

ASSIGNMENT FOR CLASS – XI :

PHYSICS - ELASTICITY, GRAVITATION

1. Distinguish between fundamental units and derived units.
2. State Newton's first law of motion.
3. What are the different types of equilibrium.
4. State the universal law of gravitation.
5. Define gravitational potential.
6. Write any 5 rules and conventions of writing SI units.
7. State Kepler's law of planetary motion.
8. Define and derive escape velocity.
9. Define and derive orbital velocity.
10. Discuss the merits and demerits of dimension with example.
11. Explain stress – strain graph.

Stress-Strain Diagram

- In case of solids if we go on increasing stress continually then a point is reached at which strain increases more and more rapidly and Hooke's law is no longer obeyed.
- Thus, the stress at which linear relationship between stress and strain ceases to hold is referred to as the elastic limit of material for the stress applied.
- If the elastic limit of material is exceeded it will fail to recover its original shape or size on removal of stress and would acquire a permanent set.
- Any type of stress can be plotted against appropriate strain and the shape of resulting stress-strain diagrams would have shapes, depending on the kind of material.
 - Simple stress-strain diagram for a bar or wire is shown below in the figure.

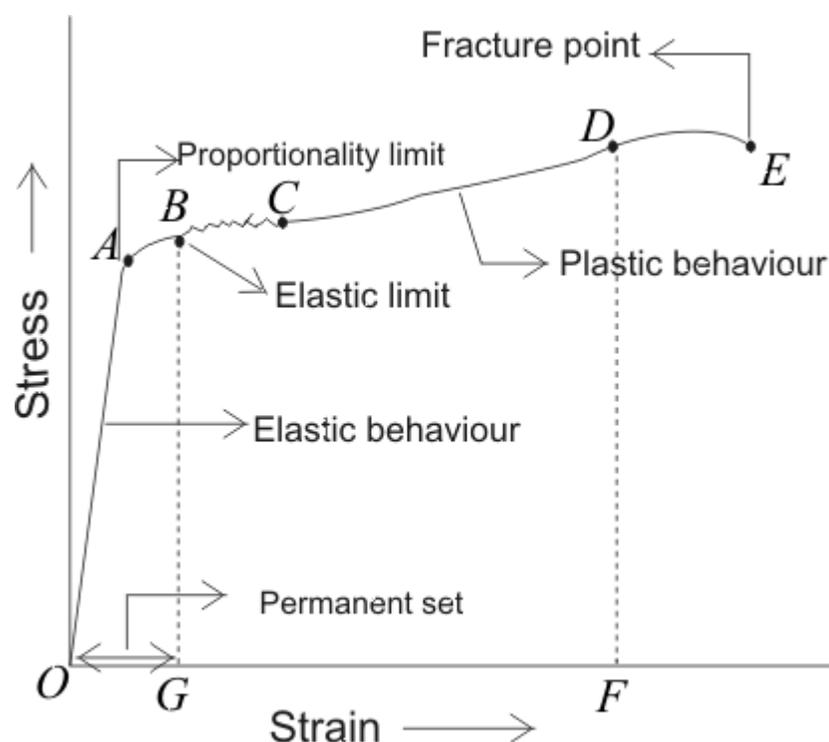


Figure 5. Stress-Strain curve for a bar or wire

(i). Portion OA is the straight line which clearly shows that stress produced is directly proportional to strain i.e., Hook's law is perfectly obeyed upto A and on removal of stress wire or bar will recover its original condition. Point A is called Proportionality limit.

(ii). As soon as proportionality limit is crossed beyond point A, the strain increases more rapidly than stress and curve AB in graph shows that extension of wire in this limit is partly elastic and partly plastic and point B is the elastic limit of the material. Thus if we start decreasing load from point B the graph does not come to O via path BAO instead it traces straight line BG. So that there remains a residual strain. This is called permanent set.

(iii). If we continue to increase the stress beyond point B then for little or no increase in stress the strain increases rapidly upto point C.

(iv). Further increase of stress beyond point C produces a large increase in strain until a point E is reached at which fracture takes place and from B to D material is said to undergo plastic flow which is irreversible.

Conclusion :

1. The wire exhibits elasticity from O to b and plasticity from b to d. If the distance between b and d is more, then the metal is ductile. If the distance between b and d is small, then metal is brittle.
2. The substances which break as soon as the stress is increased beyond elastic limit are called brittle substances eg: glass, cast iron, high carbon steel.
3. The substances which have a large plastic range are called ductile substances. Eg: copper, lead, gold, silver, iron, aluminium. Ductile materials can be drawn into wires. Malleable materials can be hammered into thin sheets. Eg: gold, silver, lead.