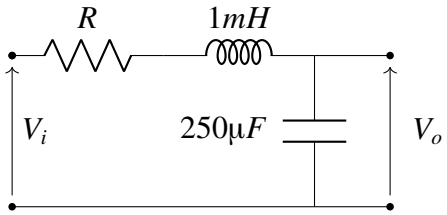
# GATE 2022 IN.53

EE23BTECH11010 - VENKATESH BANDAWAR*

**Question:** The Bode magnitude plot for the transfer function $\frac{V_o(s)}{V_i(s)}$ of the circuit is as shown. The value of R is _____Ω. (GATE 2021 EE Q20)



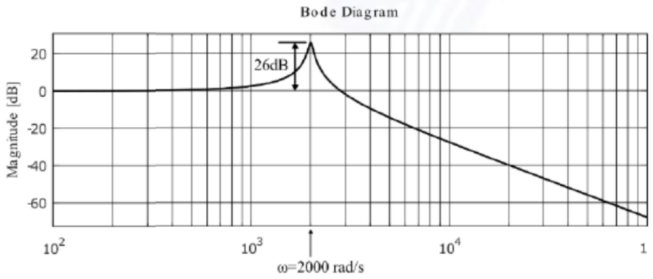




Fig. 1: Caption

**Solution:**

| Parameter | Description | Value |
|---|---|---|
| $C$ | Capacitance | $250\mu F$ |
| $L$ | Inductor | $1mH$ |
| $T(s)$ | Transfer Function | $20\log\frac{V_o(s)}{V_i(s)}$ |
| $\omega_0$ | Resonant frequency | |

TABLE I: Caption

$$\omega_O = \frac{1}{\sqrt{LC}} \tag{1}$$

$$= 2000 rad/sec \tag{2}$$

At resonant frequency,

$$X_c = \frac{1}{\omega C} \tag{3}$$

$$= 2\Omega \tag{4}$$

$$\frac{V_o}{V_i} = \frac{X_c}{R} \tag{5}$$

$$= \frac{2}{R} \tag{6}$$

$$|T(s)| = 20\log\frac{V_o(s)}{V_i(s)} \tag{7}$$

$$26 = 20\log\frac{2}{R} \tag{8}$$

$$R = 0.1\Omega \tag{9}$$