

Cnial Underwood (1650758)

Q1	2	9
Q2	11	11
Q3	0	11
Q4	13	17
	26	48

Q2.

~~Underwood~~

$$\tau = 304 \times 10^6 \text{ N/m}^2$$

$$d = 12 \text{ mm} = 5 \times 10^{-3} \text{ m} = 0.012 \text{ m}$$

$$F = 165 \text{ kN} = 165 \times 10^3 \text{ N/m}^2$$

$$\text{Area of 1 bolt} = \frac{\pi d^2}{4}$$

54%

$$= \frac{\pi \times 0.012^2}{4}$$

$$= 1.13 \times 10^{-4} \text{ m}^2$$

$$\text{Area} = \frac{F}{\tau} \longrightarrow \tau = \frac{F}{A}$$

$$= \frac{165 \times 10^3}{304 \times 10^6}$$

$$= 542.76 \times 10^{-6} \text{ m}^2$$

$$\text{No of bolts} = \frac{542.76 \times 10^{-6}}{1.13 \times 10^{-4}}$$

$$= 4.8$$

$$= 5 \text{ bolts}$$

yes

Q3.

Shame!

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Q4. $6200 \text{ Nm} \div 1000 =$

$M = \cancel{6200 \text{ Nm}} \quad 6.2 \times 10^3 \text{ Nm}$

$I = 5.50 \times 10^{-6} \text{ m}^4$

$D = 110 \text{ m}$

$y = 0.11 \div 2 = 0.055 \text{ m}$

$\sigma = 62 \times 10^6 \text{ Nm}^2$

$R =$

$E = 210 \text{ GN/m}^2 = 210 \times 10^9 \text{ N/m}^2$

$$I = \frac{BD^3}{12} - \frac{bd^3}{12} = \frac{0.065 \times 0.11^3}{12}$$

$$- \frac{0.040 \times 0.08^3}{12}$$

$I = 5.50 \times 10^{-6} \text{ m}^4$

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R} = \frac{M}{I} = \frac{\sigma}{y}$$

$$\sigma = \frac{My}{I} = \frac{(6.2 \times 10^3 \times 0.055)}{5.50 \times 10^{-6}} = 62 \times 10^6 \text{ Nm}^2$$

$$\frac{M}{I} \approx R \quad \frac{R = E}{I \nearrow M} \quad \therefore R = \frac{EI}{M}$$

$$= \frac{210 \times 10^9 \times 5.5 \times 10^{-6}}{6.2 \times 10^3}$$

$$R = 186.29 \times 10^{12} \text{ } \text{shame!}$$

Chloe Underwood

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Engineering Science
Test Exam 30th April
11am - 12.45pm

Q1.

$$K = 1.7 \text{ W/mK}$$

$$A = (8 \times 5) \text{ m}^2 = 40$$

$$x = 200 \text{ mm} = 0.2 \text{ m}$$

$$T_1 = (68 + 273) \text{ K} = 341 \text{ K}$$

$$T_2 = (15 + 273) \text{ K} = 288 \text{ K}$$

Surface area of
a cylinder
(chimney) is

$$\pi d h.$$

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

$$Q = \frac{-1.7 \times 40 \times (288 - 341)}{0.2} \quad (1)$$

$$Q = 18020 \text{ W} \div 1000 = 18.02 \text{ kW} \quad x$$

$$Q = hA(T_2 - T_1) \quad = \frac{Q}{(T_2 - T_1)} = hA = \text{scribbles}$$

$$h = \frac{Q}{(T_2 - T_1)A}$$

$$Q = ?$$

$$h = \frac{18.02}{(288 - 341) \times 40} = -8.5 \times 10^{-3} \quad x$$

Shame.