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For an RLC circuit driven with voltage of amplitude  $v_m$  and frequency  $\omega_0 = \frac{1}{\sqrt{LC}}$  the current exhibits resonance. The quality factor,  $Q$  is given by : [JEE MAIN 2018](#).

A  $\frac{CR}{\omega_0}$

B  $\frac{\omega_0 L}{R}$

C  $\frac{\omega_0 R}{L}$

D  $\frac{R}{(\omega_0 C)}$

5. For given RLC circuit;

$$\omega_0 = \frac{1}{\sqrt{LC}}$$

$$\sqrt{LC}$$

$$\Rightarrow \sqrt{C} = \frac{1}{\omega_0 \sqrt{L}}$$

$$\omega_0 \sqrt{L}$$

$$\therefore \text{Quality factor (Q)} = \frac{1}{R} \sqrt{\frac{L}{C}}$$

$$= \frac{1}{R} \left( \frac{1}{\omega_0 \sqrt{L}} \right) (\sqrt{L})$$

$$= \frac{1}{R} (\omega_0 \sqrt{L}) (\sqrt{L})$$

$$\boxed{Q = \frac{\omega_0 L}{R}}$$