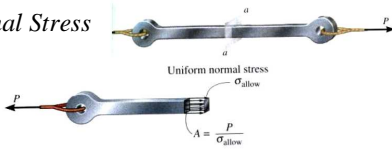
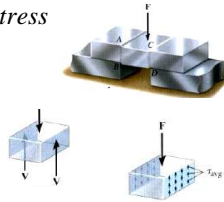


Stress

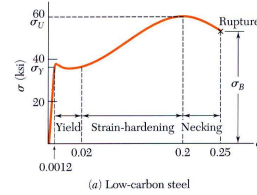
Normal Stress



Shear Stress



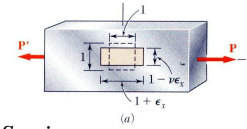
Material Properties



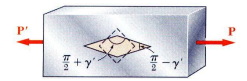
E – Modulus of Elasticity
v – Poisson's ratio

Strain

Normal Strain

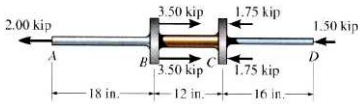


Shear Strain

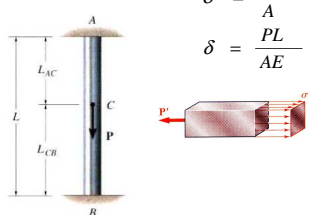


Axial load

Determinate

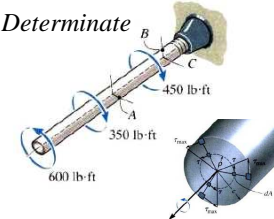


Indeterminate

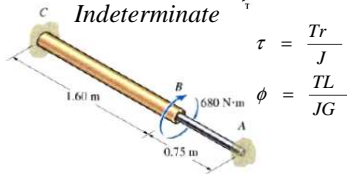


Torsion

Determinate



Indeterminate

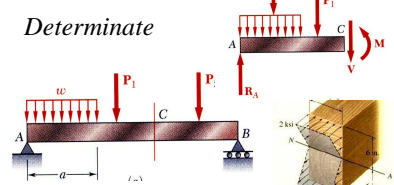


$$\tau = \frac{Tr}{J}$$

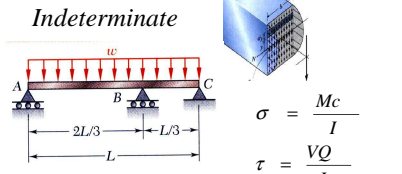
$$\phi = \frac{TL}{JG}$$

Bending

Determinate



Indeterminate

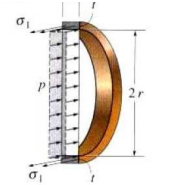


$$\sigma = \frac{Mc}{I}$$

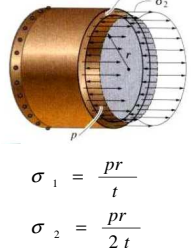
$$\tau = \frac{VQ}{It}$$

Pressure

Hoop



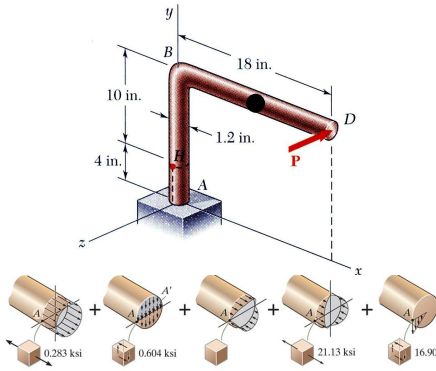
Axial



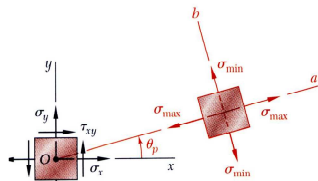
$$\sigma_1 = \frac{pr}{t}$$

$$\sigma_2 = \frac{pr}{2t}$$

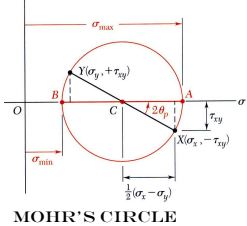
Combined loading



STRESS TRANSFORMATION

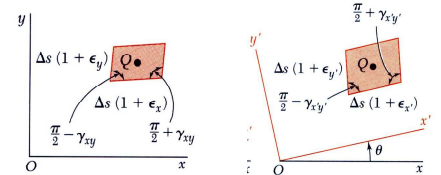


PRINCIPAL STRESSES

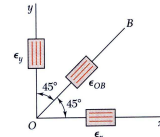


MOHR'S CIRCLE

STRAIN TRANSFORMATION



Strain Gages

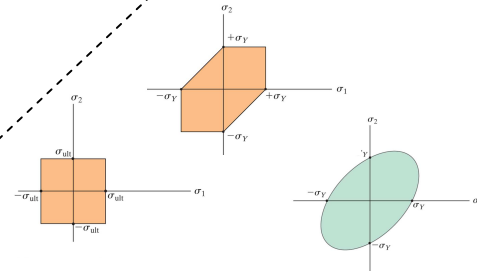


HOOKE'S LAW

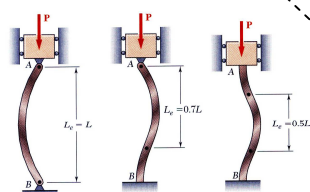
$$\sigma = E\epsilon$$

$$\tau_{xy} = G\gamma_{xy} \quad \tau_{yz} = G\gamma_{yz} \quad \tau_{zx} = G\gamma_{zx}$$

Failure Theories



Buckling



EULER

$$\epsilon_x = +\frac{\sigma_x}{E} - \frac{\nu\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\epsilon_y = -\frac{\nu\sigma_x}{E} + \frac{\sigma_y}{E} - \frac{\nu\sigma_z}{E}$$

$$\epsilon_z = -\frac{\nu\sigma_x}{E} - \frac{\nu\sigma_y}{E} + \frac{\sigma_z}{E}$$