DPP
DAILY PRACTICE PROBLEMS

CLASS : XITH **SUBJECT : PHYSICS**
DATE : **DPP NO. :5**

Topic :- MECHANICAL PROPERTIES OF SOLIDS

1. A brass rod of cross-sectional area $1cm^2$ and length $0.2m$ is compressed lengthwise by a weight of 5 kg. If Young's modulus of elasticity of brass is $1 \times 10^{11} N/m^2$ and $g = 10 m/sec^2$, then increase in the energy of the rod will be
   a) $10^{-5}\ J$ b) $2.5 \times 10^{-5}\ J$ c) $5 \times 10^{-5}\ J$ d) $2.5 \times 10^{-4}\ J$

2. Which one of the following statements is wrong
   a) Young's modulus for a perfectly rigid body is zero
   b) Bulk modulus is relevant for solids, liquids and gases
   c) Rubber is less elastic than steel
   d) The Young's modulus and shear modulus are relevant for solids

3. There are two wires of the same length. The diameter of second wire is twice that of the first. On applying the same load to both the wires, the extension produced in them will be in ratio of
   a) 1:4 b) 1:2 c) 2:1 d) 4:1

4. Which of the following substances has the highest elasticity?
   a) Sponge b) Steel c) Rubber d) Copper

5. A rope 1cm in diameter breaks, if the tension in it exceeds 500 N. The maximum tension that may be given to similar rope of diameter 3 cm is
   a) 500 N b) 3000 N c) 4500 N d) 2000 N

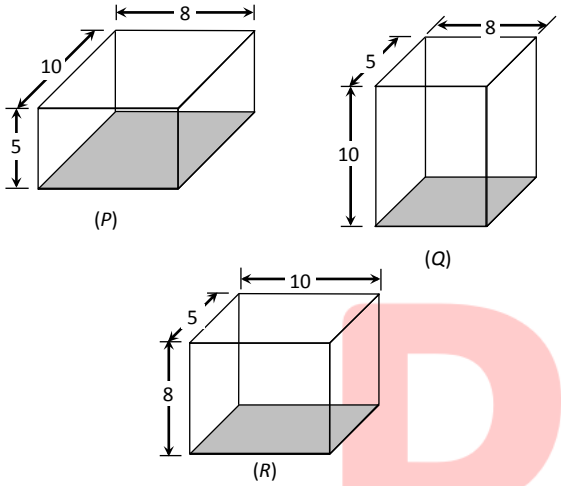
6. The increase in length on stretching a wire is 0.05%. If its Poisson's ratio is 0.4, the diameter is reduced by
   a) 0.01% b) 0.02% c) 0.03% d) 0.04%

7. A cube is subjected to a uniform volume compression. If the side of the cube decreases by 1% the bulk strain is
   a) 0.01 b) 0.02 c) 0.03 d) 0.06

8. Two wires of length l, radius r and length $2l$, radius $2r$ respectively having some Young's modulus are hung with a weight mg. Net elongation is

a) $\frac{3\,mgl}{\pi r^2 Y}$ b) $\frac{2\,mgl}{3\pi r^2 Y}$ c) $\frac{3\,mgl}{2\pi r^2 Y}$ d) $\frac{3\,mgl}{4\pi r^2 Y}$

9. A rectangular block of size $10cm \times 8cm \times 5cm$ is kept in three different positions P,Q and R in turn as shown in the figure. In each case, the shaded area is rigidly fixed and a definite force F is applied tangentially to the opposite face to deform the block. The displacement of the upper face will be



a) Same in all the three cases b) Maximum in P position
c) Maximum in Q position d) Maximum in R position

10. A spring of constant k is cut into parts of length in the ratio 1 : 2. The spring constant of larger on is

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

11. When a certain weight is suspended from a long uniform wire, its length increases by 1 cm. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one, the increase in length will be

a) 0.5 cm b) 2 cm c) 4 cm d) 8 cm

12. The rubber cord catapult has a cross-sectional area 1 $mm^2$and total unsaturated length 10.0 cm. It is stretched to 12.0 cm and then released to project a miscible of mass 5.0 g. Taking Young's modulus for rubber as, the tension in the cord is

a) 1000 N b) 100 N c) 10 N d) 1 N

13. The reason for the change in shape of a regular body is

a) Volume stress b) Shearing strain c) Longitudinal strain d) Metallic strain

14. The general form of potential energy curve for atoms or molecules can be represented by the following equation $U(R) = \frac{A}{R^n} - \frac{B}{R^m}$. Here, R is the interatomic or molecular distance, A and B are coefficients, n and m are the exponents. In the above equation
    a) First term represents the attractive part of the potential
    b) Second term represents the attractive part of the potential
    c) Both terms represents the attractive part of the potential
    d) Second term represents the repulsive part of the potential

15. A wire ($Y = 2 \times 10^{11}$ Nm^{-2}) has length 1 m and area of cross-section 1 mm^2. The work required to increase its length by 2 mm is
    a) 400 J b) 40 J c) 4 J d) 0.4 J

16. A substance breaks down by a stress of 10^6 Nm^{-2}. If the density of the material of the wire is 3×10^3 kgm^{-3}, then the length of the wire of the substance which will break under its own weight when suspended vertically is
    a) 66.6 m b) 60.0 m c) 33.3 m d) 30.0 m

17. Identify the incorrect statement.
    a) Young's modulus and shear modulus are relevant only for solids
    b) Bulk modulus is relevant for solids, liquids and gases
    c) Alloys have larger values of Young's modulus than metals
    d) Metals have larger values of Young's modulus than elastomers

18. The specific heat at constant pressure and at constant volume for an ideal gas are C_p and C_v and its adiabatic and isothermal elasticities are E_ϕ and E_θ respectively. The ratio of E_ϕ to E_θ is
    a) C_v/C_p b) C_p/C_v c) C_pC_v d) $1/C_pC_v$

19. When a wire of length 10m is subjected to a force of 100 N along its length, the lateral strain produced is 0.01×10^{-3}m. The Poisson's ratio was found to be 0.4. If the area of cross-section of wire is 0.025 m^2, its Young's modulus is
    a) 1.6×10^8 Nm^{-2} b) 2.5×10^{10} Nm^{-2} c) 1.25×10^{11}Nm^{-2} d) 16×10^9Nm^{-2}

20. The Poisson's ratio of a material is 0.4. If a force is applied to a wire of this material, there is decrease of cross-sectional area by 2%. The percentage increase in its length is
    a) 3% b) 2.5% c) 1% d) 0.5%