

Chapter: Elasticity

MCQs:

1. Steel is more elastic than rubber. This means for the same applied stress, the strain will be,
 - a. More for steel
 - b. Less for steel
 - c. Equal for steel and rubber
 - d. More or less for steel
2. What is the Young's Modulus of elasticity for a perfectly rigid body?
 - a. Infinity
 - b. Zero
 - c. 1
 - d. None
3. According to Hooke's law if stress is increased, the ratio of stress to strain is,
 - a. Increases
 - b. Decreases
 - c. Remains constant
 - d. None
4. A metal rod of Young's modulus of elasticity $2 \times 10^{11} \text{m}^2$ undergoes an elastic strain of 0.05. The energy stored per unit volume of the rod in Jm^{-3} ;
 - a. 2.5×10^8
 - b. 2.5×10^8
 - c. 2.5×10^8
 - d. 2.5×10^8
5. PE in a string when stretched by 2cm is U . Its PE when stretched by 10cm is,
 - a. $\frac{U}{25}$
 - b. $\frac{U}{5}$
 - c. $5U$
 - d. $25U$
6. With a rise of temperature, the Young's modulus
 - a. Increases
 - b. Decreases
 - c. Remains unchanged
 - d. Changes erratically
7. A metal wire of length L , area of cross section A and Young's modulus Y behaves as a spring of spring constant K given by,
 - a. $K = \frac{YA}{L}$
 - b. $K = \frac{2YA}{L}$
 - c. $K = \frac{YA}{2L}$
 - d. $K = \frac{YL}{2A}$
8. A spherical ball contracts in volume by 0.01% when subjected to a normal uniform pressure of 100atm . The Bulk modulus of its material in Nm^{-2} is,
 - a. 1×10^{10}
 - b. 1×10^{10}
 - c. 1×10^{13}
 - d. 2×10^{11}
9. A uniform wire of mass m , length L , area of cross section A and Young's modulus Y hangs from the ceiling. Its elongation under its own weight is,
 - a. Zero
 - b. $\frac{mgL}{AY}$
 - c. $\frac{2mgL}{AY}$
 - d. $\frac{mgL}{2AY}$
10. The Bulk modulus for an incompressible liquid is:
 - a. Zero
 - b. Unity
 - c. Infinity
 - d. Between 0 & 1
11. A cube of side 40cm has its upper face displaced by 0.1m by a tangential force of 8kN . The shearing modulus of cube is,
 - a. $2 \times 10^9 \text{Nm}^{-2}$
 - b. $4 \times 10^9 \text{Nm}^{-2}$
 - c. $2 \times 10^8 \text{Nm}^{-2}$
 - d. $4 \times 10^8 \text{Nm}^{-2}$
12. The area of cross section of a steel wire is 0.2cm^2 and its Young's modulus is $2.0 \times 10^{11} \text{Nm}^{-2}$. The force required to double its length be,
 - a. $4 \times 10^{12} \text{N}$
 - b. $4 \times 10^{11} \text{N}$
 - c. $4 \times 10^{10} \text{N}$
 - d. $4 \times 10^6 \text{N}$
13. The Bulk modulus of rubber is $9.8 \times 10^8 \text{Nm}^{-2}$. To what depth a rubber ball be taken in a lake so that its volume is decreased by 0.1%?
 - a. 25m
 - b. 100m
 - c. 200m
 - d. 500m
14. The Poisson's ratio of a material is 0.4. If there is a decrease of cross sectional area by 2%, the percentage increase in its length is,
 - a. 0.5%
 - b. 1%
 - c. 2.5%
 - d. 3%
15. The longitudinal strain in a stretched wire is α and Young's Modulus of its material is Y . The strain energy density will be,
 - a. $\frac{1}{2}Y\alpha^2$
 - b. $\frac{1}{2}Y\alpha$
 - c. $\frac{Y^2\alpha}{2}$
 - d. $\frac{Y^2}{2\alpha}$
16. Wires A and B are made from the same materials. A has twice the diameter and three times the length of B . If the elastic limits are not reached, when each is stretched by the same tension, the ratio of energy stored in A to that in B is:
 - a. 2:3
 - b. 3:4
 - c. 3:2
 - d. 6:1
17. When a load of 7kg is hung on a wire then extension of 20cm take place then work done will be,
 - a. 0.5J
 - b. 1.5J
 - c. 7J
 - d. 15J