

Physics

⇒ Deformation of solids

1. Stress - Force per unit area
2. Strain - The ratio of extension to its original length
3. Yang's Modulus - The ratio of stress to strain
4. Hooke's law - Extension of a spring or wire is directly proportional to the force applied provided the limit of proportionality is not exceeded
5. Limit of proportionality - The point beyond which Hooke's law is no longer obeyed.
6. Elastic limit - It is the point when force is removed, the spring does not come back to its original length/position suffering permanent deformation.
7. Ultimate Tensile Strength - Maximum force a material can withstand before it breaks
8. Elastic deformation - Material comes back to its original shape/length after the load is removed.
9. Plastic deformation - Material remains deformed after load is removed.

⇒ Formulas

$$F = kx$$

$$\text{Force} = \text{constant} \times \text{extension}$$

$$\sigma = \frac{F}{A}$$

$$\text{Stress} = \frac{\text{Force}}{\text{Area}}$$

$$E = \frac{e}{l_0}$$

$$\text{Strain} = \frac{\text{extension}}{\text{orig length}}$$

$$\text{Youngs modulus} = \frac{\text{Stress}}{\text{Strain}}$$

$$= \frac{k l_0}{A}$$

$$= \frac{F}{A} \times \frac{l_0}{e}$$

$$\text{Elastic potential energy} = \frac{1}{2} kx^2$$