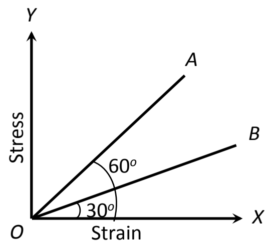
DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :6**

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. The stress versus strain graphs for wires of two materials A and B are as shown in the figure. If Y_A and Y_B are the Young's modulii of the materials, then

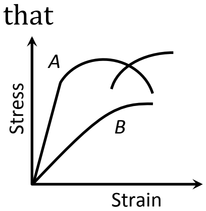


a) $Y_B = 2Y_A$ b) $Y_A = Y_B$ c) $Y_B = 3Y_A$ d) $Y_A = 3Y_B$

2. A wire whose cross-section is 4 mm^2 is stretched by 0.1 mm by a certain weight. How far will a wire of the same material and length stretch if its cross-sectional area is 8 mm^2 and the same weight is attached ?
a) 0.1 mm b) 0.05 mm c) 0.025 mm d) 0.012 mm

3. A uniform metal rod of 2 mm^2 cross-section is heated from 0^0C to 20^0C. The coefficient of the linear expansion of the rod is 12×10^{-6}/°C. Its Young's modulus of elasticity is 10^{11} Nm^{-2}. The energy stored per unit volume of the rod is
a) 1440 Jm^{-3} b) 15750 Jm^{-3} c) 1500 Jm^{-3} d) 2880 Jm^{-3}

4. The diagram shows stress v/s strain curve for the materials A and B. From the curves we infer that



a) A is brittle but B is ductile b) A ductile and B is brittle
c) Both A and B are ductile d) Both A and B are brittle

5. What is the increase in elastic potential energy when the stretching force is increased by 200 kN?

a) 238.5 J b) 636.0 J c) 115.5 J d) 79. 5 J

6. The energy stored per unit volume in copper wire, which produces longitudinal strain of 0.1% is$(Y = 1.1 \times 10^{11} \text{Nm}^{-2})$

a) $11 \times 10^{3} \text{Jm}^{-3}$ b) $5.5 \times 10^{3} \text{Jm}^{-3}$ c) $5.5 \times 10^{4} \text{Jm}^{-3}$ d) $11 \times 10^{4} \text{Jm}^{-3}$

7. The length of an elastic string is a metre when the tension is 44 N, and b metre when the tension is 5 N. The length in metre when the tension is 9 N, is

a) $4a - 5b$ b) $5b - 4a$ c) $9b - 9a$ d) $a + b$

8. A wire of length 50 cm and cross sectional area of 1 $sq.mm$ is extended by 1 mm. The required work will be $(Y = 2 \times 10^{10} Nm^{-2})$

a) $6 \times 10^{-2} J$ b) $4 \times 10^{-2} J$ c) $2 \times 10^{-2} J$ d) $1 \times 10^{-2} J$

9. When a force is applied on a wire of uniform cross sectional area $3 \times 10^{-6} \text{m}^2$ and length 4m, the increase in length is 1 mm. Energy stored in it will be
$(Y = 2 \times 10^{11}) \text{Nm}^{-2})$

a) 6250 J b) 0.177 J c) 0.075 J d) 0.150 J

10. The force required to stretch a steel wire of 1 cm^2 cross-section to 1.1 times its length would be $(Y = 2 \times 10^{11} \text{Nm}^{-2})$

a) 2×10^{6} N b) 2×10^{3} N c) 2×10^{5} N d) 2×10^{-6} N

11. A wire of Young's modulus 1.5×10^{12} Nm^{-2} is stretched by a force so as to produce a strain of 2×10^{4}. The energy stored per unit volume is

a) 3×10^{8} Jm^{-3} b) 3×10^{3} Jm^{-3} c) 6×10^{3} Jm^{-3} d) 3×10^{4} Jm^{-3}

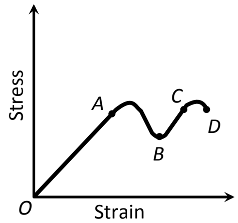
12. The relationship between Young's modulus Y, Bulk modulus K and modulus of rigidity η is

a) $Y = \frac{9\eta K}{\eta + 3K}$ b) $\frac{9YK}{Y + 3K}$ c) $Y = \frac{9\eta K}{3 + K}$ d) $Y = \frac{3\eta K}{9\eta + K}$

13. A rod elongated by l when a body of mass M is suspended from it. The work done is

a) Mgl b) $\frac{1}{2} Mgl$ c) $2\ Mgl$ d) zero

14. A graph is shown between stress and strain for a metal. The part in which Hooke's law holds good is



a) OA b) AB c) BC d) CD

15. For a given material, the Young's modulus is 2.4 times that of rigidity modulus. Its Poisson's ratio is

a) 2.4 b) 1.2 c) 0.4 d) 0.2

16. The lower surface of a cube is fixed. On its upper surface, force is applied at an angle of 30° from its surface. The change will be of the type

a) Shape b) Size c) None d) Shape and size

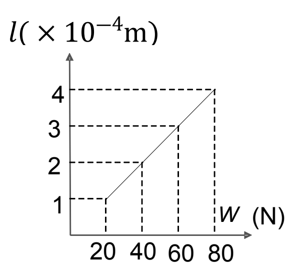
17. A steel wire of cross-sectional area $3 \times 10^{-6}\text{m}^2$ can withstand a maximum strain of 10^{-3}. Young's modulus of steel is $2 \times 10^{11}\text{Nm}^{-2}$. The maximum mass the wire can hold is (take $\text{g} = 10\ \text{ms}^{-2}$)

a) 40 kg b) 60 kg c) 80 kg d) 100 kg

18. A force F is needed to break a copper wire having radius R. The force needed to break a copper wire of radius $2R$ will be

a) $F/2$ b) $2F$ c) $4F$ d) $F/4$

19. The adjacent graph shows the extension (l) of a wire of length 1m suspended from the top of a roof at one end and with a load W connected to the other end. If the cross-sectional area of the wire is $10^{-6}\ \text{m}^2$, calculate the Young's modulus of the material of the wire.



a) $2 \times 10^{11}\ \text{Nm}^{-2}$ b) $2 \times 10^{-11}\ \text{Nm}^{-2}$ c) $3 \times 10^{12}\ \text{Nm}^{-2}$ d) $2 \times 10^{13}\ \text{Nm}^{-2}$

20. The Young's modulus of brass and steel are 10×10^{10} Nm^{-2} and 2×10^{11} Nm^{-2} respectively. A brass wire and a steel wire of the same length are extended by 1 mm under the same force. The radii of the brass and steel wires are R_B *and* R_S respectively. Then

a) $R_A = \sqrt{2}\, R_B$ b) $R_S = \frac{R_B}{\sqrt{2}}$ c) $R_S = 4\, R_B$ d) $R_S = \frac{R_B}{4}$