DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :1**

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. The value of Poisson's ratio lies between
   a) -1 to $\frac{1}{2}$ b) $-\frac{3}{4}$ to $-\frac{1}{2}$ c) $-\frac{1}{2}$ to 1 d) 1 to 2

2. A $5\ metre$ long wire is fixed to the ceiling. A weight of $10\ kg$ is hung at the lower end and is $1\ metre$ above the floor. The wire was elongated by $1\ mm$. The energy stored in the wire due to stretching is
   a) Zero b) $0.05\ joule$ c) $100\ joule$ d) $500\ joule$

3. If a spring is extended to length l, then according to Hooke's law
   a) $F = kl$ b) $F = \frac{k}{l}$ c) $F = k^2 l$ d) $F = \frac{k^2}{l}$

4. If in a wire of Young's modulus *Y*, longitudinal strain *X* is produced then the potential energy stored in its unit volume will be
   a) $0.5\ YX^2$ b) $0.5\ Y^2X$ c) $2\ YX^2$ d) YX^2

5. A steel wire of length 20 cm and uniform cross-section $1\ \mathrm{mm}^2$ is tied rigidly at both the ends. The temperature of the wire is altered from $40°\mathrm{C}$ to $20°\mathrm{C}$. Coefficient of linear expansion of steel is $\alpha = 1.1 \times 10^{-5}°\mathrm{C}^{-1}$ and *Y* for steel is $2.0 \times 10^{11}\ \mathrm{Nm}^{-2}$; the tension in the wire is
   a) 2.2×10^6 N b) 16 N c) 8 N d) 44 N

6. A wire of length *L* and radius r fixed at one end and a force *F* applied to the other end produces an extension l. The extension produced in another wire of the same material of length 2*L* and radius $2r$ by a force 2*F*, is
   a) l b) $2\ l$ c) $4\ l$ d) $\frac{l}{2}$

7. A and B are two wires. The radius of A is twice that of B. They are stretched by the same load. Then the stress on B is
   a) Equal to that on A b) Four times that on A c) Two times that on A d) Half that on A

8. When the length of a wire having cross-section area $10^{-6}m^2$ is stretched by 0.1%, then tension in it is $100\ N$. Young's modulus of material of the wire is
   a) $10^{12}N/m^2$ b) $10^2N/m^2$ c) $10^{10}N/m^2$ d) $10^{11}N/m^2$

9. A wire of length L is hanging from a fixed support. The length changes to L_1 and L_2 when masses M_1 and M_2 are suspended respectively from its free end. Then L is equal to
   a) $\frac{L_1 + L_2}{2}$ b) $\sqrt{L_1 L_2}$ c) $\frac{L_1 M_2 + L_2 M_1}{M_1 + M_2}$ d) $\frac{L_1 M_2 - L_2 M_1}{M_2 + M_1}$

10. The ratio of two specific heats of gas C_p/C_v for argon is 1.6 and for hydrogen is 1.4. Adiabatic elasticity of argon at pressure P is E. Adiabatic elasticity of hydrogen will also be equal to E at the pressure
a) P b) $\frac{8}{7}P$ c) $\frac{7}{8}P$ d) $1.4P$

11. Two wires of same material and radius have their lengths in ratio 1:2. If these wires are stretched by the same force, the strain produced in the two wires will be in the ratio
a) 2:1 b) 1:1 c) 1:2 d) 1:4

12. A wire extends by 1 mm when a force is applied. Double the force is applied to another wire of same material and length but half the radius of cross-section. The elongation of the wire in mm will be
a) 8 b) 4 c) 2 d) 1

13. Minimum and maximum values of Poisson's ratio for a metal lies between
a) $-\infty$ to $+\infty$ b) 0 to 1 c) $-\infty$ to 1 d) 0 to 0.5

14. A cube is compressed at $0°C$ equally from all sides by an external pressure p. By what amount should be temperature be raise to bring to back to the size it had before the external pressure was applied ? (Given *K* is bulk modulus of elasticity of the material of the cube and α is the coefficient of linear expansion.)
a) $\frac{p}{K\alpha}$ b) $\frac{p}{3K\alpha}$ c) $\frac{3\pi\alpha}{p}$ d) $\frac{K}{3p}$

15. When a pressure of 100 atmosphere is applied on a spherical ball, then its volume reduces to 0.01%. The bulk modulus of the material of the rubber in $dyne/cm^2$ is
a) 10×10^{12} b) 100×10^{12} c) 1×10^{12} d) 20×10^{12}

16. The force constant of a wire is *k* and that of another wire of the same material is 2*k*. When both the wires are stretched, then work done is
a) $W_2 = 2W_1^2$ b) $W_2 = 2W_1$ c) $W_2 = W_1$ d) $W_2 = 0.5\ W_1$

17. For a constant hydraulic stress on an object, the fractional change in the object's volume $\left(\frac{\Delta V}{V}\right)$ and its bulk modulus (B) are related as
a) $\frac{\Delta V}{V} \propto B$ b) $\frac{\Delta V}{V} \propto \frac{1}{B}$ c) $\frac{\Delta V}{V} \propto B^2$ d) $\frac{\Delta V}{V} \propto B^{-2}$

18. Two rods *A* and *B* of the same material and length have their radii r_1 *and* r_2 respectively. When they are rigidly fixed at one end and twisted by the same couple applied at the other end, the ratio of the angle of twist at the end of *A* and the angle of twist at the end of *B* is
a) $\frac{r_2^4}{r_1^4}$ b) $\frac{r_1^4}{r_2^4}$ c) $\frac{r_2^2}{r_1^2}$ d) $\frac{r_1^2}{r_2^2}$

19. Young's modulus of the wire depends on
a) Length of the wire
b) Diameter of the wire
c) Material of the wire
d) Mass hanging from the wire

20. For most materials the Young's modulus is n times the rigidity modulus, where n is
a) 2 b) 3 c) 4 d) 5