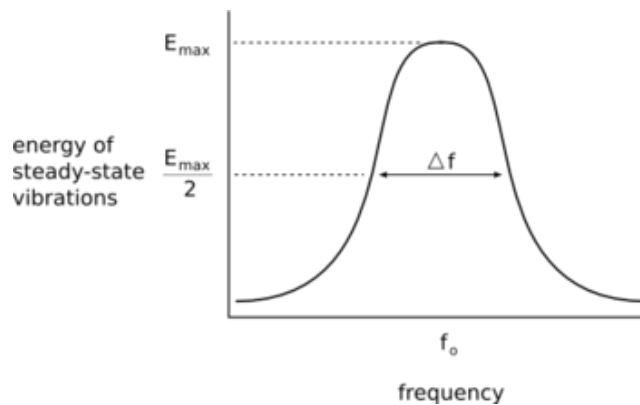Q (Quality factor) is times the ratio of the total energy stored divided by the energy lost in a single cycle or equivalently the ratio of the stored energy to the energy dissipated over one radian of the oscillation. It is a dimensionless parameter that compares the time constant for decay of an oscillating physical system's amplitude to its oscillation period. Equivalently, it compares the frequency at which a system oscillates to the rate at which it dissipates its energy.

The width (bandwidth) of the resonance is given by:

$$\Delta f = \frac{f_0}{Q}$$

For mechanical systems:

For a single damped mass-spring system, the Q factor represents the effect of simplified viscous damping or drag, where the damping force or drag force is proportional to velocity. The formula for the Q factor is:

$$Q = \frac{\sqrt{M\,k}}{D}$$

where M is the mass, k is the spring constant, and D is the damping coefficient, defined by the equation $\boldsymbol{F}_{damping} = D\boldsymbol{v}$, where v is the velocity.