

Elasticity :-

Theory of elasticity deals with the effects of external
independent static forces on the shape of rigid bodies.

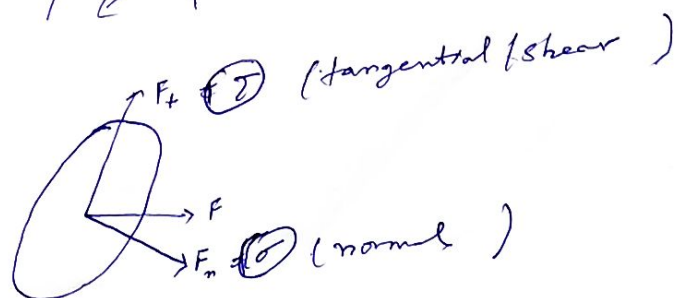
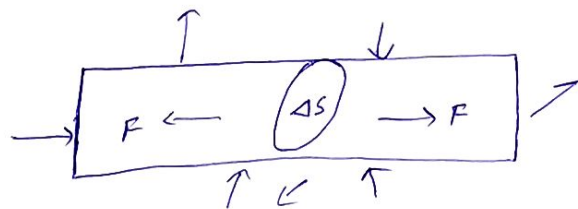
Elastic deformation - Reversible deformation - body returns to its original shape after removal of external forces.
→ Perfectly elastic body

Plastic deformation - Irreversible deformation - body does not return to its original shape after removal of external forces -
→ Perfectly inelastic / plastic body.

We also see in some cases body partially regains its original shape after removal of external forces or deforming forces. In this case we term these bodies as partially elastic.

Stress :- Internal forces within the bodies.

To describe the stresses within a body we decompose the body into small volume elements onto which ~~these~~ these forces act. Consider a body on which several forces acting. Due to these forces body gets deformed and internal forces appear. Let us take a cross sectional area ΔS of the body



On the two sides of the body ~~two forces~~ parts ΔS , the two internal forces \vec{F} and $-\vec{F}$ appear due to the deformation.

~~F_t~~
Force \vec{F} may be decomposed in two components, F_n normal

~~is F_n and F_t correspond to~~
to ΔS and F_t tangential to ΔS .

Now normal ~~and~~ stress is defined by

$$\sigma = \frac{F_n}{\Delta S}$$

and tangential or shear/shearing stress over the area is defined by

$$\tau = \frac{F_t}{\Delta S}$$