Class 11 Physics · Chapter 8: Mechanical Properties of Solids

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

Scan for the free Class 11 Physics test

1. The dimensional formula of stress is [1]

(a) $[MLT^{-2}]$ (b) $[ML^{-1}T^{-2}]$

(c) $[ML^{2}T^{-2}]$ (d) $[M^{0}L^{0}T^{0}]$

2. The compressibility of solids, liquids and gases, in increasing order, is [1]

(a) gas < liquid < solid (b) solid < liquid < gas

(c) liquid < solid < gas (d) solid < gas < liquid

3. Which statement about the elastic tissue of the aorta is correct? [1]

(a) It obeys Hooke's law over the whole of its elastic region. (b) It has a well defined plastic region, like a metal.

(c) It fractures at a strain below 1%, like glass. (d) Its elastic region is very large, but it does not obey Hooke's law over most of it.

4. On the stress–strain curve of a metal, the yield point is also known as the [1]

(a) elastic limit (b) proportional limit

(c) ultimate tensile strength (d) fracture point

5. In a tensile test on a rod of a new ceramic, the rod fractures almost as soon as the stress reaches the ultimate tensile strength. The material is [1]

(a) ductile (b) plastic

(c) brittle (d) an elastomer

6. A cube of gelatin of side 5.0 cm stands on a plate to which its base sticks. A horizontal force of 0.50 N on its top face moves that face 1.0 cm sideways. Find the shearing strain and the shear modulus of the gelatin. [2]

7. Hooke's law is described as an empirical law. What does this mean? Name one class of materials that does not obey it, with an example. [2]

8. Stress and pressure are both measured in N m^{-2}. A student argues that since force is a vector, stress must be a vector too. Is the student right? Explain. [2]

9. Show that the work done in stretching a wire of length L and cross-section A by an amount l, within the elastic limit, is ½ × stress × strain × volume. Hence write the energy stored per unit volume. [3]

10. A light rigid bar 1.0 m long hangs horizontally from two vertical wires of equal length 1.0 m and equal cross-section 1.0 mm^2, one of steel (Y = 2.0 × 10^{11} N m^{-2}) at one end and one of aluminium (Y = 7.0 × 10^{10} N m^{-2}) at the other. A 30 kg load is hung on the bar. Where must it be hung for the bar to stay horizontal? Find the tensions and the common extension (g = 10 m s^{-2}). [3]

11. A wooden plank 30 cm broad and 5.0 cm thick is used as a footbridge over a drain, supported at its ends with a person standing at its centre. Using $\delta = Wl^3/(4bd^3Y)$, find how many times more it sags when laid flat than when set on its edge. Why is the plank on edge still not a safe bridge? [3]