



# 19MET204- STRENGTH OF MATERIALS

## UNIT I - STRESS STRAIN DEFORMATION OF SOLIDS

Rigid and Deformable bodies-Strength, stiffness and stability  
Rigid bodies and deformable solids – Tension, Compression and Shear Stresses



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# **Strength of Materials**



## **Stress and Strain**

**Strength of materials**, also called **mechanics of materials**, is a subject which deals with the behavior of solid objects subject to stresses and strains.

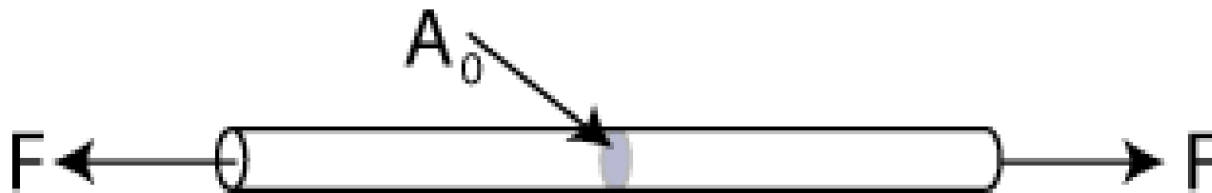


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## STRESS

Stress is defined as the resistance force acting per unit cross section area of the component

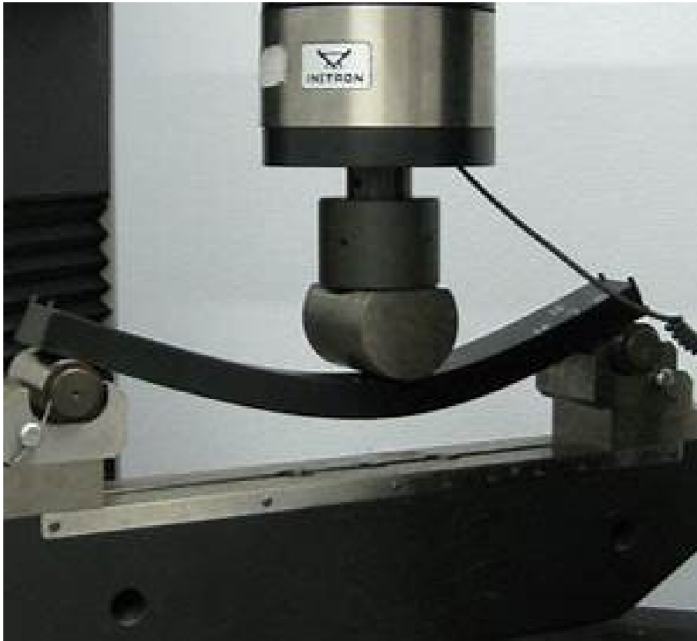


$$\text{Stress, } \sigma = \frac{\text{Force}}{\text{Cross-Sectional Area}} = \frac{F}{A_0}$$

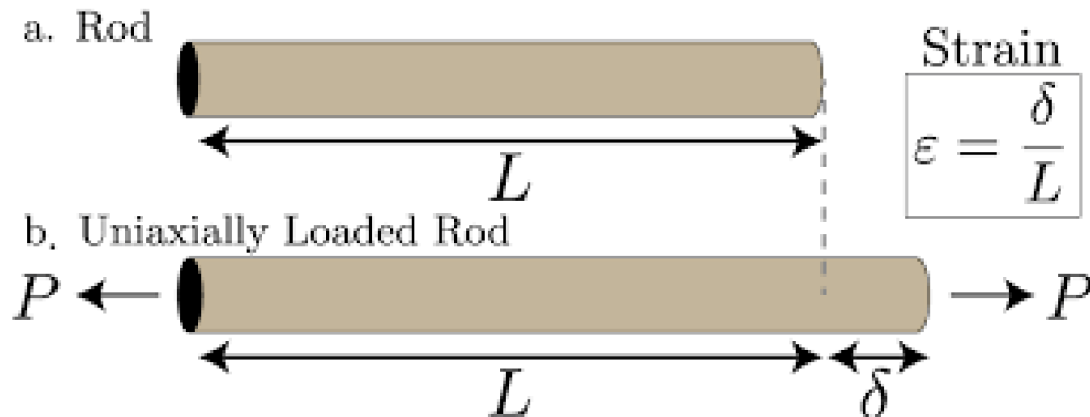


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## STRAIN



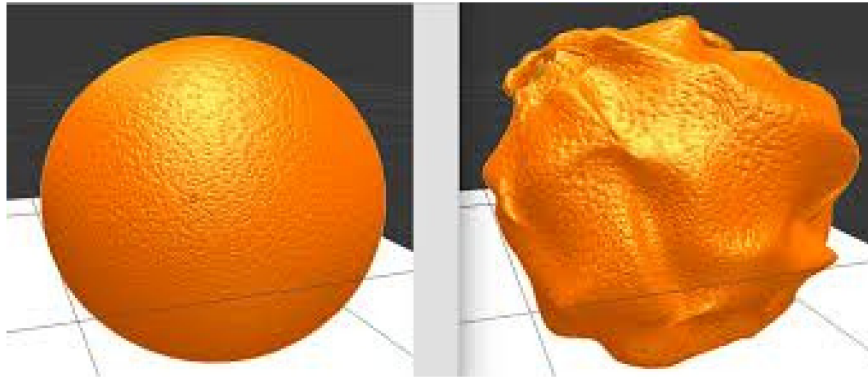
Strain is the response of a system to an applied stress. When a material is loaded with a force, it produces a stress, which then causes a material to deform.





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## DEFORMATION



In materials science, deformation refers to any changes in the shape or size of an object due to an applied force or a change in temperature



In the mechanics of the deformable bodies, the following types of loads are commonly considered:

- Dead loads—static in nature, such as the self-weight of the roof.
- Live loads—fluctuating in nature, do not remain constant- such as a weight of a vehicle moving on a bridge.
- Tensile loads.
- Compressive loads.
- Shearing loads.