

Properties of Bulk Matter(SOLIDS)

1. A wire of cross sectional area A is stretched horizontally between two clamps at a distance $2l$ m from each other. A weight W kg is suspended from the midpoint of the wire. If vertical distance through which the midpoint of the wire moves down be x less than l , then find (1) the strain produced in the wire (2) the stress in the area (3) if y is the young 's modulus of wire, then find the value of x .
2. If the normal density of sea water is 1.00 g cm^{-3} , what will be its density at a depth of 3 km. Given , compressibility of water = 0.000048 per atmosphere, 1 atmospheric pressure = 1.01×10^6 dyne
3. The length of a metal is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2 . The what will be the original length of the wire
4. If work done in stretching a wire by 1mm is 2J. Then find the work necessary for starching another wire of same material but with double the radius and half the length by 1mm distance
5. The length of an elastic string is 1m, when the long nation tension is 4N and length is b m. When the tension is 5N. Then what will be the length of the string (in m) when the longitudinal tension is 9N
6. A wire elongates by l mm when a load w is hung from it. If the wire goes over a pulley and two weights w each are hung at the two ends, then find the elongation of the wire
7. If S is the stress and Y is the young's modulus of the material of the wire , then find the energy stored in the wire per unit volume
8. A wire 3m in length and 1mm in diameter and at a temperature of 30° C is kept of a low temperature of -170° C and is stretched by hanging a weight of 10 kg at one end. Then find out the change in length of the wire if $Y = 1.2 \times 10^{11} \text{ Nm}^{-2}$ and $\alpha = 1.2 \times 10^{-5}$ degree C
9. Two rods of different materials having coefficients of thermal expansion α_1 and α_2 and Young's moduli Y_1 and Y_2 respectively are fixed between two rigid massive walls. The rods are heated such that they undergo the same increase in temperature. There is no bending of the rods. If $\alpha_1: \alpha_2 = 2:3$, then find out the thermal stress developed in the rods are equals provide what ratio of Young's modulus
10. The upper end of a wire of radius 4 mm and length 100 cm is clamped and its other end is twisted through an angle of 30° . Find the angle of shear