DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :2**

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. The elastic energy stored per unit volume in a stretched wire is
   a) $\frac{1}{2}$(Young modulus)(Strain)^2 b) $\frac{1}{2}$(Stress)(Strain)^2
   c) $\frac{1}{2}\frac{\text{Stress}}{\text{Strain}}$ d) $\frac{1}{2}$(Young modulus)(Stress)

2. Consider an iron rod of length 1 m and cross-section 1 cm^2 with a Young's modulus of 10^{12} dyne cm^{-2}. We wish to calculate the force with which the two ends must be pulled to produce an elongation of 1mm. It is equal to
   a) 10^9 dyne b) 10^8 dyne c) 10^6 dyne d) 10^{17} dyne

3. The upper end of a wire 1 m log and 2 mm radius is clamped. The lower end is twisted through and angle of 45°. The angle of shear is
   a) $0.09°$ b) $0.9°$ c) $9°$ d) $90°$

4. The average depth of Indian ocean is about 3000 m. The fractional compression, $\frac{\Delta V}{V}$ of water at the bottom of the ocean (given that the bulk modulus of the water =2.2×10^9 Nm^{-2} and g = 10 ms^{-2}) is
   a) 0.82% b) 0.91% c) 1.36% d) 1.24%

5. A wire elongates by l mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the two ends, the elongation of the wire will be (in mm)
   a) l b) $2l$ c) Zero d) $\frac{l}{2}$

6. Bulk modulus of water is 2×10^9 Nm^{-2}. The change in pressure required to increase the density of water by 0.1% is
   a) 2×10^9 Nm^{-2} b) 2×10^8 Nm^{-2} c) 2×10^6 Nm^{-2} d) 2×10^4 Nm^{-2}

7. If longitudinal strain for a wire is 0.03 and its Poisson's ratio is 0.5, then its lateral strain is
   a) 0.003 b) 0.0075 c) 0.015 d) 0.4

8. The possible value of Poisson's ratio is
   a) 1 b) 0.9 c) 0.8 d) 0.4

9. A metallic ring of radius r and cross-sectional area A is fitted into a wooden circular disc of radius $R(R>r)$. If the Young's modulus of the material of the ring is Y, the force with which the metal ring expands is
   a) $\frac{AYR}{r}$ b) $\frac{AY(R - r)}{r}$ c) $\frac{Y(R - r)}{Ar}$ d) $\frac{YR}{AR}$

10. A uniform wire, fixed at its upper end, hangs vertically and supports a weight at its lower end. If its radius is r, its length L and the Young's modulus for the material of the wire is E, the extension is
    1. directly proportional to E
    2. inversely proportional to r
    3. directly proportional to L
    a) If only 3 is correct b) If 1, 2 are correct c) If 2, 3 are correct d) If only 1 correct

11. A 2 m long rod of radius 1 cm which is fixed from one end is given a twist of 0.8 radians. The shear strain developed will be
    a) 0.002 b) 0.004 c) 0.008 d) 0.016

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

13. K is the force constant of a spring. The work done in increasing its extension from l_1 to l_2 will be
    a) $K(l_2 - l_1)$ b) $\frac{K}{2}(l_2 + l_1)$ c) $K(l_2^2 - l_1^2)$ d) $\frac{K}{2}(l_2^2 - l_1^2)$

14. A wire suspended vertically from one of its ends is stretched by attaching a weight of 200 N to the lower end. The weight stretches the wire by 1mm. Then, the elastic energy stored in the wire is
    a) 0.2 J b) 10 J c) 20 J d) 0.1 J

15. Two pieces of wire A and B of the same material have their lengths in the ratio 1 : 2, and their diameters are in the ratio 2 : 1. If they are stretched by the same force, their elongations will be in the ratio
    a) 2 : 1 b) 1 : 4 c) 1 : 8 d) 8 : 1

16. A height spring extends 40 mm when stretched by a force of 10 N, and for tensions up to this value the extension is proportional to the stretching force. Two such springs are joined end-to-end and the double- length spring is stretched 40 mm beyond its natural length. The total strain energy in (joule), stored in the double spring is
    a) 0.05 b) 0.10 c) 0.80 d) 0.40

17. Write copper, steel, glass and rubber in order of increasing coefficient of elasticity.
    a) Steel, rubber, copper, glass
    b) Rubber, copper, steel, glass
    c) Rubber, glass, steel, copper
    d) Rubber, glass, copper, steel

18. The Bulk modulus for an incompressible liquid is
    a) Zero b) Unity c) Infinity d) Between 0 and 1

19. Which one of the following quantities does not have the unit of force per unit area
    a) Stress
    b) Strain
    c) Young's modulus of elasticity
    d) Pressure

20. 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 $= 2.2 \times 10^{11} N/m^2$]
    a) $1.1 \times 10^5 N$ b) $1.1 \times 10^4 N$ c) $1.1 \times 10^3 N$ d) $1.1 \times 10^2 N$