In the figure shown, the capacitance is \( C \) and the inductance is \( L \). The resistance in the top branch is \( R_t \), and in the bottom branch is \( R_b \). The potential of the power supply is \( V_{rms} \).

Find the rms current delivered by the power supply when the frequency is very small.

A) \( I = \frac{V_{rms}}{R_t + R_b} \)

B) \( I = \frac{V_{rms}}{R_t} \)

C) \( I = \frac{V_{rms}}{R_b} \)

D) \( I = \frac{V_{rms}(R_t + R_b)}{R_t R_b} \)

The impedance of the bottom and top branches is

\[
Z_b = \sqrt{R_b^2 + \left(\frac{1}{\omega C}\right)^2} \quad \text{and} \quad Z_t = \sqrt{R_t^2 + (\omega L)^2}.
\]

We notice that, when the frequency is very small, \( \frac{1}{\omega C} \to \infty \) and \( \omega L \to 0 \). This means that the bottom branch, with very large impedance, carries negligible current; while the impedance of the top branch reduces to \( R_t \). The current that flows in the power supply and the top branch is

\[
I = I_t = \frac{V_{rms}}{Z_t} = \frac{V_{rms}}{R_t}.
\]

Answer A.