

11:00 AM

M4X02192
1704066

30/01/20

Q1	3	9
Q2	11	11
Q3	7.5	11
Q4	8	17
	29.5	48

$$1) d = 5m \quad A = \pi r^2 = \pi \times 2.5^2 \quad A = 2\pi rh + 2\pi r^2$$

$$h = 12W/m^2K$$

$$T_2 = 68^\circ C$$

$$T_1 = 15^\circ C$$

$$Q = ?$$

$$K = 1.7W/mK$$

~~$$A = 2\pi rh + 2\pi r^2 = 2\pi \times 2.5 \times 8 + 2\pi \times 2.5^2 = 16\pi + 12.5\pi = 28.5\pi = 89.6m^2$$~~

$$\text{Thickness} = 0.2m$$

$$\text{inner radius} = 2.5m = r_2$$

$$\text{Outer radius} = 2.7m = r_1$$

$$Area = 2\pi(r_1 + r_2)(r_1 - r_2 + h) = 2\pi(2.7 + 2.5)(2.7 - 2.5 + 8) = 267.92m^2$$

↑
Nearly πdh .

61%

$$U = \frac{K}{x} \quad Q = \frac{-KA(T_2 - T_1)}{x}$$

$$Q = hA(T_2 - T_1) = 12 \times 267.92(68 - 15) = 170.90 \times 10^3 W$$

$$x = \frac{-KA(T_2 - T_1)}{Q} = \frac{-1.7 \times 267.92(68 - 15)}{170.90 \times 10^3} = 0.12$$

$$U = \frac{K}{x} = \frac{1.7}{0.12} = 14.17 W/m^2K$$

x

11:26AM

M4X02142

30/4/20

1702066

Sean Perkins

$$2) \text{ load} = 165 \text{ kN} = 165000 \text{ N}$$

$$\tau = 309 \text{ MPa} = 309 \times 10^6 \text{ N/m}^2$$

$$d = 12 \text{ mm} = 12 \times 10^{-3} \text{ m}$$

$$\text{Area} = \frac{\pi d^2}{4} = \frac{\pi (12 \times 10^{-3})^2}{4} = 1.13 \times 10^{-4} \text{ m}^2$$

$$\tau = \frac{F}{A} = \frac{309 \times 10^6}{1.13 \times 10^{-4}} = 2.69 \times 10^{10}$$

yay!

$$C = \frac{F}{A} = F = \tau A = 309 \times 10^6 \times 1.13 \times 10^{-4} = 34,352 \text{ N}$$

$$\frac{165000}{34352} = 4.80 \text{ bolts which means 5 bolts are needed}$$

$$3) S = 5 \text{ mm} = 5 \times 10^{-3} \text{ m} \quad (1)$$

$$G = 78 \times 10^9 \text{ N/m}^2$$

$$\theta = ?$$

Shame!

$$T = 10 \text{ Nm}$$

$$l = 180 \text{ mm} = 180 \times 10^{-3} \text{ m} \quad (1)$$

$$S = \frac{5\sqrt{3}}{8} \text{ s} = \frac{5\sqrt{3}}{8} \times (5 \times 10^{-3})^4 = 6.77 \times 10^{-10} \text{ m}^4 \quad (2.5) \checkmark$$

$$\frac{T}{S} = \frac{10}{6.77 \times 10^{-10}} = 1.48 \times 10^{10} \quad (1)$$

$$\frac{T}{S} = \frac{10}{6.77 \times 10^{-10}} = 1.48 \times 10^{10} \quad (2)$$

$$\theta = 265.12 \times 10^{-3} \text{ radians} \times \frac{360}{2\pi} = \text{Degrees}$$

Carried error. $\checkmark$

12:36pm

MFX02192

1709066

30/4/20

4) ~~6200 NM~~

$$M = 6200 \text{ NM}$$

$$R = ?$$

$$E = 210 \text{ GN/m}^2 = 210 \times 10^9 \text{ N/m}^2 \quad \checkmark \quad (1)$$

$$b = 40 \text{ mm} = 40 \times 10^{-3} \text{ m}$$

$$B = 65 \text{ mm} = 65 \times 10^{-3} \text{ m}$$

$$d = 80 \text{ mm} = 80 \times 10^{-3} \text{ m}$$

$$D = 110 \text{ mm} = 110 \times 10^{-3} \text{ m}$$

} (4)

$$I = \frac{BD^3}{12} - \frac{bd^3}{12} = \frac{(65 \times 110)^3}{12} - \frac{(40 \times 80)^3}{12} =$$

$$I = 2.77 \times 10^{10} \text{ m}^4 \left[\frac{(65 \times 10^{-3}) \times (110 \times 10^{-3})}{12} - \frac{(40 \times 10^{-3}) \times (80 \times 10^{-3})}{12} \right]$$

$$I = 5.50 \times 10^{-6} \text{ m}^4 \quad \checkmark \quad (3)$$

Shame!