

ELASTICITY

- The ratio of radius of two wire of same material is 2 : 1. Stretched by same force, then the ratio of stress is
(a) 2 : 1 (b) 1 : 2 (c) 1 : 4 (d) 4 : 1
- The reason for the change in shape of a regular body is
(a) Volume stress (b) Shearing strain (c) Longitudinal strain (d) Metallic strain
- In the Young's experiment, if length of wire and radius both are doubled then the value of Y will become
(a) 2 times (b) 4 times (c) Remains same (d) Half
- A rubber cord catapult has cross-sectional area 25mm^2 and initial length of rubber cord is 10cm . It is stretched to 5cm . and then released to project a missile of mass 5gm . Taking $Y_{\text{rubber}} = 5 \times 10^8 \text{ N / m}^2$ velocity of projected missile is
(a) 20 ms^{-1} (b) 100 ms^{-1} (c) 250 ms^{-1} (d) 200 ms^{-1}
- The longitudinal extension of any elastic material is very small. In order to have an appreciable change, the material must be in the form of
(a) Thin block of any cross section (b) Thick block of any cross section
(c) Long thin wire (d) Short thin wire
- In suspended type moving coil galvanometer, quartz suspension is used because
(a) It is good conductor of electricity (b) Elastic after effects are negligible
(c) Young's modulus is greater (d) There is no elastic limit
- A slightly conical wire of length L and end radii r_1 and r_2 is stretched by two forces F , F applied parallel to length in opposite directions and normal to end faces. If Y denotes the Young's modulus, then extension produced is
(a) $\frac{FL}{\pi r_1^2 Y}$ (b) $\frac{FL}{\pi r_1 Y}$ (c) $\frac{FL}{\pi r_1 r_2 Y}$ (d) $\frac{FLY}{\pi r_1 r_2}$
- If the potential energy of a spring is V on stretching it by 2 cm , then its potential energy when it is stretched by 10 cm will be
(a) $V/25$ (b) $5V$ (c) $V/5$ (d) $25V$
- The strain energy stored in a body of volume V due to shear S and shear modulus η is
(a) $\frac{S^2 V}{2\eta}$ (b) $\frac{SV^2}{2\eta}$ (c) $\frac{S^2 V}{\eta}$ (d) $\frac{1}{2} \eta S^2 V$
- A heavy mass is attached to a thin wire and is whirled in a vertical circle. The wire is most likely to break
(a) When the mass is at the highest point (b) When the mass is at the lowest point
(c) When the wire is horizontal (d) At an angle of $\cos^{-1}(1/3)$ from the upward vertical
- If a rubber ball is taken at the depth of 200 m in a pool. Its volume decreases by 0.1% . If the density of the water is $1 \times 10^3 \text{ kg / m}^3$ and $g = 10 \text{ m/s}^2$, then the volume elasticity in N/m^2 will be
(a) 10^8 (b) 2×10^8 (c) 10^9 (d) 2×10^9
- The compressibility of water is 4×10^{-5} per unit atmospheric pressure. The decrease in volume of $100 \text{ cubic centimetre}$ of water under a pressure of 100 atmosphere will be
(a) 0.4 cc (b) $4 \times 10^{-5} \text{ cc}$ (c) 0.025 cc (d) 0.004 cc
- The Young's modulus of a metal is $1.2 \times 10^{11} \text{ N / m}^2$ and the inter-atomic force constant is $3.6 \times 10^{-9} \text{ N / \AA}$. The mean distance between the atoms of the metal is
(a) 2 \AA (b) 3 \AA (c) 4.5 \AA (d) 5 \AA
- A uniform rod of mass m , length L , area of cross-section A is rotated about an axis passing through one of its ends and perpendicular to its length with constant angular velocity ω in a horizontal plane. If Y is the Young's modulus of the material of rod, the increase in its length due to rotation of rod is
(a) $\frac{m \omega^2 L^2}{AY}$ (b) $\frac{m \omega^2 L^2}{2AY}$ (c) $\frac{m \omega^2 L^2}{3AY}$ (d) $\frac{2m \omega^2 L^2}{AY}$
- The interatomic distance for a metal is $3 \times 10^{-10} \text{ m}$. If the interatomic force constant is $3.6 \times 10^{-9} \text{ N / \AA}$, then the Young's modulus in N / m^2 will be
(a) 1.2×10^{11} (b) 4.2×10^{11} (c) 10.8×10^{-19} (d) 2.4×10^{10}