PROPERTY OF SOLIDS

1	If the length of a wire is made double and radius is halved of its respective values. Then, the Young's modules of the material of the wire will (a) remains same. (b) become 8 times its initial value. (c) become ¼ th of its initial value. (d) become 4 times its initial value.
2	Four identical hollow cylindrical columns of mild steel support a big structure of mass 50 x 10^3 kg. The inner and outer radii of each column are 50 cm and 100 cm respectively. Assuming uniform local distribution, calculate the compression strain of each column. [use Y = 2.0 x 10^{11} Pa, g = 9.8 m/s ^{2}] (a) 1.87 x 10^{-3} (b) 2.60 x 10^{-7} (c) 3.27 x 10^{-6} (d) 7.07 x 10^{-4}
3	A man grows into a giant such that his linear dimensions increase by a factor of 9. Assuming that his density remains same, the stress in the leg will change by a factor of (a) 1 / 9 (b) 81 (c) 1 / 81 (d) 9
4	Two wires are made of the same material and have the same volume. However, wire 1 has cross-sectional area A and wire 2 has cross-sectional area 3 A. If the length of wire 1 increases by Δ x on applying force F, how much force is needed to stretch wire 2 by the same amount? (a) F (b) 3 F (c) F / 9 (d) 9 F
5	One end of a horizontal thick copper wire of length 2 L and radius 2 R is welded to an end of another horizontal thin copper wire of length L and radius R. When the arrangement is stretched by applying forces at two ends, the ratio of the elongation in the thin wire to that in the thick wire is (a) 0.25 (b) 0.50 (c) 2.00 (d) 4.00
6	Two wires of same length and radius are joined end to end and loaded. The Young's moduli of the materials of the two wires are Y_1 and Y_2. The combination behaves as a single wire then its Young's modulus is (A) $Y = \frac{Y_1 Y_2}{2(Y_1 + Y_2)}$ (B) $Y = \frac{2Y_1 Y_2}{3(Y_1 + Y_2)}$ (C) $Y = \frac{Y_1 Y_2}{Y_1 + Y_2}$ (D) $Y = \frac{2Y_1 Y_2}{Y_1 + Y_2}$
7	A steel wire of length 3.2 m (Y_S = 2.0 x 10^{11}Nm^{-2}) and a copper wire of length 4.4 m (Y_c = 1.1 x 10^{11}Nm^{-2}), both of radius 1.4 mm are connected end to end. When stretched by a load, the net elongation is found to be 1.4 mm. The load applied, in Newton, will be (Given π = 22 / 7) (a) 360 (b) 180 (c) 1080 (d) 154

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PROPERTY OF SOLIDS

8	The length of a metal wire is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2 . The natural length of the wire is A $\frac{l_1 + l_2}{2}$ B $\sqrt{l_1 l_2}$ C $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$ D $\frac{l_1 T_2 + l_2 T_1}{T_2 + T_1}$
9	A wire of length L is hanging from a fixed support. The length changes to L_1 and L_2 when masses 1 kg and 2 kg are suspended respectively from its free end. Then the value of L is equal to (a) $\sqrt{(L_1 L_2)}$ (b) $(L_1 + L_2) / 2$ (c) $2 L_1 - L_2$ (d) $3 L_1 - L_2$
10	A string of area of cross-section 4 mm^2 and length 0.5 m is connected with a rigid body of mass 2 kg. The body is rotated in a vertical circular path of radius 0.5 m. The body acquires a speed of 5 m/s at the bottom of the circular path. Strain produced in the string when the body is at the bottom of the circle is: (Use Young's modulus 10^{11} N/m^2 and g = 10 m/s^2) (a) 5×10^{-3} (b) 2.5×10^{-4} (c) 3×10^{-4} (d) 12×10^{-4}