Physics: Elasticity
Practice Problems
November 2019

1. Two wires of the same material and length are stretched by the same force. Their masses are in the ratio 3 : 2, their elongations are in the ratio :

   (A) 3 : 2

   (B) 9 : 4

   (C) 2 : 3

   (D) 4 : 9

2. A cable that can support a load of 800 N is cut into two equal parts. The maximum load that can be supported by either part is :

   (A) 100 N

   (B) 400 N

   (C) 800 N

   (D) 1600 N

3. When a weight of 5 kg is suspended from a copper wire of length 30 m and radius 0.5 mm, the length of the wire increases by 2.4 cm. If the radius is doubled, the extension produced is:

   (A) 1.2 cm

   (B) 0.6 cm

   (C) 0.3 cm

   (D) 0.15 cm

4. The Young's modulus of steel is twice that of brass. Two wires of same length and of same area of cross-section, one of steel and the other of brass, are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio:

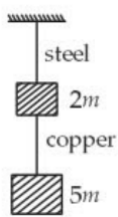
   (A) 4 : 1

   (B) 1 : 1

(C) 1 : 2

(D) 2 : 1

5. If the ratio of diameters, lengths and Young's modulii of steel and copper wires shown in the figure are p, q and s respectively, then the corresponding ratio of increase in their lengths would be



(A) $\frac{5q}{7sp^2}$

(B) $\frac{7q}{5sp^2}$

(C) $\frac{2q}{5sp}$

(D) $\dfrac{7q}{5sp}$

6. For a constant hydraulic stress on an object, the fractional change in volume ($\Delta V/V$) and its bulk modulus (B) are related as

(A) $\dfrac{\Delta V}{V} \propto B$

(B) $\dfrac{\Delta V}{V} \propto \dfrac{1}{B}$

(C) $\dfrac{\Delta V}{V} \propto B^2$

(D) $\dfrac{\Delta V}{V} \propto \dfrac{1}{B^2}$

7. For a constant hydraulic stress P on an object with bulk modulus B, the fractional change in the volume will be

(A) $\dfrac{P}{B}$

(B) $\dfrac{B}{P}$

(C) $\sqrt{\dfrac{P}{B}}$

(D) $\left(\dfrac{B}{P}\right)^2$

8. A cube is subjected to a uniform volume compression. If the side of the cube decreases by 2%, the bulk strain is:

   (A) 0.02

   (B) 0.03

   (C) 0.04

   (D) 0.06

9. In question 7, the fractional change in radius is:

   (A) $\dfrac{B}{3P}$

   (B) $\dfrac{3P}{B}$

   (C) $\dfrac{P}{3B}$

(D) $\dfrac{P}{B}$