Mini Exam I

18 Sept 2007

CM3110

Solution

1. $\mu = 1.069$ Pa s

$\frac{dv_z}{dy} = 1.5\ s^{-1}$

$\tau_{yz} = ?$

Newton's Law of Viscosity:

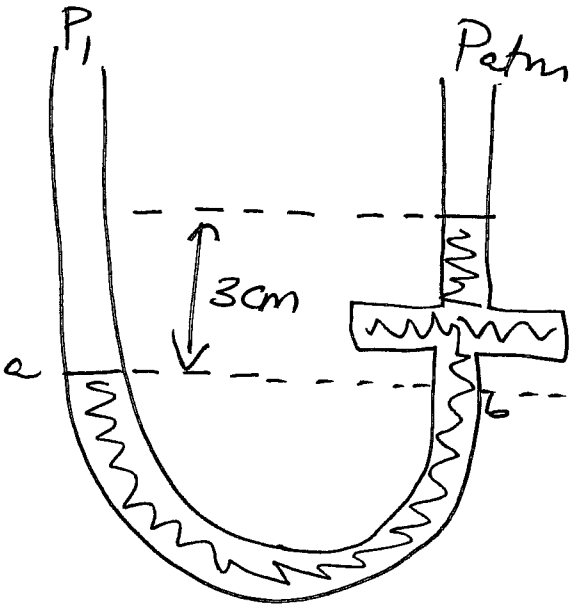
$$\tau_{yz} = -\mu \frac{dv_z}{dy}$$

$$= -(1.069\ \text{Pa s})(1.5\ s^{-1})$$

$$= -1.6035\ \text{Pa}$$

$$= \boxed{1.6\ \text{Pa}}$$ 2 SIG FIGS

2.



$$P_a = P_b$$

$$P_a = P_1 + (\rho g h)_{air}$$

$\rightarrow 0$

$$P_b = P_{atm} + (\rho g h)_{air} + (\rho_{blue\ fluid})(g)(3.0\,cm)$$

$\rightarrow 0$

$$P_a = P_b$$

$$P_1 = P_{atm} + \left(1.75\frac{g}{cm^2}\right)\left(\frac{980\,cm}{s^2}\right)(3.0\,cm)$$

$$\times \frac{kg}{1000\,g}\left(\frac{100\,cm}{m}\right)^2 \times \frac{Pa\,m^2}{N}\,\frac{N\,s^2}{kg\,m}$$

$$P_{atm} = 1.01325 \times 10^5\ Pa$$

Gauge pressure

$P_1 - P_{atm} = 514.85\ Pa$

$= \boxed{510\ PA}$ 2 SIG FIGS //