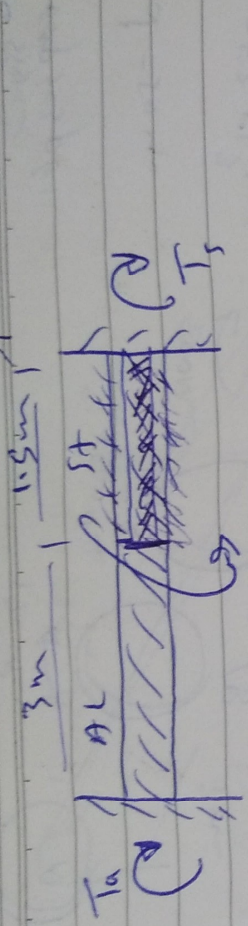


سجل
exp 302 p 80



solid shaft
 $T_a, T_s = 1$

AL
St
 $T = 1 \text{ kW} \cdot \text{m}$

$d = 75 \text{ mm}$

$d = 50 \text{ mm}$

$G = 28 \times 10^9 \text{ N/m}^2$

$G = 83 \times 10^9 \text{ N/m}^2$

$T = 1000 \text{ N} \cdot \text{m}$ applied at joint two segments

$T_{max} = 1$

$T_s + T_a = T = 1000$ — D

$\theta = \theta_a$

$$\left(\frac{T L}{G J}\right)_s = \left(\frac{T L}{G J}\right)_a$$

$$\frac{T_s \times 1.5}{\frac{\pi}{32} (0.075)^4 \times 83 \times 10^9} = \frac{T_a \times 3}{\frac{\pi}{32} (0.075)^4 \times 28 \times 10^9}$$

$T_s = 1.17 T_a$ — D

$$T_a = \frac{16 \times 461}{\pi (0.075)^3} = 5.57 \times 10^6 \text{ N/m}^2$$

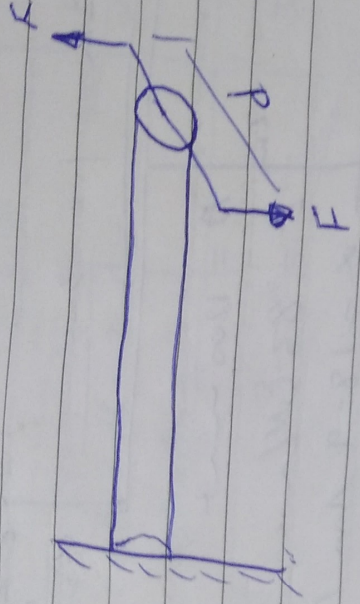
$T_s = 539 \text{ N} \cdot \text{m}$

$$T_s = \frac{16 \times 539}{\pi (0.075)^3} = 2.2 \times 10^6 \text{ N/m}^2$$

$T_a = 461 \text{ N} \cdot \text{m}$

$$Z = \frac{16 T}{\pi d^3} = 22 \text{ MN/m}^2$$

Torsion



$$T = F \cdot d$$

effects of Torque

- 1- angular displacement
- 2- Shear stress

probable number of Torque P is possible

J: polar second moment of area

$$J = \frac{\pi d^4}{32} \quad \text{solid shaft}$$

$$J = \frac{\pi (D_o^4 - D_i^4)}{32} \quad \text{hollow shaft}$$

C: modulus of rigidity

$$C = \frac{E}{8}$$

Z: Shear stress

y: Shear strain