Problem 1.22

The calibration curve of a piezoelectric accelerometer is shown in Fig. P1.22 where the ordinate is in decibels. If the peak is 32 dB, what is the ratio of the resonance response to that at some low frequency, say, 1000 cps?

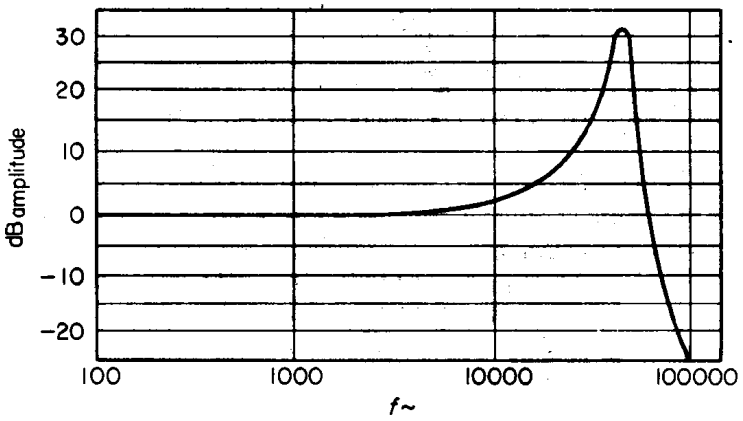

FIGURE P1.22.

Solution

At $f = 1000$ cycles per second

$$20 \log_{10}\left(\frac{x_{1000}}{x_2}\right) = 0$$

$$\log_{10}\left(\frac{x_{1000}}{x_2}\right) = 0$$

$$\frac{x_{1000}}{x_2} = 1$$

$$x_{1000} = x_2$$

At $f = f_{\text{peak}}$

$$20 \log_{10}\left(\frac{x_{\text{peak}}}{x_2}\right) = 32$$

$$\log_{10}\left(\frac{x_{\text{peak}}}{x_2}\right) = 1.6$$

$$\frac{x_{\text{peak}}}{x_2} = 10^{1.6}$$

$$x_{\text{peak}} = 10^{1.6} x_2$$

Therefore,

$$\frac{x_{\text{peak}}}{x_{1000}} = 10^{1.6} \approx 39.8.$$