A glass capillary tube of inner diameter 0.28 mm is lowered vertically into water in a vessel .the pressure to be applied on the water in the capillary tube so that water level in the tube is same as that in vessel is (surface tension of water =0.07 N/m and atomspheric pressure = 10 raise to power 5)

Solution:

$\mathrm{d} = 28 \times 10^{-5}\mathrm{m} - \text{diameter of the glass capillary tube;}$

We know surface tension (T) = $\frac{\rho \mathrm{rhg}}{2}$

Pressure (P) = $\rho \mathrm{gh} = \frac{2\mathrm{T}}{\mathrm{r}} = \frac{2\mathrm{T}}{\frac{\mathrm{d}}{2}} = \frac{2\left(7\times10^{-3}\frac{\mathrm{N}}{\mathrm{m}}\right)}{14\times10^{-5}\ \mathrm{m}} = 10^{3}\mathrm{N}\cdot\mathrm{m}^{-2}$

Atmospheric pessure (P_0) = $10^{5}\mathrm{N}\cdot\mathrm{m}^{-2}$

Pressure to be applied = $\mathrm{P} + \mathrm{P}_0 = 10^{3}\mathrm{N}\cdot\mathrm{m}^{-2} + 10^{5}\mathrm{N}\cdot\mathrm{m}^{-2} = 101 \times 10^{3}\mathrm{N}\cdot\mathrm{m}^{-2}$

Answer: Pressure to be applied on the water is $101 \times 10^{3}\mathrm{N}\cdot\mathrm{m}^{-2}$.