

Elasticity

Elasticity : Elasticity is the property of material of a body by virtue of which the body acquires its original shape and size after the removal of deforming force.

Elastic Limit : Elastic limit is the maximum value of deforming force upto which a material shows elastic property and above which the material loses its elastic property.

Stress : The restoring force per unit area set up inside the body subjected to deforming force is called stress.

Strain : The relative change in dimension or shape of a body which is subjected to stress is called strain.

It is measured by ratio of change in length to the original length (logitudinal strain), change in volume to original volume (volume strain).

Hooke's law : Under elastic limit, stress is proportional to strain stress i.e. $\text{stress} \propto \text{strain}$ or $\text{stress/strain} = E$ (constant)

E is called elastic constant or modulus of elasticity. Its value is different for different material. Its SI unit is Nm^{-2} also called pascal.

Elastic constant is of three types :

(i) Young's modulus of elasticity $Y = \text{Logitudinal stress} / \text{Logitudinal strain}$

(ii) Bulk modules of elasticity $K = \text{Volume Stress} / \text{Volume Strain}$

(iii) Rigidity modulus (η) = $\text{Tangential (or shear) stress} / \text{Shear strain}$