ID : 16242

Program : B.Tech Civil

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Subject : Mechanic of Meterial

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Instructor : Engr Marvan Raza

(Q.1) (A)

Shear Stresses and normal Stresses

A few other examples of Shear Stress include Stress exerted on the pipeline by a flowing fluid and Shear Stress on Soil exerted by a normal load from the top. Shear is what makes a Sand Castle collapse when Someone steps on it instead of just Settling.

Shear Stress examples

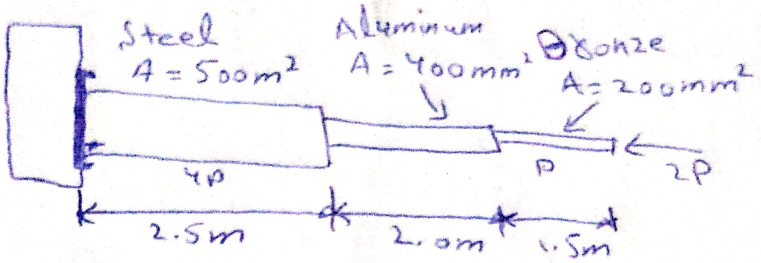
- Car axle produces Shear Stress due to torsion.
- Drill bite produces Shear Stress due to torsion.
- All types of cutting hairs, paper etc. Opening any Screwed cap of bottle, Containers.
- River beds are always in Shear Stress.
- In India while making dosas and chappathies.
- While writing on black boards with chalk piece.
- In mobiles when ever we slide our fingers.
- While a bus starts or Stops seats are in Sheer Stress.
- Washing hands with tissue papers or with both hands

  While Counting papers and currency notes

Normal Stress example

A normal stress is a stress that occure when a member is loaded by an axial force. examples of members ~~loaded~~ experiencing pure normal forces would include columns, collar ties, etc.

(Q2) A).



(Sol)

For Bronze

$\sigma_{br} \times A_{br} = 2P$

$110(200) = 2P$

$22000 = 2P$

$= 11000N$

For aluminum

$\sigma_{al} \times A_{al} = P$

$100(400) = P$

$40000N$

For steel

$\sigma_{st} \times A_{st} = 5P$

$= 15000N$

For Safe P, use $P = 11000N = 11kN$

answer.

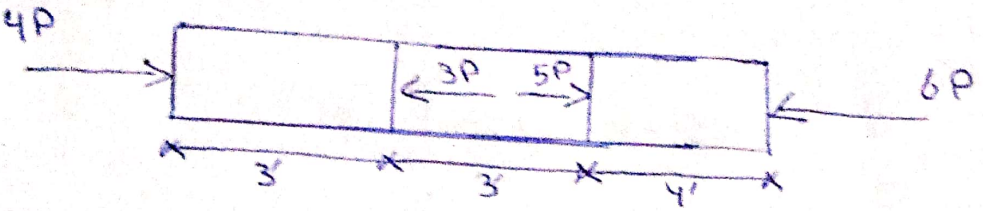
(Q2) (B)

B. (Ans) Area = A = 1.5 in^2

E = 10×10^6 psi

P = 2000 lb

Change in lenght = ?

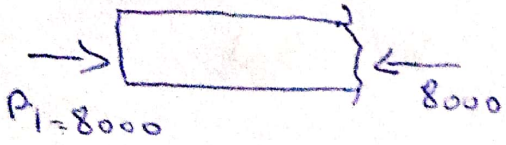


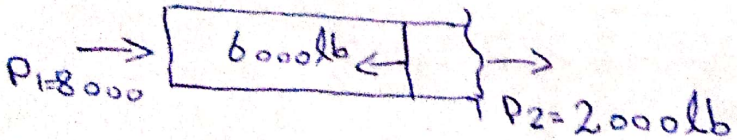
3P = 3 x 2000 = 6000 lb

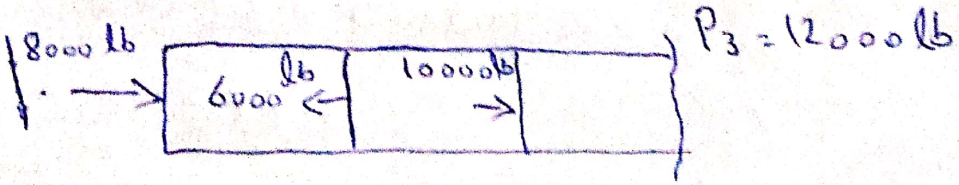
5P = 5 x " = 10000 lb

4P = 4 x " = 80000 lb

6P = 6 x " = 12000 lb







P_1 = 8000 lb (Comp)

P_2 = 2000 lb (Tens)

P_3 = 12000 lb (Comp)

Sigma $\delta = \frac{PxL}{AxE}$

$$= -\frac{8000x3x12}{1.5x10x10^6} + \frac{2000x3x12}{1.5x10x10^6} - \frac{12000x4x12}{1.5x10x10^6}$$

$$= -0.0192 + 0.0048 - 0.0384$$

$$= -0.0528 \text{ in}$$

δ = 0.0528in Compression

Answer

(Q3)

(Ans) $P = \sigma A$

Where

$P = 650KN = 650000 N$

$\sigma = 135 Mpa$

$A = \frac{1}{4}\pi D^2 - \frac{1}{4}\pi(100)^2$

$= \frac{1}{4}\pi(D^2 - 10000)$

Thus

$$650000 = 135\left\{\frac{1}{4}\pi(D^2 - 10000)\right\}$$

$$650000 = 33.75\pi D^2 - 337,500\pi$$

$$D^2 = \frac{650000 + 337500\pi}{33.75\pi}$$

$D = 127.05 mm$ Ans