1.17

dane: $\nu_0 = 136\,kHz = 136000\,Hz$ wzór: $\nu = \frac{1}{2\pi\sqrt{LC}}$

szukane: $\nu_1 = ?$

a) Szeregowe łączenie kondensatorów C_1 - pojemność zastępcza

$$\frac{1}{C_1} = \frac{1}{C} + \frac{1}{C} \Rightarrow \frac{1}{C_1} = \frac{2}{C} \Rightarrow C_1 = \frac{1}{2}C$$

$$\frac{\nu_0}{\nu_1} = \frac{\frac{1}{2\pi\sqrt{LC}}}{\frac{1}{2\pi\sqrt{LC_1}}} = \frac{1}{2\pi\sqrt{LC}} \cdot \frac{2\pi\sqrt{LC_1}}{1} = \frac{\sqrt{L}\cdot\sqrt{\frac{1}{2}C}}{\sqrt{L}\cdot\sqrt{C}} = \sqrt{\frac{1}{2}\cdot\frac{1}{1}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\frac{\nu_0}{\nu_1} = \frac{\sqrt{2}}{2} \Rightarrow \nu_1 = \sqrt{2}\cdot\nu_0$$

$$\nu_1 = \sqrt{2}\cdot 136\,kHz \approx 192\,kHz$$

Odp: $\nu_1 \approx 192\,kHz$

a) Równoległe łączenie kondensatorów C_1 - pojemność zastępcza

$$C_1 = C + C \Rightarrow C_1 = 2C$$

$$\frac{\nu_0}{\nu_1} = \frac{\frac{1}{2\pi\sqrt{LC}}}{\frac{1}{2\pi\sqrt{LC_1}}} = \frac{1}{2\pi\sqrt{LC}} \cdot \frac{2\pi\sqrt{LC_1}}{1} = \frac{\sqrt{L}\cdot\sqrt{C_1}}{\sqrt{L}\cdot\sqrt{C}} = \sqrt{\frac{2C}{C}} = \sqrt{2}$$

$$\frac{\nu_0}{\nu_1} = \sqrt{2} \Rightarrow \nu_1 = \frac{\sqrt{2}}{2}\cdot\nu_0$$

$$\nu_1 = \frac{\sqrt{2}}{2}\cdot 136\,kHz \approx 96\,kHz$$

Odp: $\nu_1 \approx 96\,kHz$