DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH | SUBJECT : PHYSICS
DATE : | DPP NO. :10

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. $Y = \frac{mgl}{\pi r^2 L}$ formula would give Y if mg is doubled
   a) $2Y$ b) $\frac{Y}{2}$ c) Y d) Zero

2. The Poisson's ratio cannot have the value
   a) 0.7 b) 0.2 c) 0.1 d) 0.3

3. A force of 10^3 *newton* stretches the length of a hanging wire by 1 *millimetre*. The force required to stretch a wire of same material and length but having four times the diameter by 1 *millimetre* is
   a) $4 \times 10^3 N$ b) $16 \times 10^3 N$ c) $\frac{1}{4} \times 10^3 N$ d) $\frac{1}{16} \times 10^3 N$

4. Two wires of the same length and same material but radii in the ratio of 1 : 2 are stretched by unequal forces to produce equal elongation. The ratio of the two forces is
   a) 1 : 1 b) 1 : 2 c) 2 : 3 d) 1 : 4

5. One litre of a gas is maintained at pressure 72 cm of mercury. It is compressed isothermally so that its volume becomes 900 cm^3. The value of stress and strain will be respectively
   a) 0.106 Nm^{-2} and 0.1 b) 1.106 Nm^{-2} and 0.1
   c) 106.62 Nm^{-2} and 0.1 d) 10662.4 Nm^{-2} and 0.1

6. A uniform cube is subjected to volume compression. If each side is decreased by 1%, then bulk strain is
   a) 0.01 b) 0.06 c) 0.02 d) 0.03

7. A wire of length L and cross-section A is made of material of Young's modulus Y. It is stretched by an amount x, the work done is
   a) $\frac{YxA}{2L}$ b) $\frac{Yx^2A}{L}$ c) $\frac{Yx^2A}{2L}$ d) $\frac{2Yx^2A}{L}$

8. Wires A and B are made from the same material. A has twice the diameter and three times the length of B. If the elastic limits are not reached, when each is stretched by the same tension, the ratio of energy stored in A to that in B is
a) 2 : 3 b) 3 : 4 c) 3 : 2 d) 6 : 1

9. The Young's modulus of a wire of length L and radius r is $Y\ N/m^2$. If the length and radius are reduced to $L/2$ and $r/2$, then its Young's modulus will be
a) $Y/2$ b) Y c) $2Y$ d) $4Y$

10. The ratio of diameters of two wires of same materials is n: 1. The length of each wire is 4 m. On applying the same load, the increase in length of thin wire will be $(n > 1)$
a) n^2 times b) n times c) $2n$ times d) $(2n + 1)$times

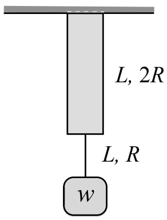
11. The coefficient of linear expansion of brass and steel are α_1 and α_2. If we take a brass rod of length l_1 and steel rod of length l_2 at 0°C, their difference in length $(l_2 - l_1)$ will remain the same at a temperature if
a) $\alpha_1 l_2 = \alpha_2 l_1$ b) $\alpha_1 l_2^2 = \alpha_2 l_1^2$ c) $\alpha_1^2 l_1 = \alpha_2^2 l_2$ d) $\alpha_1 l_1 = \alpha_2 l_2$

12. The hollow shaft is….. than a solid shaft of same mass, material and length.
a) Less stiff b) More stiff c) Squally stiff d) None of these

13. A wire is stretched 1 mm by a force of 1 k N. How far would a wire of the same material and length but of four times that diameter be stretched by the same force ?
a) $\frac{1}{2}$ mm b) $\frac{1}{4}$ mm c) $\frac{1}{8}$ mm d) $\frac{1}{16}$ mm

14. Two exactly similar wires of steel and copper are stretched by equal forces. If the difference in their elongations is $0.5cm$, the elongation (l) of each wire is
$Y_s(\text{steel}) = 2.0 \times 10^{11} N/m^2$
$Y_c(\text{copper}) = 1.2 \times 10^{11} N/m^2$
a) $l_s = 0.75cm, l_c = 1.25cm$ b) $l_s = 1.25cm, l_c = 0.75cm$
c) $l_s = 0.25cm, l_c = 0.75cm$ d) $l_s = 0.75cm, l_c = 0.25cm$

15. Two wires of the same material (Young's modulus Y) and same length L but radii R and $2R$ respectively are joined end to end and a weight w is suspended from the combination as shown in the figure. The elastic potential energy in the system is



a) $\frac{3w^2L}{4\pi R^2Y}$ b) $\frac{3w^2L}{8\pi R^2Y}$ c) $\frac{5w^2L}{8\pi R^2Y}$ d) $\frac{w^2L}{\pi R^2Y}$

16. 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 $3A$. If the length of wire 1 increases by Δx on applying force F, how much force is needed to stretch wire 2 by the same amount?
a) F b) $4F$ c) $6F$ d) $9F$

17. A spring is extended by 30 mm when a force of 1.5 N is applied to it. Calculate the energy stored in the spring when hanging vertically supporting a mass of 0.20 kg if the spring was instructed before applying the mass.
a) 0.01 J b) 0.02 J c) 0.04 J d) 0.08 J

18. On applying a stress of $20 \times 10^8 N/m^2$ the length of a perfectly elastic wire is doubled. Its Young's modulus will be
a) $40 \times 10^8 N/m^2$ b) $20 \times 10^8 N/m^2$ c) $10 \times 10^8 N/m^2$ d) $5 \times 10^8 N/m^2$

19. On increasing the length by 0.5 mm in a steel wire of length 2 m and area of cross-section 2 m m^2, the force required is [Y for steel $= 2.2 \times 10^{11} \text{Nm}^{-2}$]
a) 1.1×10^5N b) 1.1×10^4N c) 1.1×10^3 N d) 1.1×10^2 N

20. Which one of the following statements is correct? In the case of
a) Shearing stress there is change in volume
b) Tensile stress there is no change in volume
c) Shearing stress there is no change in shape
d) Hydraulic stress there is no change in volume