

4.2

Homework 21 MET330

$$R_x = P_1 A_1 + \rho \frac{Q^2}{A}$$

$$= 14.4 \text{ psig} \cdot (\pi (15 \text{ in})^2) + 0$$

$$= 10178.76 \text{ lbs}$$

$$R_y = \cancel{\rho \frac{Q^2}{A_2}} + \cancel{P_2 A_2}$$

$$= 0$$

4.10

$$R_y = P A$$

$$= \rho \left(\frac{\pi}{4} D^2 A \right)$$

$$= (\rho_{H_2O} \cdot h) \cdot \left(\frac{\pi}{4} D^2 \right)$$

$$= (9.81 \text{ kN/m}^3 \cdot 1.8) \cdot \left(\frac{\pi}{4} \cdot .075^2 \right)$$

$$M_H = R_y \cdot \frac{75}{2} - F \cdot 65 = 0$$

$$F = \frac{R_y \cdot 92.5}{65}$$

$$F = 0.045 \text{ kN}$$

$$R_y = .07801 \text{ kN/m}$$

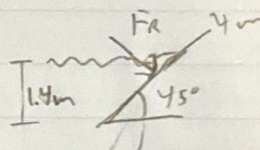
4.17

$$\sin 45 = \frac{h}{L}$$

$$A = 1.98.4$$

$$L = \frac{1.4}{\sin 45} = 1.94 \text{ m}$$

$$= 7.92$$



$$F_R = \gamma_{oil} \cdot \frac{1}{2} \cdot A$$

$$\rho_{oil} = .86 \cdot 1600 = 860 \text{ kg/m}^3$$

$$= 8436.6 \cdot \frac{1.4}{2} \cdot 7.92$$

$$\gamma_{oil} = 860 \text{ kg/m}^3 \cdot 9.81 \text{ N/kg}$$

$$= 8436.6$$

$$F_R = 46717.07 \text{ N}$$

4.28

$$\bar{y} = \frac{4R}{3\pi} = \frac{4(20 \text{ m})}{3(\pi)}$$

$$AF = \frac{FE}{\cos 30} = \frac{10}{\cos 30}$$

$$= 11.55 \text{ m}$$

$$\bar{y} = 8.49 \text{ m}$$

$$L_c = 16.49 \text{ m} + 11.55 \text{ m}$$

$$= 28.24 \text{ m}$$

$$FG = 8 + \bar{y} = 8 + 8.49$$

$$= 16.49 \text{ m}$$

4.26 cont

$$\begin{aligned}\gamma_{\text{eff}} &= SG \cdot \gamma_{\text{H}_2\text{O}} \\ &= 1.1 \cdot 62.4 \text{ lb/ft}^3 \\ &= 68.64 \text{ lb/ft}^3\end{aligned}$$

$$F_R = \rho A = \gamma h \cdot A = \gamma h \cdot \left(\frac{\pi}{2} R^2\right)$$

$$\begin{aligned}&= 68.64 \frac{\text{lb}}{\text{ft}^3} \cdot \left(27.28 \text{ m} \cdot \frac{1 \text{ ft}}{12 \text{ in}}\right) \cdot \frac{\pi}{2} \cdot \left(20 \text{ in} \cdot \frac{1 \text{ ft}}{12 \text{ in}}\right)^2 \\ &= \underline{605.9 \text{ lb}}\end{aligned}$$

