A thin metallic ring of mass $m$, electrical resistance $R$, and radius $\alpha$ is rotating about an axis perpendicular to a uniform magnetic field $\mathbf{B}$ as shown in the figure. Initially the ring rotates with a frequency $\omega_0$. Throughout this problem, you may assume that the fractional change in the ring’s rotation frequency per cycle is small. Please state your system of units (SI or CGS).

A) Determine the average energy loss per cycle due to Joule heating.

B) Determine the time it takes for the frequency of the rotation to slow down to $1/e$ of its initial value. Express your answer in terms of the parameters above.