DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :9**

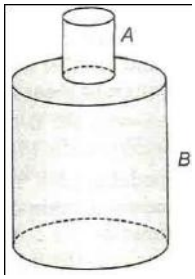
Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. In the Young's experiment, If length of wire and radius both are doubled then the value of Y will become
   a) 2 times b) 4 times c) Remains same d) Half

2. A wire can be broken by applying a load of 200 N. The force required to break another wire of the same length and same material, but double in diameter, is
   a) 200 N b) 400 N c) 600 N d) 800 N

3. The temperature of a wire of length 1 m and area of cross section 1 cm^2 is increased from0°C to 100°C. If the rod is not allowed to increased in length, the force required will be ($\alpha = 10^{-5}/°C$ and $Y = 10^{11} N/m^2$)
   a) $10^3 N$ b) $10^4 N$ c) $10^5 N$ d) $10^9 N$

4. Two cylinders of same material and of same length are joined to end as shown in figure. The upper end of A is rigidly fixed. Their radii are in ratio of 1 : 2, If the lower end of B is twisted by an angle θ, the angle of twist of cylinder A is



   a) $\frac{15}{16}\theta$ b) $\frac{16}{15}\theta$ c) $\frac{16}{17}\theta$ d) $\frac{17}{16}\theta$

5. Shearing stress causes change in
   a) Length b) Breadth c) Shape d) Volume

6. There are two wires of same material and same length while the diameter of second wire is 2 times the diameter of first wire, then ratio of extension produced in the wires by applying same load will be
a) 1 : 1 b) 2 : 1 c) 1 : 2 d) 4 : 1

7. A rod is fixed between two points at 20°C. The coefficient of linear expansion of material of rod is 1.1×10^{-5}/°C and Young's modulus is $1.2 \times 10^{11} N/m^2$. Find the stress developed in the rod if temperature of rod becomes 10°C
a) $1.32 \times 10^{7} N/m^2$ b) $1.10 \times 10^{15} N/m^2$ c) $1.32 \times 10^{8} N/m^2$ d) $1.10 \times 10^{6} N/m^2$

8. The increase in pressure required to decrease the 200 L volume of a liquid by 0.008% in kPa is (Bulk modulus of the liquid = 2100 MPa is)
a) 8.4 b) 84 c) 92.4 d) 168

9. In solids, inter-atomic forces are
a) Totally repulsive b) Totally attractive
c) Combination of (a) and (b) d) None of these

10. A stress of $3.18 \times 10^{8} Nm^{-2}$ is applied to a steel rod of length $1m$ along its length. Its Young's modulus is $2 \times 10^{11} Nm^{-2}$. Then the elongation produced in the rod in mm is
a) 3.18 b) 6.36 c) 5.18 d) 1.59

11. The isothermal bulk modulus of a gas at atmospheric pressure is
a) 1 mm of Hg b) 13.6 mm of Hg c) $1.013 \times 10^{5} N/m^2$ d) $2.026 \times 10^{5} N/m^2$

12. A load of 1 kg weight is a attached to one end of a steel wire of area of cross-section 3 mm^2 and Young's modulus 10^{11} Nm^{-2} . The other end is suspended vertically from a hook on a wall, then the load is pulled horizontally and released. When the load passes through its lowest position the fractional change in length is ($g = 10$ ms^{-2})
a) 0.3×10^{-4} b) 0.3×10^{-3} c) 0.3×10^{3} d) 0.3×10^{4}

13. For a given material, the Young's modulus is 2.4 times that of modulus of rigidity. Its Poisson's ratio is
a) 0.1 b) 0.2 c) 0.3 d) 0.4

14. A wire of cross-sectional area A is stretched horizontally between two clamps loaded at a distance $2l$ metres from each other. A weight w kg suspended from the mid point of the wire. The strain produced in the wire, (if the vertical distance through which the mid point of the wire moves down $x < l$) will be
a) x^2/l^2 b) $2x^2/l^2$ c) $x^2/2l$ d) $x/2l$

15. A wire is stretched under a force. If the wire suddenly snaps the temperature of the wire
    a) Remains the same
    b) Decrease
    c) Increase
    d) First decrease then increase

16. To keep constant time, watches are fitted with balance wheel made of
    a) Invar
    b) Stainless steel
    c) Tungsten
    d) Platinum

17. The compressibility of water is $6 \times 10^{-10} N^{-1} m^2$. If one litre is subjected to a pressure of 4×10^7 $N\ m^{-2}$, the decrease in its volume is
    a) 2.4 cc
    b) 10 cc
    c) 24 cc
    d) 15 cc

18. A cube of side 40 mm has its upper face displaced by 0.1 mm by a tangential force of 8 kN. The shearing modulus of cube is
    a) $2 \times 10^9 \text{Nm}^{-2}$
    b) $4 \times 10^9 \text{Nm}^{-2}$
    c) $8 \times 10^9 \text{Nm}^{-2}$
    d) $16 \times 10^9 \text{Nm}^{-2}$

19. A wire of length L and area of cross-section A is stretched through a certain length l. If Y is Young's modulus of the material of the wire, then the force constant of the wire is
    a) $\frac{YL}{A}$
    b) $\frac{Yl}{A}$
    c) $\frac{YA}{l}$
    d) $\frac{YA}{L}$

20. If the interatomic spacing in a steel wire is 3.0Å and $Y_{steel} = 20 \times 10^{10} N/m^2$ then force constant is
    a) $6 \times 10^{-2} N/\text{Å}$
    b) $6 \times 10^{-9} N/\text{Å}$
    c) $4 \times 10^{-5} N/\text{Å}$
    d) $6 \times 10^{-5} N/\text{Å}$