

# **Mechanics of Materials**

## **CONTENTS**

- 1. Simple Stress and Strain**
- 2. Compound Bars**
- 3. Shearing Force and Bending Moment Diagrams**
- 4. Bending**
- 5. Slope and Deflection of Beams**
- 6. Shear Stress Distribution**
- 7. Torsion**
- 8. Thin Cylinders and Shells**
- 9. Thick cylinders**
- 10. Strain Energy**

## **Reference**

**Mechanics of Materials Hearn E.J -**

## Chapter One: Simple Stress and Strain

### 1-1 Load

In any engineering structure or mechanism the individual components will be subjected to external forces arising from the service conditions or environment in which the component works. If the component or member is in equilibrium, the resultant of the external forces will be zero but, nevertheless, they together place a load on the member which tends to deform that member and which must be reacted by internal forces which are set up within the material.

If a cylindrical bar is subjected to a direct pull or push along its axis as shown in Fig. 1.1, then it is said to be subjected to *tension or compression*.

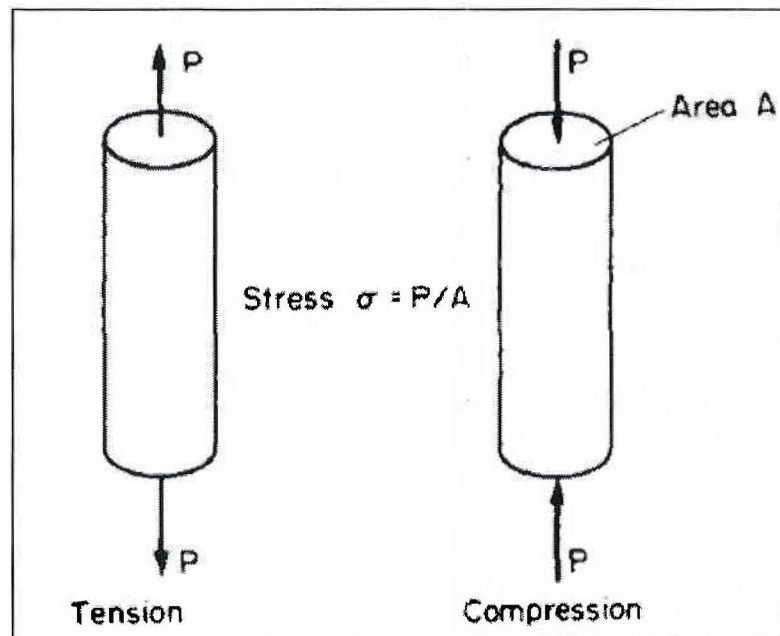


Fig. 1.1 Types of Direct Stress

There are a number of different ways in which load can be applied to a member. Typical loading types are:

- Static or dead loads*, i.e. non-fluctuating loads, generally caused by gravity effects.
- Live loads*, as produced by, for example, Lorries crossing a bridge.
- Impact or shock loads* caused by sudden blows.