

CHAPTER-8 | Mechanical Properties of Solids

QUIZ-01

1. What is the SI unit of stress?

- A. Newton (N) B. Pascal (Pa)
C. Joule (J) D. Watt (W) (B)

Explanation: Stress is defined as force per unit area, and its SI unit is Newton per square meter, which is called Pascal (Pa).

2. The ratio of change in length to the original length of a material under stress is called :

- A. Shearing strain B. Compressive strain
C. Longitudinal strain D. Volume strain (C)

Explanation: Longitudinal strain is defined as the change in length (ΔL) divided by the original length (L) of the object.

3. Hooke's Law is valid only :

- A. After the elastic limit
B. For large deformations
C. Before the fracture point
D. Within the linear region of the stress-strain curve (D)

Explanation: Hooke's Law holds true in the linear portion of the stress-strain graph, where stress is directly proportional to strain.

4. Which of the following materials has the highest Young's modulus?

- A. Copper B. Aluminium
C. Steel D. Brass (C)

Explanation: Steel has the highest Young's modulus among these materials, meaning it is more resistant to elongation under tensile stress.

5. The area under the stress-strain curve in the elastic region represents :

- A. Force
B. Elastic potential energy per unit volume
C. Strain energy only for plastic materials
D. Shearing modulus (B)

Explanation: The area under the curve in the elastic region gives the elastic potential energy stored per unit volume: $(1/2) \times \text{stress} \times \text{strain}$.

6. A solid sphere submerged in a fluid is under which type of stress?

- A. Tensile stress B. Shearing stress
C. Hydraulic stress D. Fracture stress (C)

Explanation: When submerged, the sphere experiences forces from all directions, which is hydraulic stress resulting in volume strain.

7. The ratio of lateral strain to longitudinal strain is called:

- A. Young's modulus B. Bulk modulus
C. Poisson's ratio D. Shear modulus (C)

Explanation: Poisson's ratio is defined as the negative ratio of lateral strain to longitudinal strain, indicating dimensional contraction.

8. Which one of the following materials is an elastomer?

- A. Steel B. Brass
C. Rubber D. Glass (C)

Explanation: Elastomers like rubber can undergo large strains and still return to their original shape, although they may not obey Hooke's Law.

9. In which type of modulus is the strain defined as the change in volume per original volume?

- A. Young's modulus B. Shear modulus
C. Bulk modulus D. Poisson's modulus (C)

Explanation: Bulk modulus involves volume strain, which is the change in volume divided by the original volume.

10. A beam is more resistant to bending when its:

- A. Breadth is increased B. Length is increased
C. Depth is increased D. Volume is reduced (C)

Explanation: Resistance to bending increases significantly with depth because deflection is inversely proportional to the cube of depth ($\delta \propto 1/d^3$).