DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :7**

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. The length of a wire is 1.0 m and the area of cross-section is $1.0 \times 10^{-2} cm^2$. If the work one for increase in length by 0.2 cm is 0.4 $joule$, then Young's modulus of the material of the wire is
   a) $2.0 \times 10^{10} N/m^2$ b) $4.0 \times 10^{10} N/m^2$ c) $2.0 \times 10^{11} N/m^2$ d) $4.0 \times 10^{11} N/m^2$

2. X linear strain is produced in a wire of elasticity coefficient Y. The stored potential energy in unit volume of this wire is
   a) Yx^2 b) $2Yx^2$ c) $\frac{1}{2}Y^2x$ d) $\frac{1}{2}Yx^2$

3. Two bars A *and* B of circular cross-section and of same volume and made of the same material are subjected to tension. If the diameter of A is half that of B and if the force applied to both the rods is the same and it is in the elastic limit, the ratio of extension of A to that of B will be
   a) 16 b) 8 c) 4 d) 7

4. Find the extension produced in a copper of length 2 m and diameter 3 mm, when a force of 30 N is applied. Young's modulus for copper = $1.1 \times 10^{11} Nm^{-2}$
   a) 0.2 mm b) 0.04 mm c) 0.08 mm d) 0.68 mm

5. Which is the most elastic
   a) Iron b) Copper c) Quartz d) Wood

6. A force of 200 N is applied at one end of a wire of length $2m$ and having area of cross-section $10^{-2} cm^2$. The other end of the wire is rigidly fixed. If coefficient of linear expansion of the wire $\alpha = 8 \times 10^{-6}$/°C and Young's modulus $Y = 2.2 \times 10^{11}\ N/m^2$ and its temperature is increased by 5°C, then the increase in the tension of the wire will be
   a) 4.2 N b) 4.4 N c) 2.4 N d) 8.8 N

7. Two wires, one made of copper and other of steel are joined end to end (as shown in figure). The area of cross-section of copper wire is twice that of steel wire.

They are placed under compressive force of magnitudes F. The ratio for their lengths such that change in lengths of both wires are same is ($Y_s = 2 \times 10^{11}\text{Nm}^{-2}$ and $Y_c = 1.1 \times 10^{11}\ \text{Nm}^{-2}$)

a) 2.1 b) 1.1 c) 1.2 d) 2

8. A rubber cord catapult has cross-sectional area 25 mm^2 and initial length of rubber cord is 10 cm. It is stretched to 5 cm and then released to project a missile of mass $5gm$. Taking $Y_{rubber} = 5 \times 10^8 N/m^2$ velocity of projected missile is

a) 20 ms^{-1} b) 100 ms^{-1} c) 250 ms^{-1} d) 200 ms^{-1}

9. Young's modulus of perfectly rigid body material is

a) Infinite b) Zero c) $10 \times 10^{10}\ \text{Nm}^{-2}$ d) $1 \times 10^{10}\ \text{Nm}^{-2}$

10. The Poisson's ratio of a material is 0.1. If the longitudinal strain of a rod of this material is 10^{-3}, then the percentage change in the volume of the rod will be

a) 0.008% b) 0.08% c) 0.8% d) 8%

11. If a spring extends by x on loading, then the energy stored by the spring is (if T is tension in the spring and k is spring constant)

a) $\frac{T^2}{2x}$ b) $\frac{T^2}{2k}$ c) $\frac{2x}{T^2}$ d) $\frac{2T^2}{k}$

12. A load of 4.0 kg is suspended from a ceiling through a steel wire of length 2.0 m and radius 2.0 mm. It is found that the length of the wire increase by 0.031 mm as equilibrium is achieved. Taking g =3.1 π ms^{-2}, the Young's modulus of steel is

a) $2.0 \times 10^8\ \text{Nm}^{-2}$ b) $2.0 \times 10^9\ \text{Nm}^{-2}$ c) $2.0 \times 10^{11}\ \text{Nm}^{-2}$ d) $2.0 \times 10^{13}\ \text{Nm}^{-2}$

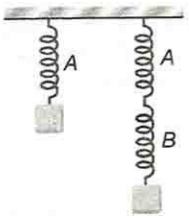
13. A cube is shifted to a depth of 100 m in a lake. The change in volume is 0.1%. The bulk modulus of the material is nearly

a) 10 Pa b) 10^4 Pa c) 10^7 Pa d) 10^6 Pa

14. Calculate the work done, if a wire is loaded by 'Mg' weight and the increase in length is 'l'

a) Mgl b) Zero c) $Mgl/2$ d) $2Mgl$

15. In the figure three identical springs are shown. From spring A, a mass of 4 kg is hung and spring shows elongation of 1 cm. But when a weight of 6 kg is hung on B, the Hook descends



a) 1 cm b) 2 cm c) 3 cm d) 4 cm

16. A steel wire has length 2 m, radius 1 mm and $Y = 2 \times 10^{11}$ Nm^{-2}. A 1 kg sphere is attached to one end of the wire and whirled in a vertical circle with an angular velocity of 2 revolutions per second. When the sphere is at the lowest point of the vertical circle, the elongation of the wire is nearly (Take g = $10ms^{-2}$)
    a) 1 mm b) 2 mm c) 0.1 mm d) 0.01 mm

17. Which of the following statements is correct
    a) Hooke's law is applicable only within elastic limit
    b) The adiabatic and isothermal elastic constants of a gas are equal
    c) Young's modulus is dimensionless
    d) Stress multiplied by strain is equal to the stored energy

18. What among of work is done in increasing the length of a wire though unity ?
    a) $\frac{YL}{2A}$ b) $\frac{YL^2}{2A}$ c) $\frac{YA}{2L}$ d) $\frac{YL}{A}$

19. After effects of elasticity are maximum for
    a) Glass b) Quartz c) Rubber d) Metal

20. The upper end of a wire of radius 4 mm length 100 cm is clamped and its other end is twisted through an angle of 30°. Then angle of shear is
    a) 12° b) 0.12° c) 1.2° d) 0.012°