

# **ELASTICITY**

**Presented By**

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**When an external force is applied to a rigid body there is a change in its length, volume (or) shape. When external forces are removed the body tends to regain its original shape and size. Such a property of a body by virtue of which a body tends to regain its original shape (or) size when external forces are removed is called elasticity.**

# Elastic Stress and Strain

## What is Stress?

When the body is deformed by the application of external forces, forces within the body are brought into play. Elastic bodies regain their original shape due to internal restoring forces. The internal forces and external forces are opposite in direction. If a force  $F$  is applied uniformly over a surface of area  $A$  then the stress is defined as the force per unit area.

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

S.I unit for stress is  $\text{Nm}^{-2}$

# **Types of Stress**

**There are three types of stress**

**Longitudinal stress**

**Volume stress or Bulk Stress**

**Tangential stress (or) shear stress**

# **Longitudinal Stress**

**When the stress is normal to the surface area of the body and there is a change in the length of the body it is known as longitudinal stress.**

**Again it is classified into two types**

**Tensile stress**

**Compressive stress.**

**Tensile stress:**

**When longitudinal stress produced due to an increase in the length of the object is known as tensile stress.**

**Compressive stress:**

**Longitudinal stress produced due to the decrease in length of the object is known as compressive stress.**

## **Volume Stress or Bulk Stress**

**If equal normal forces applied to the body causes a change in volume of the body, the stress is called volume stress.**

## **Tangential Stress**

**When the stress is tangential (or) parallel to the surface of the body is known as Tangential (or) Shear stress. Due to this shape of body changes (or) gets twisted.**

# **What is a Strain?**

**A body under stress gets deformed. The fractional change in the dimension of a body produced by the external stress acting on it is called strain. The ratio of change of any dimension to its original dimension is called strain. Since strain is the ratio of two identical physical quantities, it is just a number. It has no unit and dimension.**



# **Hooke's Law**

**If deformation is small, the stress in a body is proportional to the corresponding strain, this fact is known as Hooke's law.**

**Within elastic limit, Stress & strain**

# **Elasticity Examples in Daily Life**

**The springs.**

**The base of a trampoline.**

**The bow to shoot arrows.**

**Fishing rods.**

**The mattresses.**

**Rubber bracelets.**

**The clothes.**

**The chewing gum, when chewed.**

**The string of a guitar, in a state of tension.**

**The cables.**

A close-up photograph of two hands, palms up, holding a small, rectangular piece of white paper with deckled edges. The paper is centered between the fingers and has the words "THANK YOU" printed on it in a bold, dark brown, sans-serif font. The background is a solid, light orange color.

**THANK YOU**

