

Answer on Question #51586-Physics-Mechanics-Kinematics-Dynamics

In a resonance column experiment radius of column tube is $r = 2\text{ cm}$ and the frequency of tuning fork is $f = 512\text{ Hz}$. if zero of meter scale coincide with the top end of resonance column then reading of position of water column at resonance (speed of sound $c = 340\frac{\text{m}}{\text{s}}$) nearly...

1) 18.3 cm. 2) 15.4 cm. 3) 30cm. 4) 16.6cm

Solution

End correction

$$e = 0.3d = 0.6r = 0.6 \cdot 2\text{ cm} = 1.2\text{ cm}.$$

Wavelength

$$\lambda = \frac{c}{f} = \frac{340\frac{\text{m}}{\text{s}}}{512\text{ Hz}} = 0.664\text{ m} = 66.4\text{ cm}.$$

When the first resonance occurs,

$$L + e = \frac{\lambda}{4} \rightarrow L = \frac{\lambda}{4} - e = \frac{66.4\text{ cm}}{4} - 1.2\text{ cm} = 15.4\text{ cm}.$$

Answer: 2) 15.4 cm.