$$
\begin{aligned}
\mathbf{Z}_{\text{series}} &= \mathbf{Z_1} + \mathbf{Z_2} \\
&= \frac{1}{j\omega C_1} + \frac{1}{j\omega C_2} \\
&= \frac{1}{j\omega}\left(\frac{1}{C_1} + \frac{1}{C_2}\right) \\
&= \frac{1}{j\omega}\left(\frac{C_2}{C_1 C_2} + \frac{C_1}{C_2 C_1}\right) \\
&= \frac{1}{j\omega}\left(\frac{C_1 + C_2}{C_1 C_2}\right) \\
&= \frac{1}{j\omega}\frac{1}{\left(\frac{C_1 C_2}{C_1 + C_2}\right)} \\
&= \frac{1}{j\omega\left(\frac{C_1 C_2}{C_1 + C_2}\right)}
\end{aligned}
$$