$$E(t) = \frac{1}{2}\int_0^L \left(u_t^2 + Ku_{xx}^2 + \omega^2 u^2\right) dx$$

Take the derivative with respect to t and then integrate the middle term by parts.

$$\begin{aligned}
E'(t) &= \frac{1}{2}\int_0^L \left(u_{tt}u_t + Ku_{xx}u_{xxt} + \omega^2 uu_t\right) dx \\
&\quad K\left(u_{xt}u_{xx}\Big|_0^L - \int_0^L u_{xt}u_{xxx}dx\right) \\
&\implies K\left(u_{xt}u_{xx}\Big|_0^L - u_tu_{xxx}\Big|_0^L + \int_0^L u_tu_{xxxx}\right) \\
E'(t) &= \int_0^L u_t\left(u_{tt} + Ku_{xxxx} + \omega^2 u\right)dx + K\left[u_{xt}u_{xx} - u_tu_{xxx}\right]_0^L \\
&= K\left[u_{xt}u_{xx} - u_tu_{xxx}\right]_0^L
\end{aligned}$$

After plugging in the bounds and checking boundary conditions, we see that $E'(t) = 0$ and thus $E(t)$ is a constant function, independent of t.