Answers to NCERT/CBSE PHYSICS Class 10(Class XI)textbook Exercise and Additional exercise
CHAPTER NINE
MECHANICAL PROPERTIES OF FLUIDS
EXERCISES

(For simplicity in numerical calculations, take g = 10 m s-2)
10.10 In the previous problem, if 15.0 cm of water and spirit each are further poured into the respective arms of the tube, what is the difference in the levels of mercury in the two arms ? (Specific gravity of mercury = 13.6)
10.10

Solution:

Density of mercury, $\rho_m = 13.6$ g cm^{-3}
Height of water column, $h_w = 10+15=25$ cm
Height of spirit column, $h_s = 12.5+15=27.5$ cm
Density of water, $\rho_w = 1$ g cm^{-3}
Density of spirit, $\rho_s = 0.8$ g cm^{-3}
Difference in level of mercury in two arms=h_m(let)
Select two points A and B on same height on two different arms and applying Pascal's law,
Pressure at A=Pressure at B

$$P_0 + h_w\rho_w g = P_0 + h_s\rho_s g + h_m\rho_m g$$

$$\Rightarrow h_m = \frac{h_w\rho_w - h_s\rho_s}{\rho_m} = \frac{25\times1 - 27.5\times0.8}{13.6} = 0.22 \text{ cm}$$