

Solution \rightarrow For a loaded spring

$$\omega = \sqrt{\frac{c}{m}}$$

$$c = 80 \text{ N/m}, \quad m = 1 \text{ kg}$$

$$\therefore \omega = \sqrt{\frac{80}{1}} = 8.944$$

Let a be the distance by which the mass has to be pulled down

$$v = a\omega$$

$$a = \frac{v}{\omega}$$

$$\text{Here } v = 1 \text{ m/s} \quad \text{and } \omega = 8.944$$

$$\therefore a = \frac{1}{8.944}$$

$$a = 0.1118 \text{ m} \quad \underline{\text{Ans}}$$