[120BM0014]

Assignment - 2

1) $u = \frac{2}{3}y - y^2$

Shear stress $\tau = \mu \frac{du}{dy}$

$\mu = 8.63$

$u = \frac{2}{3}y - y^2$

$\frac{du}{dy} = \frac{2}{3} - 2y$

i, at $y = 0$

$\tau = 8.63 \times \frac{2}{3}$

$= \frac{17.26}{3} = 5.7535 \ N/m^2$

at $y = 0.15m$

$\tau = 8.63\left(\frac{2}{3} - 2 \times 0.15m\right)$

$= 8.63\left(\frac{2}{3} - 0.3m\right) \ N/m^2$

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2) $\tau = \mu \frac{du}{dy}$

$\mu = 0.1 \ Ns/m^2$, $U = 0.4 m/s$, $Y = 0.15 \times 10^{-3} m$

Area $= 1.5 * m^2$

$\frac{du}{dy} = \frac{U}{Y} = \frac{0.4}{0.15} \times 10^3 = 2.67 \times 10^3 \approx 267 \ s^{-1}$

$\tau = 0.1 \times 267 = 26.7 \ N/m^2$

$F = 26.7 \times 1.5 = 400.5 * N$

$P = F \times U = 160.2 * W \ 16.02 W$

$dy = 0.025\ mm$

$= 0.025 \times 10^{-3}\ m$

Velocity $= 60\ cm/s = 0.6\ m/s$

Force $= 2\ N/m^2 = \tau$

$du = 4 - 0 = 0.6\ m/s$

$dy = 0.025 \times 10^{-3}\ m$

$\mu = \frac{\tau}{du/dy} = \frac{2}{(0.6/0.025 \times 10^{-3})} = 0.0833 \times 10^{-3}$ Poise

$= 8.33 \times 10^{-5}$ poise

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4) $\tau = \mu \times \frac{\partial V}{\partial y}$

$t = 1.25\ cm = 0.0125\ m$

$\mu = 1\ cp$

$\Delta V = 2.5\ m/s$

$\tau = \mu \times \frac{\partial V}{\partial y} \Rightarrow \tau = \mu \times \frac{\Delta V}{t}$

$\Rightarrow \tau = 1 \times \frac{2.5}{0.0125} = 200\ N/m^2$