

CLASS : XITH
DATE :

SUBJECT : PHYSICS
DPP NO. :4

Topic :- MECHANICAL PROPERTIES OF SOLIDS

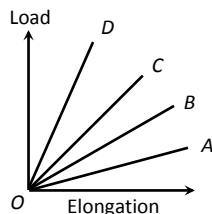
1. A body of mass m is suspended to an ideal spring of force constant k . The expected change in the position of the body due to an additional force F acting vertically downwards is

a) $\frac{3F}{2k}$ b) $\frac{2F}{k}$ c) $\frac{5F}{2k}$ d) $\frac{4F}{k}$

2. Stress to strain ratio is equivalent to

a) Modulus of elasticity b) Poisson's Ratio c) Reynold number d) Fund number

3. The load versus elongation graph for four wires of the same material is shown in the figure. The thickest wire is represented by the line



a) OD b) OC c) OB d) OA

4. A rubber cord 10 m long is suspended vertically. How much does it stretch under its own weight (Density of rubber is 1500 kg/m^3 , $Y = 5 \times 10^8 \text{ N/m}^2$, $g = 10 \text{ m/s}^2$)

a) $15 \times 10^{-4} \text{ m}$ b) $7.5 \times 10^{-4} \text{ m}$ c) $12 \times 10^{-4} \text{ m}$ d) $25 \times 10^{-4} \text{ m}$

5. Equal torsional torques act on two rods x and y having equal length. The diameter of rod y is twice the diameter of rod x . If θ_x and θ_y are the angles of twist, then $\frac{\theta_x}{\theta_y} =$

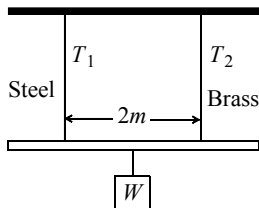
a) 1 b) 2 c) 4 d) 16

6. When a spring is stretched by a distance x , it exerts a force, given by $F = (-5x - 16x^3) \text{ N}$. The work done, when the spring is stretched from 0.1 m to 0.2 m is

a) $8.7 \times 10^{-2} \text{ J}$ b) $12.2 \times 10^{-2} \text{ J}$ c) $8.7 \times 10^{-1} \text{ J}$ d) $12.2 \times 10^{-1} \text{ J}$

7. The elastic energy stored in a wire of Young's modulus Y is
- a) $\frac{1}{2} Y \times \text{stress} \times \text{strain} \times \text{volume}$ b) $\frac{(\text{stress})^2 \times \text{volume}}{2Y}$
- c) $\text{stress} \times \text{strain} \times \text{volume}$ d) $Y \times \frac{(\text{stress})^2}{\text{volume}}$
8. According to Hooke's law of elasticity, if stress is increased, then the ratio of stress to strain
- a) Becomes zero b) Remains constant c) Decreases d) Increases
9. When a force is applied on a wire of uniform cross-sectional area $3 \times 10^{-6} \text{m}^2$ and length 4 m, the increase in length is 1mm. Energy stored in it will be ($Y = 2 \times 10^{11} \text{N/m}^2$).
- a) 6250J b) 0.177J c) 0.075J d) 0.150J
10. The Young's modulus of the material of a wire is $6 \times 10^{12} \text{Nm}^{-2}$ and there is no transverse strain it, then its modulus of rigidity will be
- a) $3 \times 10^{12} \text{Nm}^{-2}$ b) $2 \times 10^{12} \text{Nm}^{-2}$ c) 10^{12}Nm^{-2} d) None of these
11. A weight of 200 kg is suspended by vertical wire of length 600.5cm. The area of cross-section of wire is 1mm^2 . When the load is removed, the wire contracts by 0.5 cm. The Young's modulus of the material of wire will be
- a) $2.35 \times 10^{12} \text{N/m}^2$ b) $1.35 \times 10^{10} \text{N/m}^2$ c) $13.5 \times 10^{11} \text{N/m}^2$ d) $23.5 \times 10^9 \text{N/m}^2$
12. Two wires of the same material and length but diameters in the ratio 1 : 2 are stretched by the same force. The potential energy per unit volume for the two wires when stretched will be in the ratio
- a) 16 : 1 b) 4 : 1 c) 2 : 1 d) 1 : 1
13. A thick rope of rubber of density $1.5 \times 10^3 \text{kgm}^{-3}$ and Young's modulus $5 \times 10^6 \text{Nm}^{-2}$, 8m in length is hung from the ceiling of a room, the increase in ϕ its length due to its own weight is
- a) $9.6 \times 10^{-2} \text{m}$ b) $19.2 \times 10^{-2} \text{m}$ c) $9.6 \times 10^{-3} \text{m}$ d) 9.6 m
14. A load suspended by a massless spring produces an extension of x cm in equilibrium. When it is cut into two unequal parts, the same load produces an extension of 7.5 cm when suspended by the larger part of length 60 cm. When it is suspended by the smaller part, the extension is 5.0 cm. Then
- a) $x = 12.5$ b) $x = 3.0$
- c) The length of the original spring is 90 cm d) The length of the original spring is 80 cm

15. If the force constant of a wire is K , the work done in increasing the length of the wire by l is
 a) $K/2$ b) Kl c) $Kl^2/2$ d) Kl^2
16. Mark the wrong statement
 a) Sliding of molecular layer is much easier than compression or expansion
 b) Reciprocal of bulk modulus of elasticity is called compressibility
 c) It is difficult to twist a long rod as compared to small rod
 d) Hollow shaft is much stronger than a solid rod of same length and same mass
17. A pan with set of weights is attached with a light spring. When disturbed, the mass-spring system oscillates with a time period of 0.6 s. When some additional weights are added then time period is 0.7 s. The extension caused by the additional weights is approximately given by
 a) 1.38 cm b) 3.5 cm c) 1.75 cm d) 2.45 cm
18. To break a wire, a force of $10^6 N/m^2$ is required. If the density of the material is $3 \times 10^3 kg/m^3$, then the length of the wire which will break by its own weight will be
 a) 34 m b) 30 m c) 300 m d) 3 m
19. A light rod of length $2m$ suspended from the ceiling horizontally by means of two vertical wires of equal length. A weight W is hung from a light rod as shown in figure. The rod hung by means of a steel wire of cross-sectional area $A_1 = 0.1 cm^2$ and brass wire of cross-sectional area $A_2 = 0.2 cm^2$. To have equal stress in both wires, $T_1/T_2 =$



- a) $1/3$ b) $1/4$ c) $4/3$ d) $1/2$
20. A stretched rubber has
 a) Increased kinetic energy b) Increased potential energy
 c) Decreased kinetic energy d) Decreased potential energy