

Properties of Bulk Matter(SOLIDS)

1. A composite wire of Diameter 1 cm consisting of copper and steel wire of length 2.2m and 2.0m respectively. Total extension of the wire when stretched by a force is 1.2 mm. Calculate the force, given the $Y_{\text{copper}} = 1.1 \times 10^{11} \text{ Pa}$ and $Y_{\text{steel}} = 2.0 \times 10^{11} \text{ Pa}$
2. Two wires A and B of length l , radius r and length $2l$, radius $2r$ having same Young's Modulus Y are hung with a weight mg in an sequence A , B then mg . What is the net elongation in the two wires
3. A cube is subjected to pressure of $5 \times 10^5 \text{ N/m}^2$. Each side of the cube is shortened by 1%. Find volumetric strain and bulk modulus of elasticity of cube
4. A 45kg boy whose leg bone are 5 cm^2 in area and 50cm long falls through a height of 2m without breaking his leg bone. If the bone can stand a stress of $0.9 \times 10^8 \text{ N m}^{-2}$, calculate the young' modulus for the material of the Bone. Use $g = 10 \text{ ms}^{-1}$
5. A wire of length l and radius r has a weight W and Young's modulus of elasticity Y . It is suspended vertically from a fixed point. Calculate the increase in length of wire produced due to its own weight.
6. A bob of 1kg wt. is suspended by a rubber cord 2m long and of cross section 0.5 cm^2 . It is made to describe a horizontal circle of radius 50 cm, 4 times a second. Find the extension of cord. Young's modulus of rubber is $5 \times 10^8 \text{ N/m}^2$
7. A wire of cross sectional area $4 \times 10^{-4} \text{ m}^2$, modulus of rigidity $2 \times 10^{11} \text{ N/m}^2$ and length 1m is stretched between two vertically rigid poles. A mass of 1kg is suspended at its middle. Calculate the angle it makes with horizontal.
8. A wire of radius r and length $2l$ is stretched between two vertically points A and B. What is the tension in the wire when it is pulled in the shape ACB as C is just lies below the centre of the line joining A and B. Assume Young's modulus rigidity of material to be Y
9. A 40 kg Girl whose leg bones are 4 cm^2 in area and 40cm long falls through a height of 1.6m without breaking his leg bones. If the bones can stand a stress of $0.8 \times 10^8 \text{ N m}^{-2}$, calculate the young's modulus for the material of the bone.
10. A rubber cord catapult has a cross sectional area is 1 mm^2 and total unstressed length is 10cm. it is stretched to 12 cm and then released to project a missile of mass 5 kg. Taking Young's modulus for rubber is $5 \times 10^8 \text{ N m}^{-2}$, Find the tension in the cord and the velocity of the projected projectile
11. Calculate the possible maximum error can be possible in young's modulus of rigidity experiment performed of a load force F on a wire of radius r and length l