

11:00 AM (Time)
 30/04/20 (Date)
 M4X02192 (Module)
 1910311 (Student)

Q1	0	9
Q2	11	11
Q3	3	11
Q4	17	17
28		48

58%

2) $F = 165 \times 42 \times 10^3 \text{ N}$ ✓

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

$d = 0.012 \text{ m}$ ✓

$\tau = \frac{F}{A}$

Area needed for load, $A = \frac{F}{\tau} = \frac{165 \times 10^3}{304 \times 10^6}$

$A = 5.43 \times 10^{-4} \text{ m}^2$ ✓

$\therefore \text{no of bolts} = \frac{2.1 \times 10^{-3}}{5.43 \times 10^{-4}}$

$= 4.80 \dots$

$= 5 \text{ bolts}$ ✓

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

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

$= 1.13 \times 10^{-4} \text{ m}^2$ ✓

yay!

11:00 AM (DUE TIME)
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M4X02192 (matric)
1910311 (student ID)

Jade Jones

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

✓① $r = \frac{d}{2} = \frac{0.005}{2} = 2.5 \times 10^{-3}$

$R = 140 \text{ nm} = 0.14 \text{ m}$

✓①

$d = 5 \text{ mm} = 0.005 \text{ m}$

✓①

$T = 10 \text{ Nm}$

$J = \frac{\pi}{32} D^4 = \frac{\pi}{32} \times 0.0045^4 = \underline{\underline{6.14 \times 10^{-11} \text{ m}^4}}$

← Equation was on the paper.

$\frac{T}{J} = \frac{T}{r} = \frac{G \theta}{L}$

You were looking for θ .

$\theta = \frac{T r}{J} = \frac{10 \times 2.5 \times 10^{-3}}{6.14 \times 10^{-11}} = \underline{\underline{407.20 \times 10^6}}$

x .

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1910311 (STUDENT ID)

Jacob James

4

3) $b = 0.04 \text{ m}$

$d = 0.08$

$B = 0.65$

$D = 0.11$

$m = 6200 \text{ nm}$

$E = 210 \times 10^9 \text{ N/m}^2$ ①

$\sigma = ?$

$R = ?$

$y = \frac{D}{2} = \frac{0.11}{2} = 0.055 \text{ m}$ ✓ ③

$$I = \frac{BD^3}{12} - \frac{bd^3}{12} = \frac{0.65 \times 0.11^3}{12} - \frac{0.04 \times 0.08^3}{12}$$
 ✓ ①

$I = 7.04 \times 10^{-5}$

x units?

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

$\frac{M}{I} \rightarrow \frac{\sigma}{y}$

①

$\sigma = \frac{My}{I} = \frac{I(6200 \times 0.055)}{7.04 \times 10^{-5}} = 4843750 \text{ N/m} = 4843.75 \text{ kN/m}$

x Carried error

②

$\frac{M}{I} \rightarrow \frac{E}{R}$

$\therefore R = \frac{EI}{M} = \frac{210 \times 10^9 \times 7.04 \times 10^{-5}}{6200}$ ①

②

$\frac{R}{I} \rightarrow \frac{E}{M}$

$R = 2384.52$

x Carried error.