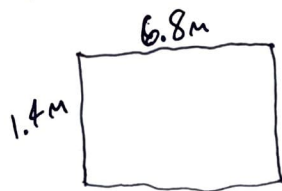


17.30)



Given

$$\alpha (\text{Angle of Attack}) = 10^\circ$$

$$L = 1.4 \text{ m}$$

$$W = 6.8 \text{ m}$$

$$V = 200 \frac{\text{km}}{\text{hr}} = 55.55 \text{ m/s}$$

$$C_L (\text{from figure}) = 0.90$$

$$C_D (\text{from figure}) = 0.06$$

$$A = L \times W = 1.4 \text{ m} \times 6.8 \text{ m} = 9.52 \text{ m}^2$$

Robert Knupp
MET 330
HW 2.2
10/20/2021

a) At elevation of 200m

$$\rho_{\text{Air @ 200m}} = 1.202 \frac{\text{kg}}{\text{m}^3} (\text{From table E.3})$$

$$F_D = \text{drag} = C_D \left(\frac{\rho V^2}{2} \right) A = 0.06 \left(\frac{1.202 (55.55)^2}{2} \right) 9.52 = (0.06)(1854.567)(9.52)$$

$$\therefore F_D = 1,059.329 \text{ N}$$

$$F_L = \text{Lift} = C_L \left(\frac{\rho V^2}{2} \right) A = (0.90) \left(\frac{1.202 (55.55)^2}{2} \right) (9.52) = (0.90)(1854.567)(9.52)$$

$$\therefore F_L = 15,889.930 \text{ N}$$

b) At elevation of 10,000m

$$\rho_{\text{Air @ 10,000m}} = 0.4135 \frac{\text{kg}}{\text{m}^3} (\text{From table E.3})$$

$$F_D = \text{drag} = C_D \left(\frac{\rho V^2}{2} \right) A = (0.06) \left(\frac{0.4135 (55.55)^2}{2} \right) (9.52) = (0.06)(637.99)(9.52)$$

$$\therefore F_D = 364.42 \text{ N}$$

$$F_L = \text{Lift} = C_L \left(\frac{\rho V^2}{2} \right) A = (0.90) \left(\frac{0.4135 (55.55)^2}{2} \right) (9.52) = (0.90)(637.99)(9.52)$$

$$\therefore F_L = 5,466.30 \text{ N}$$