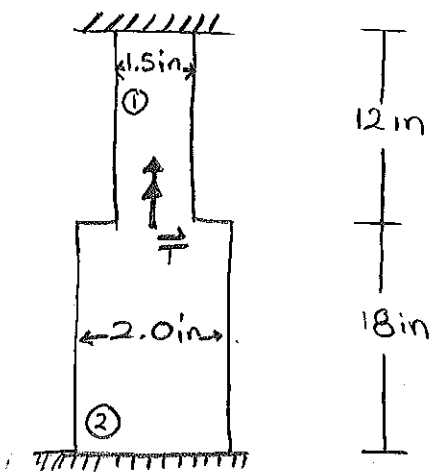
I.



The shaft shown is made up of two sections each with a different material. Find the maximum stresses in both parts.

Take $|\vec{T}| = 12.5$ kip in

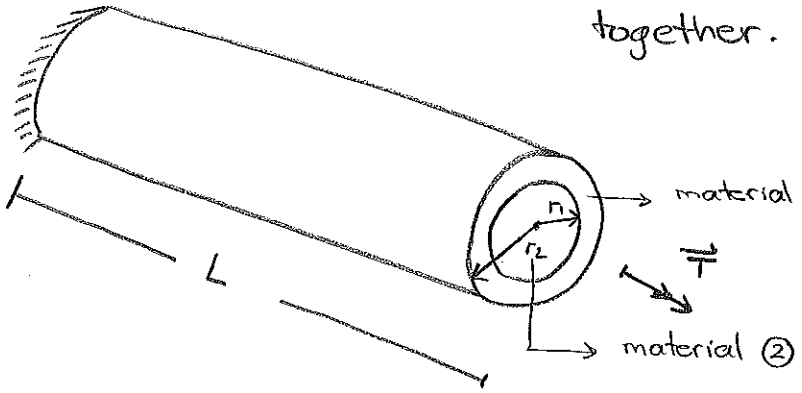
$G_{①} = 3.7 \times 10^{6}$ psi

$G_{②} = 5.6 \times 10^{6}$ psi

II. The composite shaft shown is made of two materials bonded together. Let $r_1 = 20mm$ $G_{①} = 39GPa$

$r_2 = 25mm$ $G_{②} = 77.2GPa$

$L = 2m$ $|\vec{T}| = 600N.m$



If a torque $\vec{T}$ is applied as shown, find

a) the maximum shear stresses in both materials.

b) the angle of twist at the free end of the shaft.

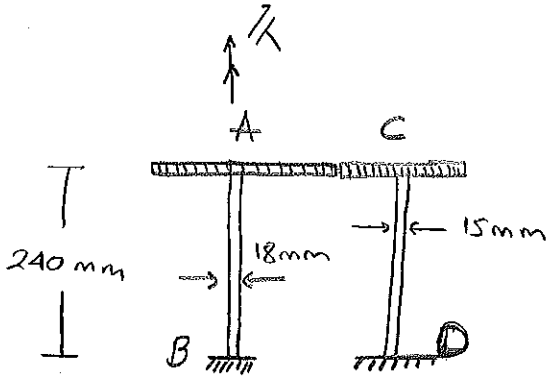
III. For the system shown $G = 77\,GPa$. A and C are gears connected to shafts fixed at B and D. If a torque $|\bar{T}| = 50\,N.m$ is applied at A, find

a) the maximum shear stress in shaft CD

b) Angle of twist of the shaft at A.

Let $r_{gear\,C} = 50\,mm$

$r_{gear\,A} = 75\,mm$



IV. A solid shaft is to transmit 15 kw at a frequency of 50 Hz. If the maximum allowable shear is 23.5 MPa find the smallest diameter that will work.