

Worksheet: Mechanical Properties of Solids

Uttar Pradesh State Board · Class 11 · Physics · 10 questions · 31 marks

Name: _____

Date: _____

Score: _____ / 31

Q1. A wire of cross-sectional area 2.0 mm^2 carries a load of 40 N. Find the tensile stress. *[2 marks]*

Q2. Why is Young's modulus not defined for a liquid? *[2 marks]*

Q3. On a stress-strain curve, which feature gives the stiffness of the material and which gives its strength? *[2 marks]*

Q4. A steel wire 2.0 m long and of cross-sectional area 1.0 mm^2 is stretched by a 100 N load. Find its elongation ($Y = 2.0 \times 10^{11} \text{ Pa}$). *[3 marks]*

Q5. Find the fractional change in volume of a copper block under a hydraulic pressure of $2.0 \times 10^7 \text{ Pa}$ ($B = 1.4 \times 10^{11} \text{ Pa}$). *[3 marks]*

Q6. A wire of volume $1.0 \times 10^{-6} \text{ m}^3$ is under a strain of 2.0×10^{-3} . If $Y = 2.0 \times 10^{11} \text{ Pa}$, find the elastic energy stored. [3 marks]

Q7. A hollow steel column has inner radius 10 cm and outer radius 20 cm and carries $3.0 \times 10^5 \text{ N}$. Find the compressive stress. [3 marks]

Q8. Distinguish ductile from brittle materials, giving one example of each and stating what the difference looks like on a stress-strain curve. [3 marks]

Q9. Two wires of the same material and the same length have radii r and $2r$. They are joined end to end and a force F is applied to the free ends. Compare the stress, strain and elongation in the two wires. [5 marks]

Q10. A steel wire has a breaking stress of $7.8 \times 10^8 \text{ N/m}^2$ and density 7800 kg/m^3 . Find the greatest length that can hang vertically without breaking under its own weight ($g = 9.8 \text{ m/s}^2$), and explain why thickening the wire does not help. [5 marks]