PHYSICS

AAKASH INSTITUTE ENGLISH

MECHANICAL PROPERTIES OF SOLIDS

Example

1. A rod has a radius of 100 mm and a length of 10 cm. A 100 N force compresses along its length . Calculate the longitudinal stress developed in the rod.

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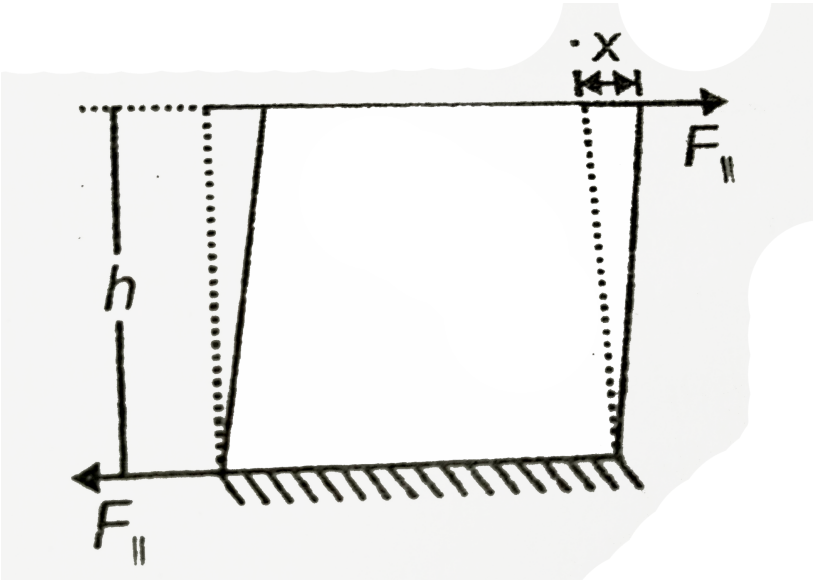
2. Suppose the object in figure shown is the brass plate of an outdoor sculpture. It experiences shear forces as a result of an erthquake. The

frame is 0.80 m and 0.50 cm thick. Calculate the shear strain produced in this object if the displacement x is 0.16 mm. (Shear modulus $= 3.5 \times 10^{10} Pa$)



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3. A spherical ball contracts in volume by $0.05\,\%$, when subjected to a normal uniform pressure. Calculate the volume strain produced in spherical ball.

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4. A steel rod 2.0 m long has a cross-sectional area of $0.30 cm^2$. The rod is now hung by one end from a support structure, and a 550 kg milling machine is hung from the strain, and the elongation of the rod.

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5. A structural steel rod has a radius of 10 mm and a length of 1.0 m. A 100 kN force stretches it along its length. Calculate (a) stress, (b) elongation, and (c) strain on the rod. Young's modulus, of structural steel is 2.0×10^{11} N m^{-2}.

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6. In a human pyramid in a circus, the entire weight of the balanced group is supported by the legs of a performer who is lying on his back (as shown in Fig. 9.5). The combined mass of all the persons performing the act, and the tables, plaques etc. involved is 280 kg and of each

person is 60 kg. Each thighbone (femur) of this performer has a length of 50 cm and an effective radius of 2.0 cm. Determine the amount by which each thighbone gets compressed under the extra load.

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7. A 4 cm cube has its upper face displaced by 0.1 mm by a tangential force of 8 kN. Calculate the shear modulus of the cube.

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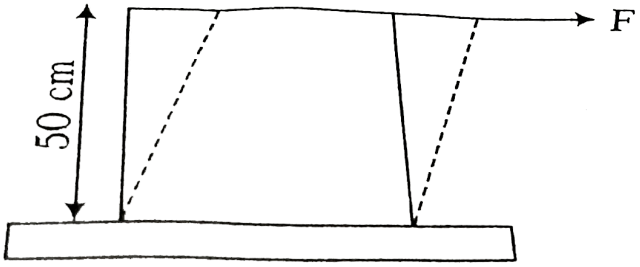
8. A square lead slab of side 50 cm and thickness 10.0 cm is subjected to a shearing force (on its narrow face) of magnitude 9.0×10^4 N. The lower edge is riveted to the floor as shown in figure. How much is the upper edge displaced, if the shear modulus of lead is $5.6 \times 10^8 Pa$?



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9. A hydraulic press contains $0.25m^3(250L)$ of oil. Find the decrease in volume of the oil when it is subjected to a pressure increase $\triangle\ p = 1.6 \times 10^7 Pa$. The bulk modulus of the oil is $B = 5.0 \times 10^9 Pa$.

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10. The average depth of Indian Ocean is about 3000 m. Calculate the fractional compression, $\Delta V / V$, of water at the bottom of the ocean, given that the bulk modulus of water is $2.2 \times 10^{9} \mathrm{Nm}^{-2}$. (Take $g = 10 \ \mathrm{m\,s}^{-2}$)

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11. A wire of length l and cross-sectional are A is suspended at one of its ends from a ceiling. What will be its strain energy due to its own weight, if the density and Young's modulus of the material of the wire be d and Y?

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12. A steel wire 4 m in length is stretched through 2mm. The cross-sectional area of the wire is $2.0 mm^{2}$. If Young's modulus of the steel is $2 \times 10^{11} Nm^{-2}$. Find

(i) the energy density of wire,

(ii) the elastic potential energy stored in the wire.

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13. A 45 kg boy whose leg bones are 5 cm^2 in area and 50 cm long falls through a height of 2 m without breaking his leg bones can stand a stress of $0.9 \times 10^8 Nm^{-2}$, then what will be the Young's modulus for the material of the bone ?

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14. A metallic wire is stretched by suspending a weight of it. If α is the longitudinal strain and Y is its Young's modulus of elasticity, then slow that the elastic potential energy per unit volume is given by $\frac{1}{2}Y\alpha^2$.

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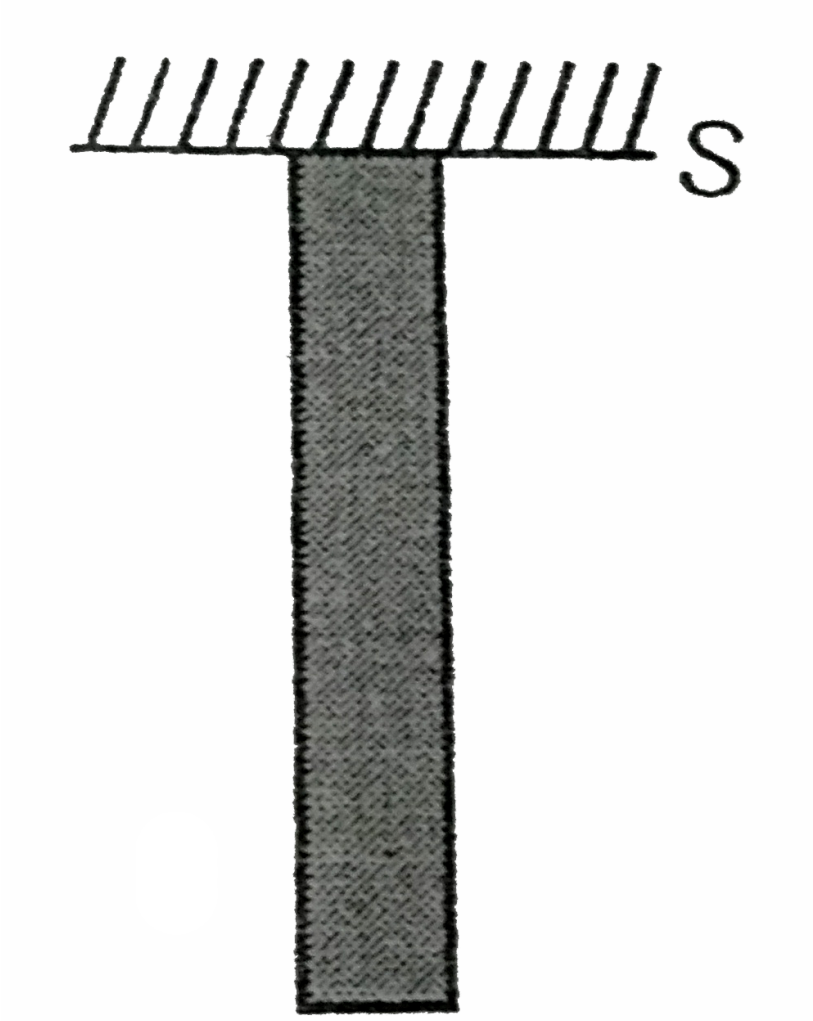
15. A bar of mass M and length L is hanging from point S as shown in figure. The Young's modulus of elasticity of the wire is Y and the area of cross-section of the wire is A.



(i) Find the stress at x distance from bottom end.

(ii) Consider a samll section dx of the bar at a distance x from lowest point of bar. Find elongation (dL) in section dx.

(iii) Find total elongation in bar.

(iv) Find energy density at x distance from bottom and.

(v) Find total elastic potential energy stored in bar.

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16. A light rod of length of length $2m$ is suspended from a ceiling horizontally by means of two vertical wires of equal length tied to its ends. One of the wires is made of steel and is of cross - section $10^{-3}m^2$ and the other is of brass of cross- section $2 \times 10^{-3}m^2$. x is the distance from the steel wire end, at which a weight may be hung. $Y_{steel} = 2 \times 10^{11}Pa$ and $Y_{brass} = 10^{11}Pa$

Which of the following statement(s) is /are correct ?

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17. A thin ring of radius R is made of a material of density ρ and Young's modulus Y. If the ring is rotated about its centre in its own plane with angular velocity ω, find the small increase in its radius.

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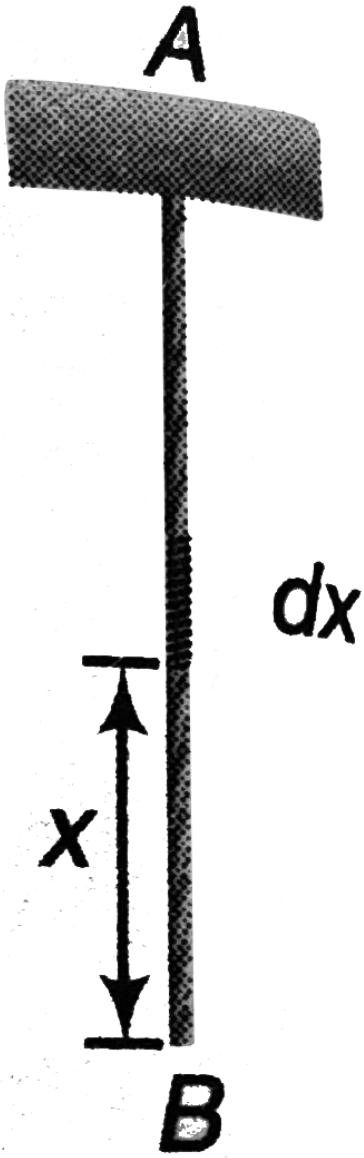
18. A steel rod of length $6.0m$ and diameter $20mm$ is fixed between two rigid supports . Determine the stress in the rod, when the temperature increases by 80° C if

(a)the ends do not yield (b) the ends yield by 1mm

Take $Y = 2.0 \times 10^6 kg/cm^2$ and $\alpha = 12 \times 10^{-6} per^\circ C$.



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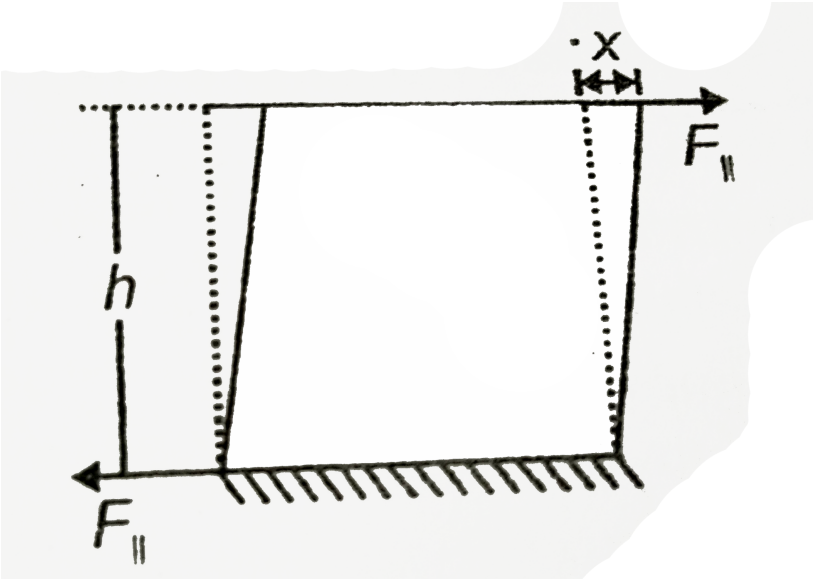

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24. The length of a metal wire is l_1 when the tension in it is F_1 and l_2 when the tension becomes F_2. Find the natural length of wire.

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25. The stress-strain graph for a metallic wire is shown at two different temperature, T_1 and T_2 which temperature is high T_1 or T_2 ?

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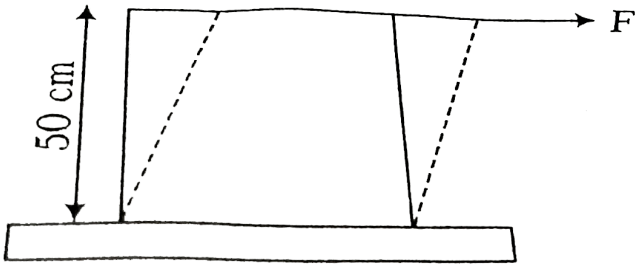

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31. A steel wire 4 m in length is stretched through 2mm. The cross-sectional area of the wire is $2.0mm^2$. If Young's modulus of the steel is $2 \times 10^{11} Nm^{-2}$. Find

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Try Yourself

1. When a body is under certain stress, is it equilibrium ?

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2. What is the dimensional formula of tensile stress?

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3. In problem 65, calculate ΔS_{gas} if process is carried out at constant volume :

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4. The resultant of two forces has magnitude 20N. One of the forces is of magnitude $20\sqrt{3}N$ and makes an angle of 30° with the resultant. Then what is the magnitude of the other force?

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5. Write the SI unit of volumetric strain.

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6. Find the dimensional formula of volumetric stress.

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7. A load of 4 kg is suspended from a ceiling through a steel wire of length 2 m and radius 2 mm. It is found that the length of the wire increase by 0.032 mm as equilibrium is achieved. What would be the Young's modulus of steel ? (Take , $g = 3.1\pi ms^{-2}$)

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8. One end of a wire 2m long and 0.2 cm^2 in cross section is fixed in a ceiling and a load of 4.8 kg is attached to the free end. Find the extension of the wire. Young modulus of steel $= 2.0 \times 10^{11} Nm^{-2}$. Take $g = 10ms^{-2}$.

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9. Modulus of rigidity of a liquid

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10. Define Poisson's ratio.

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11. The length of a metal is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2 . The natural length of the wire is

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12. Compute the fractional change in volume of a glass slab, when subjected to a hydraulic pressure of 10 atm.

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13. A structural steel rod has a radius of 10 mm and a length of 1.0 m. A 100 kN force stretches it along its length. Calculate (a) stress, (b) elongation, and (c) strain on the rod. Young's modulus, of structural steel is 2.0 $\times$ 10^{11} N m^{-2}.

A. $1.59 \times 10^9 Pa$

B. $.18 \times 10^9 Pa$

C. $3.18 \times 10^8 Pa$

D. $1.59 \times 10^8 Pa$

Answer: C

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14. A structural steel rod has a radius r =10mm and a length l.=1m When a force F=100kN is applied, it stretches it along its length. Young's modulus of elasticity of the structural steel is $2.0 \times 10^{11} Nm^{-2}$. What is the elastic energy density of the steel rod ?

A. a. 1.59 mm

B. b. 2.32 mm

C. c. 0.159 mm

D. d. 3.18 mm

Answer: A

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15. A structural steel rod has a radius r(=10 mm) and a length l(=1 m). When a force F(= 100 kN) is applied, it stretches it along its length.

Young's modulus of elasticity of the structural steel is $2.0 \times 10^4 Nm^{-2}$. What is the elastic energy density of the steel rod ?

A. $6.12 \times 10^4 J/m^3$

B. $1.25 \times 10^4 J/m^3$

C. $2.5 \times 10^4 J/m^3$

D. $2.5 \times 10^5 J/m^3$

Answer: D

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16. A structural steel rod has a radius r =10mm and a length l.=1m When a force F=100kN is applied, it stretches it along its length. Young's modulus of elasticity of the structural steel is $2.0 \times 10^{11} Nm^{-2}$. What is the elastic energy density of the steel rod ?

A. 19.2 J

B. 3.92 J

C. 7.92 J

D. 79.2 J

Answer: D

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28. Compute the fractional change in volume of glass slab when subjected to a hydraulic pressure of 10 atm. (1 atm $= 1.013 \times 10^5$ Pa, Bulk modulus of glass $= 37 \times 10^9$ pa)

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29. A structural steel rod has a radius r(=10 mm) and a length l(=1 m). When a force F(= 100 kN) is applied, it stretches it along its length. Young's modulus of elasticity of the structural steel is $2.0 \times 10^{11} Nm^{-2}$.

What is the stress produced ?

A. $1.59 \times 10^{9} Pa$

B. $3.18 \times 10^{9} Pa$

C. $3.18 \times 10^{8} Pa$

D. $1.59 \times 10^{8} Pa$

Answer:

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.

What is the elongation produced ?

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31. A structural steel rod has a radius r(=10 mm) and a length l(=1 m). When a force F(= 100 kN) is applied, it stretches it along its length. Young's modulus of elasticity of the structural steel is $2.0 \times 10^{4} Nm^{-2}$. What is the elastic energy density of the steel rod ?

A. $6.12 \times 10^{4} J/m^{3}$

B. $1.25 \times 10^{4} J/m^{3}$

C. $2.5 \times 10^{4} J/m^{3}$

D. $2.5 \times 10^{4} J/m^{3}$

Answer:

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A. 19.2 J

B. 3.92 J

C. 7.92 J

D. 79.2 J

Answer:

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Assignment Section A

1. SI units of stress is

A. Nm^2

B. Nm

C. Nm^{-2}

D. Nm^{-1}

Answer: C

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2. Dimensional formula for strain is

A. $\left[M^0LT^{-2}\right]$

B. [MLT]

C. $\left[M^2LT^{-2}\right]$

D. $\left[M^0L^0T^0\right]$

Answer: D

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3. The ratio of radii of two wires of same material is $2:1$. If these wires are stretched by equal forces, then the ratio of stresses produced in them will be

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer: C

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4. A load of 20 kg produces an extension of 1 mm in a wire 3 m in length and 1 mm in diameter.l Calculate Young's modulus of elesticity of wire.

A. $3.25 \times 10^{10} Nm^{-2}$

B. $7.48 \times 10^{10} Nm^{2}$

C. $7.48 \times 10^{10} Nm^{-2}$

D. $7.48 \times 10^{-10} Nm^{-2}$

Answer: C

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5. Relationship between efficiency of heat engines and coefficient of performance.

A. Stress applied on material

B. Strain produced in material

C. Temperature of material

D. All of these

Answer: C

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6. What is the Young's modulus for a perfect rigid body?

A. 1

B. Less than 1

C. Zero

D. Infinite

Answer: D

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7. The breaking stress of aluminium is $7.5 \times 10^7 Nm^{-2}$ Find the greatest length of aluminum wire that can hang vertically without breaking Density of aluminium is $2.7 \times 10^3 kgm^{-3}$

A. a.$283 \times 10^3 m$

B. b.$28.3 \times 10^3 m$

C. c.$2.83 \times 10^3 m$

D. d.$0.283 \times 10^3 m$

Answer: C

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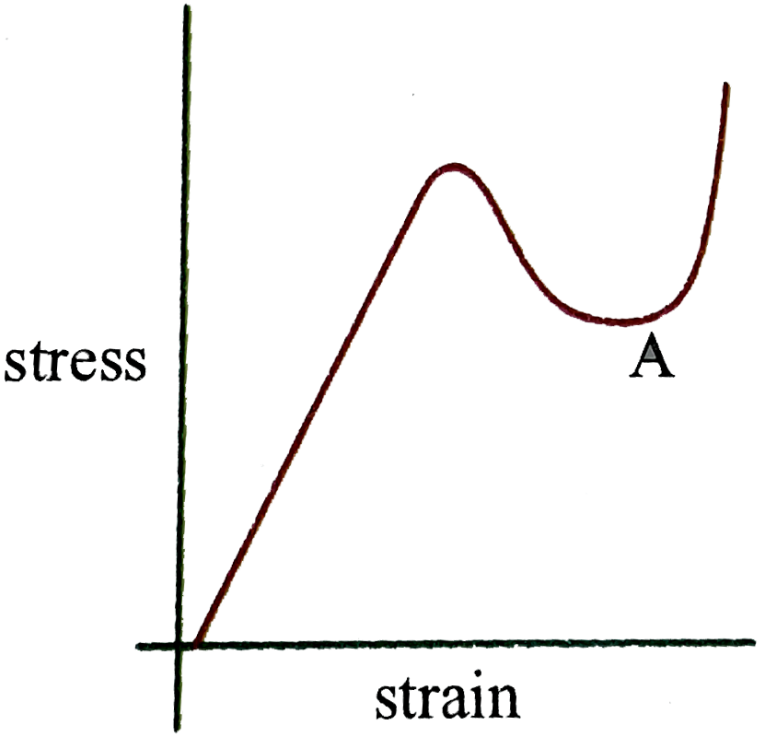
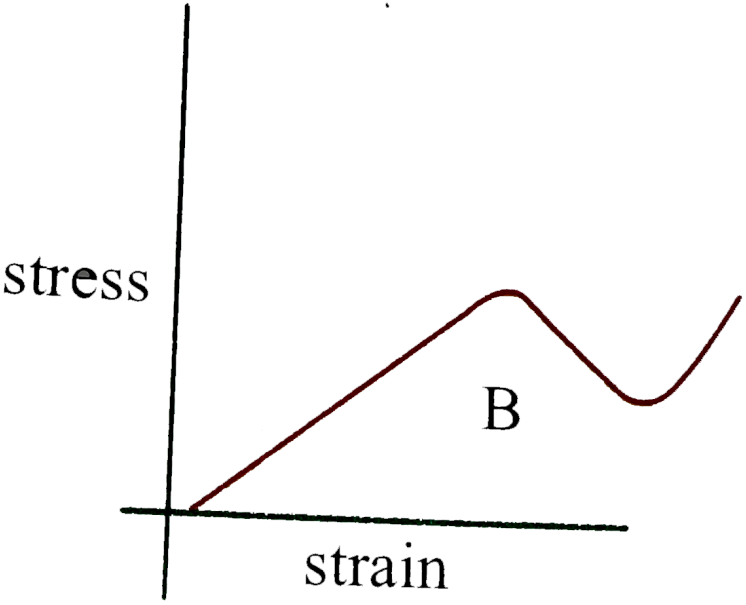
8. The stress- strain graphs for materials A and B are as shown. Choose the correct alternative


stress
A
strain


stress
B
strain

A. a.Material A is stronger than material B

B. b.Material B is stronger than material A

C. c.The Young's modulus of A is greater than or equal to that of B

D. d.The Young's modulus of B is greater than that of A

Answer: B

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9. A steel wire of diameter 2 mm has a breaking strength of 4×10^5N. What is the breaking strength of similar steel wire of diameter $1.5mm$?

A. a.$2.3 \times 10^5 N$

B. b.$2.6 \times 10^5 N$

C. $c.3 \times 10^5 N$

D. d.$1.5 \times 10^5 N$

Answer: A

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10. Find the greatest length of copper wire, that can hang without breaking. Breaking stress $= 7.2 \times 10^7 N/m^2$. Density of copper $7.2g/cc$. $g = 10m/s^2$.

A. a.100 m

B. b.1000 m

C. c.150 m

D. d.1500 m

Answer: B

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11. A wire 2 m in length suspended vertically stretches by. 10 mm when mass of 10 kg is attached to the lower end. The elastic potential energy

gain by the wire is (take g = $10m/s^2$)

A. 0.5 J

B. 5 J

C. 50 J

D. 500 J

Answer: A

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12. A wire of length L and cross-sectional area A is made of a material of Young's modulus Y. IF the wire is stretched by an amount x, the workdone is

A. $\frac{YAx^2}{L}$

B. $\frac{YAx^2}{2L}$

C. $\frac{2YAx^2}{L}$

D. $\frac{4YAx^2}{L}$

Answer: B

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13. A spherical ball contracts in volume by 0.01% when subjected to a normal uniform pressure of 100 atmospheres. Calculate the bulk modulus of the meterial.

A. $1.01 \times 10^{11} Nm^{-2}$

B. $1.01 \times 10^{12} Nm^{-2}$

C. $1.01 \times 10^{10} Nm^{-2}$

D. $1.01 \times 10^{13} Nm^{-2}$

Answer: A

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14. What is the percentage increase in length of a wire of diameter 2.5 mm, stretched by a force of 100 kg wt ? Young's modulus of elasticity of wire $= 12.5 \times 10^{11} dyne/cm^2$.

A. $0.16\,\%$

B. $0.32\,\%$

C. $0.08\,\%$

D. $0.12\,\%$

Answer: A

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15. Two exactly similar wires of steel and copper are stretched by equal force. If the total elongation is 2 cm, then how much is the elongation in steel and copper wire respectively? Given, $Y_{\text{steel}} = 20 \times 10^{11} \text{dyne/cm}^2$, $Y_{\text{copper}} = 12 \times 10^{11} \text{Dyne/cm}^2$

A. $1.25cm, 0.75cm$

B. $0.75cm, 1.25cm$

C. $1.15cm, 0.85cm$

D. $0.5cm, 1.15cm$

Answer: B

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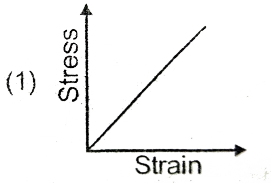
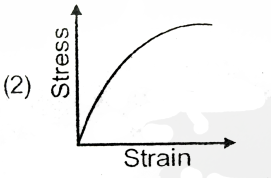
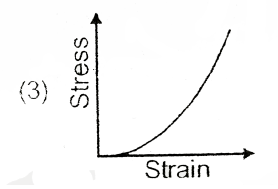
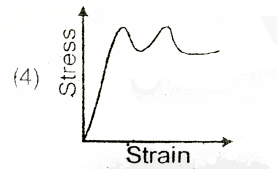
16. Which of the following graphs represents stress-strain variation for elastomers?

A. 

B. 

C. 

D. 

Answer: C

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17. A steel rod has a radius 10 mm and a length of 1.0 m. A force stretches it along its length and produces a strain of $0.32\,\%$. Young's modulus of the steel is $2.0 \times 10^{11} Nm^{-2}$. What is the magnitude of the force stretching the rod?

A. 100.5 kN

B. 201 kN

C. 78 kN

D. 150 kN

Answer: B

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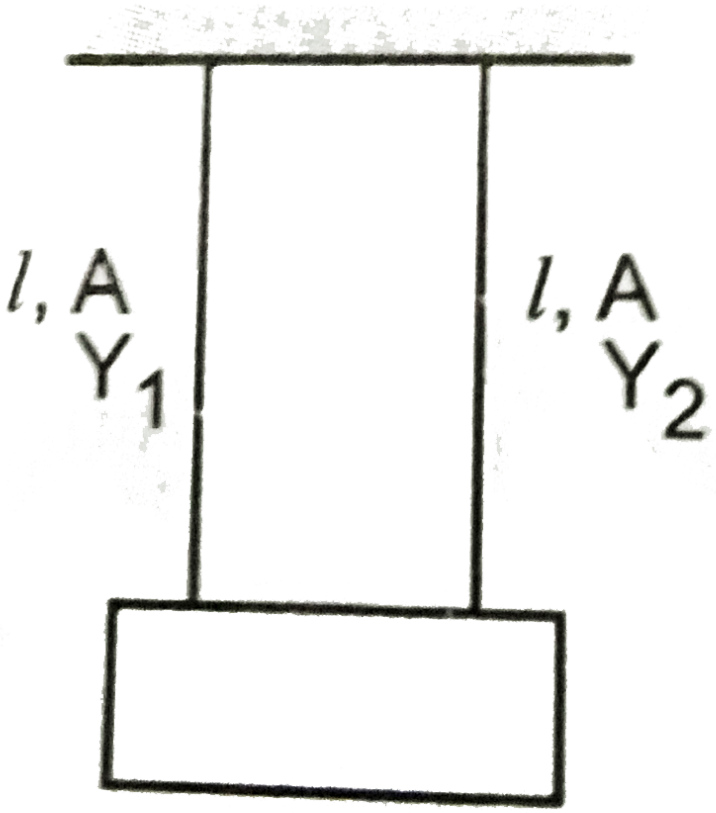
18. Two wires of equal length and cross sectional area suspended as shown in



Their Young's modulii are $Y_1 = 2 \times 10^{11}$ Pa and $Y_2 = 0.90 \times 10^{11}$ Pa respectively. What will be the equivalent Young's modulus of combination?

A. $2.90 \times 10^{11} Pa$

B. $1.45 \times 10^{11} Pa$

C. $1.34 \times 10^{11} Pa$

D. $4.25 \times 10^{11} Pa$

Answer: B

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19. When a wire is stretched to double its length, then

A. Strain is unity

B. Stress is equal to strain

C. Its radius is halved

D. Young's modulus is equal to twice the elastic energy per unit volume

Answer: A

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20. Select the correct alternative (s)

A. Elastic forces are not always conservative

B. Elastic forces are always conservative

C. Elastic forces are-conservative only when Hooke's law is obeyed

D. Elastic forces are not conservative

Answer: A

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21. A metallic rod of length l and cross-sectional area A is made of a material of Young's modulus Y. If the rod is elongated by an amount y,then the work done is proportional to

A. y

B. $\frac{1}{y}$

C. y^2

D. $\frac{1}{y^2}$

Answer: C

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22. The Poisson's ratio of a material is 0.5. If a force is applied to a wire of this material, there is a decrease in the cross-sectional area by 4%. The percentage increase in the length is

A. 4%

B. 2%

C. 2.5%

D. 4.5%

Answer: D

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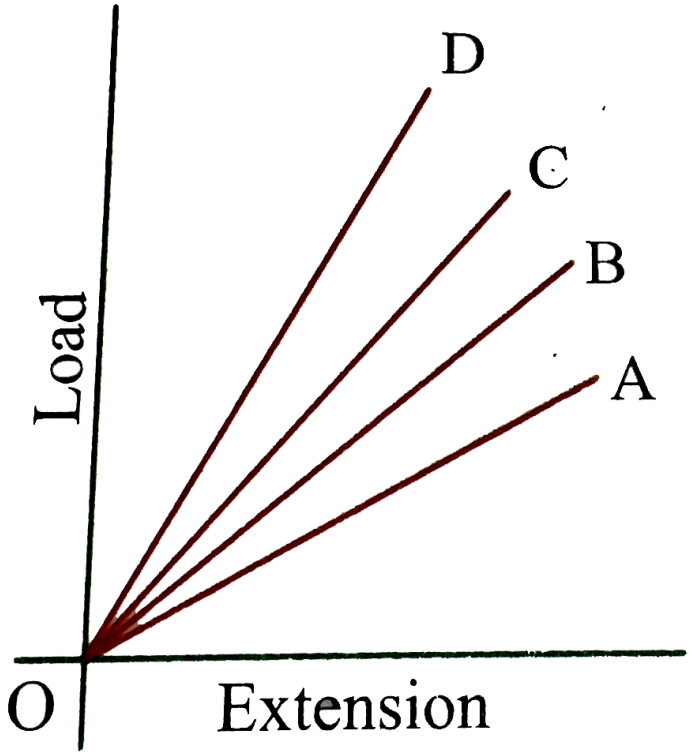
23. The load versus extension graph for four wires of same material is shown.

The thinnest wire is represented by the line



A. OC

B. OD

C. OA

D. OB

Answer: C

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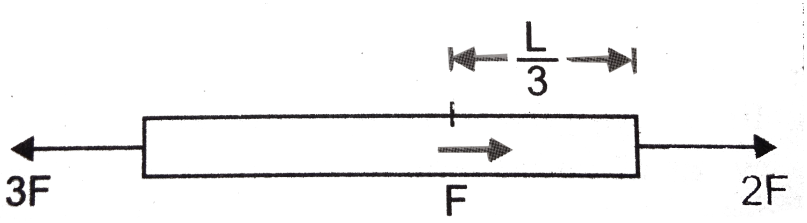
24. A uniform cylindrical rod of length L, cross-section area A and Young's modulus Y is acted upon by the force as shown in Fig. 7(CF).3. The elongation of the rod is



A. $\frac{2FL}{5AY}$

B. $\frac{3FL}{8AY}$

C. $\frac{3FL}{5AY}$

D. $\frac{8FL}{3AY}$

Answer: D

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25. One end of a wire of length L and weight w is attached rigidly to a point in roof and a weight w_1 is suspended from its lower end. If A is the area of cross-section of the wire then the stress in the wire at a height $\frac{3L}{4}$ from its lower end is

A. $\frac{w_1}{A}$

B. $\frac{w_1 + \frac{w}{4}}{A}$

C. $\frac{w_1 + \frac{3w}{4}}{A}$

D. $\frac{w_1 + w_2}{A}$

Answer: C

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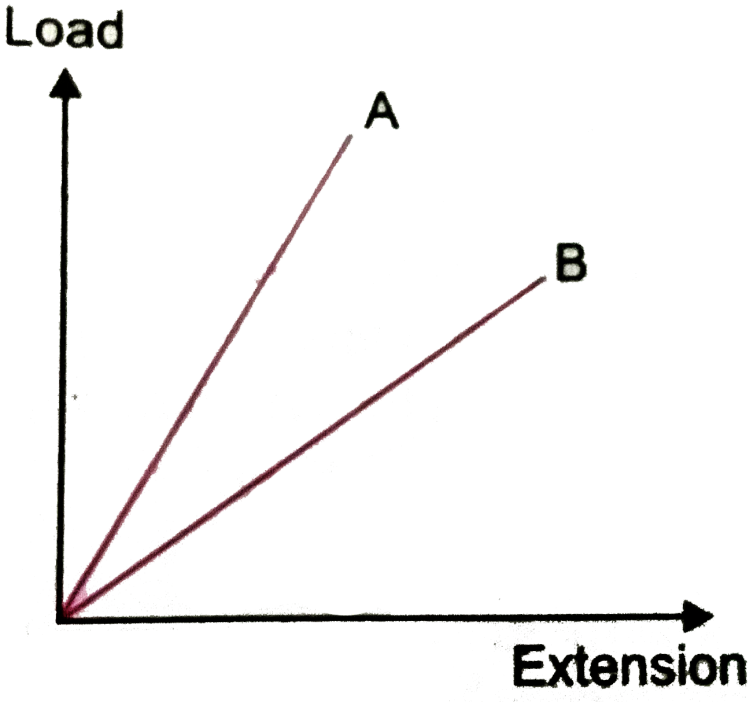
26. In the given Fig. 7(CF).2, if the dimensions of the two wires are the same and materials are different, Young's modulus is



A. More for A than B

B. More for B than A

C. Equal for A and B

D. None of these

Answer: A

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27. If the Bulk modulus of lead is $8.0 \times 10^9 N/m^2$ and the initial density of the lead is $11.4 g/cc$, then under the pressure of $2.0 \times 10^8 N/m^2$, the density of the lead is

A. 11.3 g/cc

B. 11.5 g/cc

C. 11.6 g/cc

D. 11.7 g/cc

Answer: D

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28. Two wires A and B of same material have radii in the ratio $2:1$ and lengths in the ratio $4:1$. The ratio of the normal forces required to

produce the same change in the lengths of these two wires is

A. $1:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer: A

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29. For a given material, the Young's modulus is 2.4 times that of the modulus of rigidity. Its Poisson's ratio is

A. 0.2

B. 0.4

C. 1.2

D. 2.4

Answer: A

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30. When the temperature of a gas is $20^\circ C$ and pressure is changed from $P_1 = 1.01 \times 10^5 Pa$ to $P_2 = 1.165 \times 10^5 Pa$, then the volume changes by $10\,\%$. The Bulk modulus is

A. $1.55 \times 10^5 Pa$

B. $1.01 \times 10^5 Pa$

C. $1.4 \times 10^5 Pa$

D. $0.115 \times 10^5 Pa$

Answer: A

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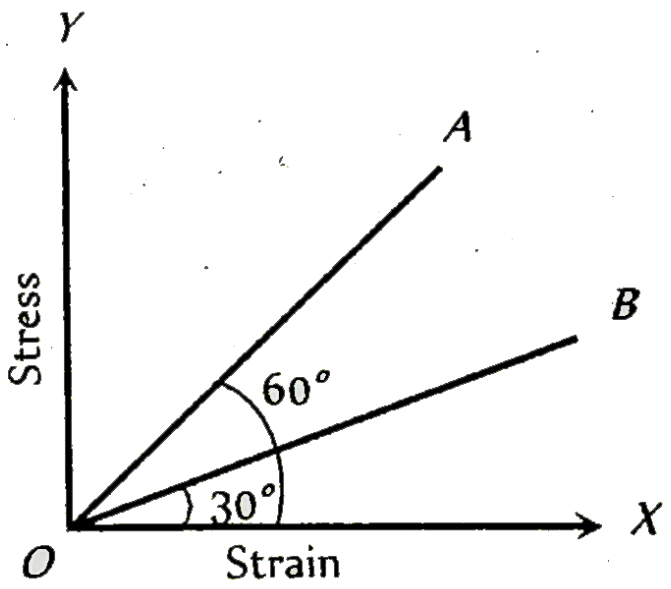
31. The stress versus strain graphs for wires of two materials A and B are as shown in the figure. If Y_A and Y_B are the younng's moduli of the materials, then



A. $Y_B = 2A_A$

B. $Y_A = 3Y_B$

C. $Y_B = 3Y_A$

D. $Y_A = Y_B$

Answer: B

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Assignment Section B

1. The following four wires of length L and radius r are made of the same material. Which of these will have the largest extension, when the samne tersion is applied?

A. Length 50 cm, diameter 0.5 mm

B. Length 100 cm, diameter 1 mm

C. Length 200 cm, diameter 2 mm

D. Length 300 cm, diameter 3 mm

Answer: A

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2. As shown in figure, by combining together copper and steel wires of same length and same diameter, a force F is applied at one of their end. The combined length is increased by 2 cm. The wires will have

A. Same stress and same strain

B. Different stress and different strain

C. Different stress and same strain

D. Same stress and different strain

Answer: D

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3. A horizontal rod is supported at both ends and loaded at the middle. If L and Y are length and Young's modulus repectively, then depression

at the middle is directly proportional to

A. L

B. L^2

C. Y

D. $\frac{1}{Y}$

Answer: A

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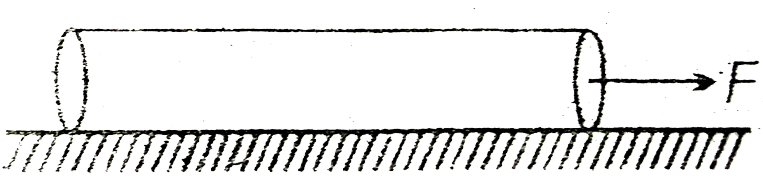
4. A rod of length L kept on a smooth horizontal surface is pulled along its length by a force F. The area of cross-section is A and Young's modulus is Y. The extension in the rod is



A. $\frac{FL}{AY}$

B. $\frac{2FL}{AY}$

C. $\frac{FL}{2AY}$

D. Zero

Answer: C

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5. When a load W is hung from a wire, it extends by Δl. The heat produced in the process is

A. $W \times \Delta l$

B. $\frac{1}{2}W \times \Delta l$

C. $\frac{W \times \Delta l}{4}$

D. Zero

Answer: B

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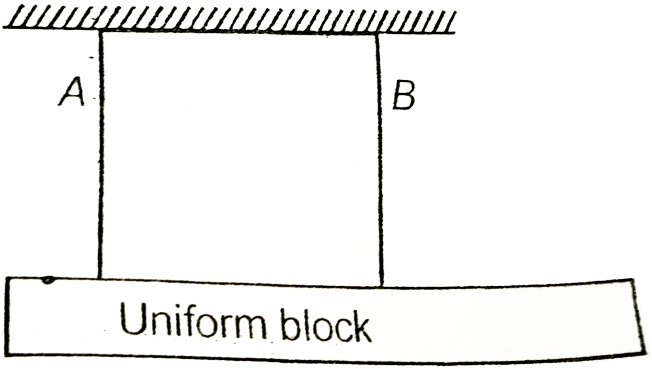
6. The figure shows a horizontal block that is suspended by two wires A and B which are identical except their original length. Which wire was originally shorter?



A. A

B. B

C. Both had equal length

D. Any one of them could be shorter

Answer: B

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7. A force of one newton doubles the length of a cord having cross-sectional area $1mrh^2$. The Young's modulus of the material of the cord is

A. $1Nm^{-2}$

B. $5 \times 10^5 Nm^{-2}$

C. $10^6 Nm^{-2}$

D. $2 \times 10^6 Nm^{-2}$

Answer: C

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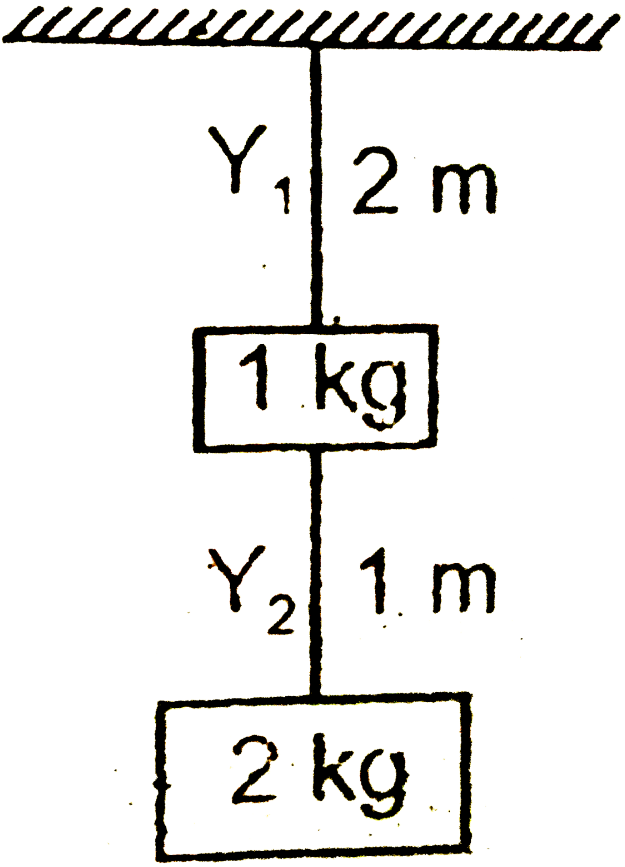
8. Two blocks of masses 1 kg and 2 kg are suspended with the help of two wires having same area of cross section. If the ratio of Young's moduli i.e., $Y_1 : Y_2 = 1:2$, then the ratio of extensions produced in

wires is



A. a. $2:1$

B. b. $4:1$

C. c. $6:1$

D. d. $8:1$

Answer: C

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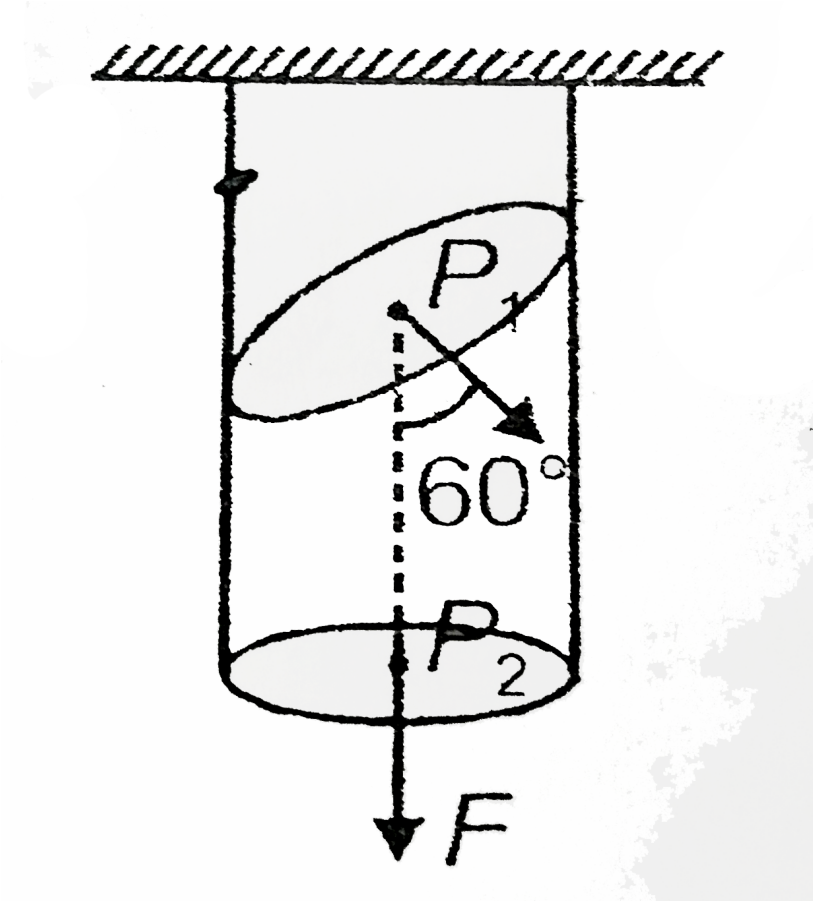
9. A massless uniform rod is subjected to froce F at its free end as shown in figure. The ratio of tensile stress at plane P_1 to stress at P_2 is



A. $1:2$

B. $\sqrt{2}:1$

C. $1:4$

D. $3:2$

Answer: C

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10. A copper wire of negligible mass, length l and corss-section A is kept on a smooth horizontal table with one end fixed. A ball of mass m is attached to the other end. The wire and the ball are rotating with an angular velocity ω. If elongation in the wire is Δl, obtain the expression for the Young's modulus.

$\frac{mL^2\omega}{A\Delta L}$

$\frac{m\omega^2L^2}{A\Delta L}$

$\frac{m\omega^2 L}{A\Delta L}$

$\frac{m\omega L}{A\Delta L}$

A. $\frac{mL^2\omega}{A\Delta L}$

B. $\frac{m\omega^2 L^2}{A\Delta L}$

C. $\frac{m\omega^2 L}{A\Delta L}$

D. $\frac{m\omega L}{A\Delta L}$

Answer: B

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11. Select the incorrect option

A. a. The Young's modulus and modulus of rigidity exist only for solids

B. b. The value of modulus of elasticity is independent of the magnitude of stress and strain

C. c. The value of modulus of elasticity depends only on the nature of material of the body

D. d. Only gases cannot exhibit a shearing stress

Answer: D

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12. A body of mass M is attached to lower end of a metal wire whose upper End is fixed. The elongation is l. The ratio of loss of gravitational potential energy to the energy stored in the wire is

A. 1

B. 2

C. $\frac{1}{2}$

D. $\frac{4}{3}$

Answer: B

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13. A heavy rope is suspended from the ceiling of a room. If ϕ is the density of the rope, L be its original length and Y be its. Young's modulus, then increase ΔL in the length of the rope due to its own weight is

A. a. $\Delta L = \frac{\phi g L^2}{Y}$

B. b. $\Delta L = \frac{2\phi g L^2}{Y}$

C. c. $\Delta L = \frac{\phi g L^2}{2Y}$

D. d. $\Delta L = \frac{\phi g L}{Y}$

Answer: C

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14. If s is stress and Y is Young's modulus of material, the energy stored per unit volum is

A. $\frac{2Y}{s}$

B. $\frac{s}{2Y}$

C. $2s^2Y$

D. $\frac{s^2}{2Y}$

Answer: D

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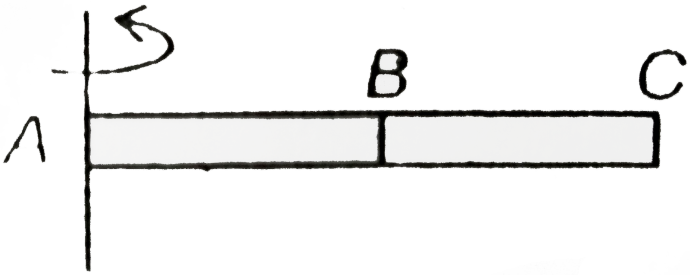
15. A rigid rod of mass m and lengths l, is being rotated in horizontal plane about a vertical axis, passing through one end A. If T_A, T_B and T_C are the tensions in rod at point A, mid point B and

point C of rod repsectively, then



A. $T_C = 0$

B. $T_B = \frac{3}{4}T_A$

C. $T_B = \frac{T_A}{2}$

D. $T_A = m\omega^2 l$

Answer: B,a

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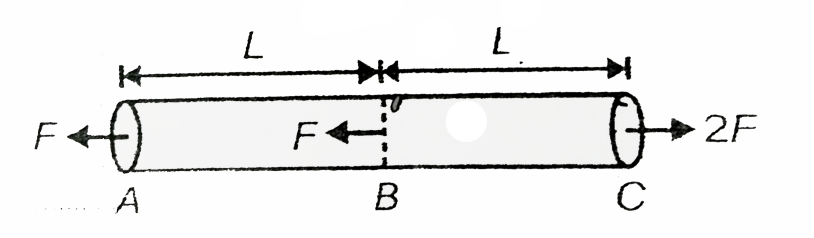
Assignment Section C

1. A uniform rod of length 2L, area of cross - section A and Young's modulus Y is lying at rest under the action of three forces as shown.



Select the correct alternatives.

A. The stress at any cross - section is $\frac{2F}{A}$

B. The stress at any cross-section in section AB is $\frac{F}{A}$

C. The total extension is $\frac{3FL}{AY}$

D. The total extension is $\frac{6FL}{AY}$

Answer: B::C

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2. When a wire is stretched to double its length, then

A. Stress is double of Young's modulus

B. Strain is unity

C. Young's modulus is equal to the half of the elastic energy per unit volume

D. Its radius is halved

Answer: A::C

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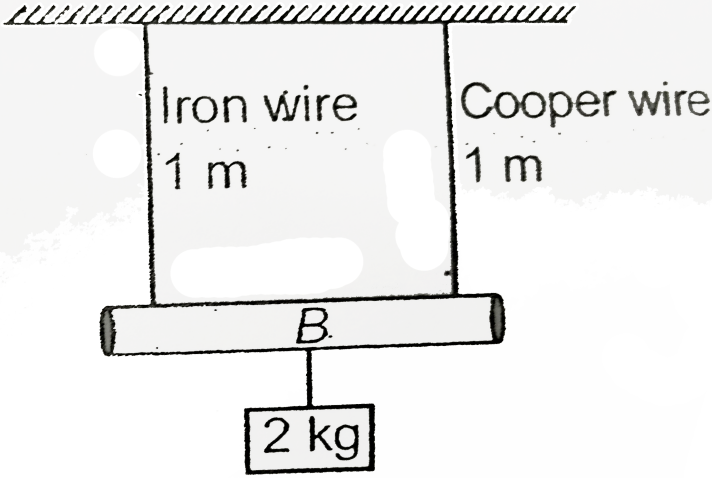
Assignment Section D

1. An iron rod B of length 1 m and mass 1 kg is suspended with help of two wires as shwon in figure. The area of cross-section of iron wire is 0.3 cm^2 and of copper wire is $0.6cm^2$.



At what distance from iron wire a weight can be hung to produce equal stress in wires?

A. a. 0.82 m

B. b. 0.38 m

C. c. 0.67 m

D. d. 0.47 m

Answer: C

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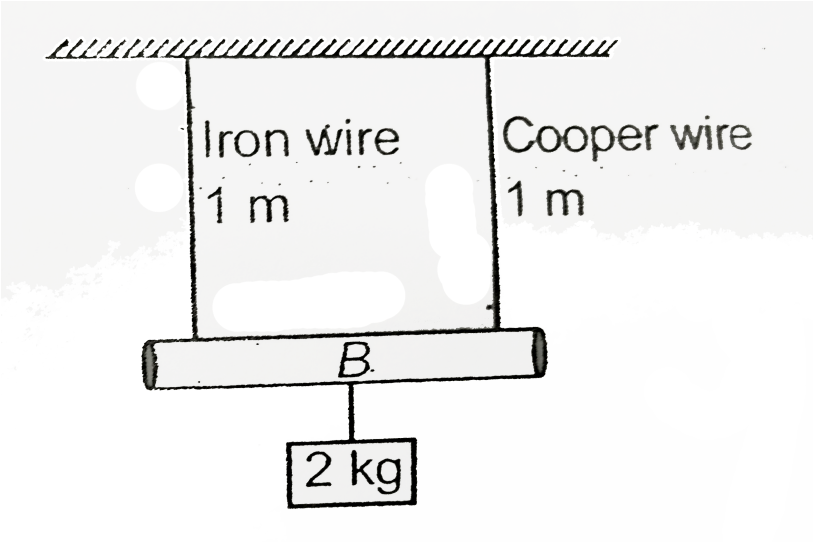
2. An iron rod B of length 1 m and mass 1 kg is suspended with help of two wires as shwon in figure. The area of cross-section of iron wire is 0.3 cm^2 and of copper wire is $0.6cm^2$.



At what distance from iron wire a weight can be hung to produce equal stress in wires?

A. a.$1:1$

B. b.$2:1$

C. c.$1:2$

D. d.$1:4$

Answer: B

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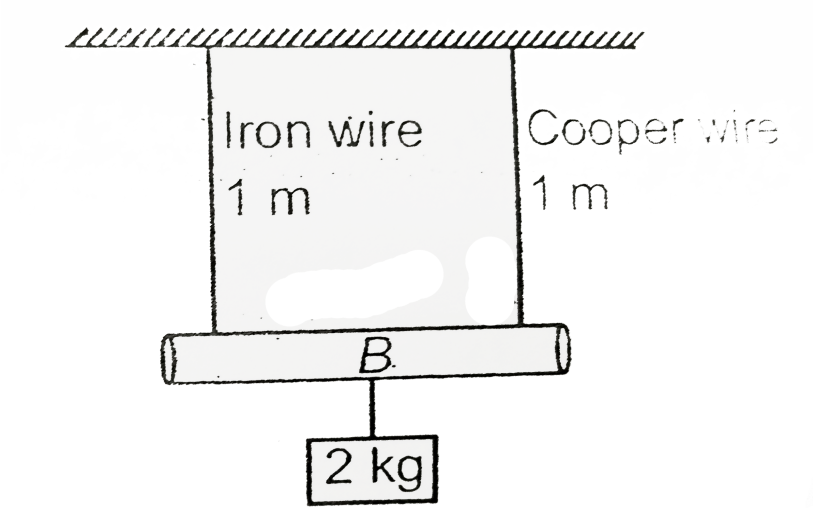
3. An iron rod B of length 1 m and mass 1 kg is suspended with help of two wires as shwon in figure. The area of cross-section of iron wire is 0.3 cm^2 and of copper wire is $0.6cm^2$.



In the above question, if $Y_{\text{iron}} : Y_{Cu} = 2:1$, then the ratio of elastics energy per unit volume stored in iron wire to copper wire is

A. $1:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer: b

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Assignment Section E

1. STATEMENT - 1 : When a rod lying freely is heated, no thermal stress is developed in it.

and

STATEMENT - 2 : On heating, the length of the rod increase.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-1

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-1

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: B

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2. STATEMENT - 1 : The value of modulus of elasticity depends on the magnitude of the stress and strain

and

STATEMENT - 2 : A given material have different moduli of elasticity depending on the type of stress applied.

A. Statement-1 is True, Statement-2 is True, Statement-2 is a correct explanation for Statement-2

B. Statement-1 is True, Statement-2 is True, Statement-2 is NOT a correct explanation for Statement-2

C. Statement-1 is True, Statement-2 is False

D. Statement-1 is False, Statement-2 is True

Answer: D

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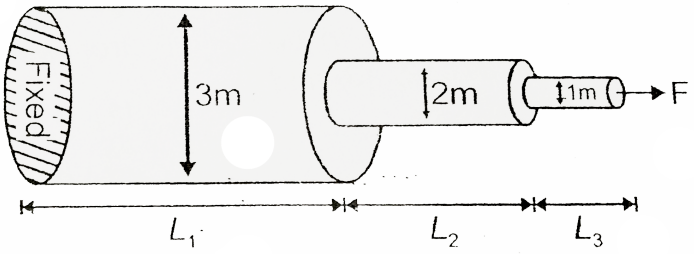
Assignment Section F

1. Three wires of lengths L_1, L_2, L_3 and Youngs moduli Y_1, Y_2 and Y_3 respectively are pulled by a force F as shown in fig. The extensions produced in wires are $\Delta L_1, \Delta L_2, \Delta L_3$



Match the Column-I with Column-II

Column-I		Column-II	
(A)	If $9L_2 = 4L_1$ and $\Delta L_1 = \Delta L_2$, then	(p)	$Y_2 = Y_1$
(B)	If $L_2 < 4L_3$ and $\Delta L_2 = \Delta L_2$, then	(q)	$Y_2 > Y_1$
(C)	If $\Delta L_1 = \Delta L_2$ and $L_1 = L_2$, then	(r)	$Y_2 < Y_3$
(D)	If $L_2 = L_3$ and $\Delta L_2 = \Delta L_3$, then	(s)	$4Y_2 = Y_3$

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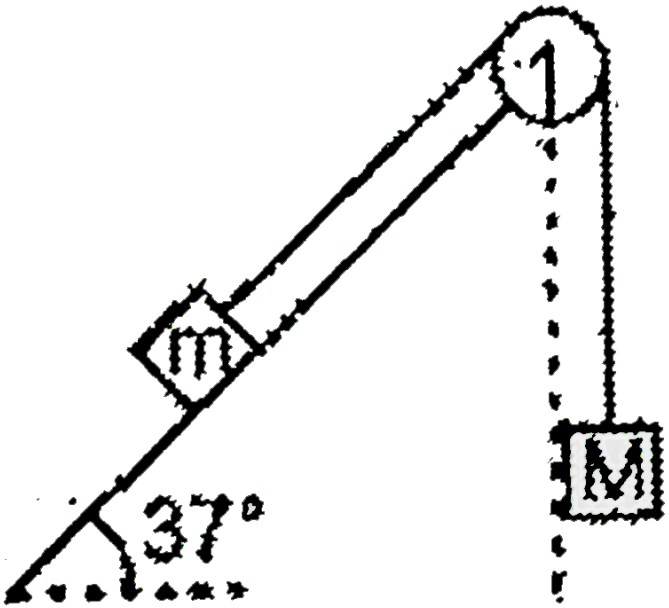
2. The inclined surface is rough $\mu = \frac{1}{2}$. For different values of m and M system slides down or up the plane or remains stationary. Match the appropriate entries of column-1 with those of column-2



	Column-1		Column-2
(A)	Minimum value of $\frac{m}{M}$ so theta m slides down	(P)	$\frac{5}{3}$
(B)	Minimum valie of $\frac{M}{m}$ so that m slides up	(Q)	1
(C)	Value of $\frac{m}{M}$ so that friction force on m is zero	(R)	$\frac{3}{5}$
(D)	Ratio of vertical component of acceleration of m and acceleration of M	(S)	5

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Assignment Section G

1. Two identical rods are pulled as shown in figure (1) and (2). The surface are smooth. If Δl_1 and Δl_2 are the elongations in two cases respectively, then find $\frac{\Delta l_2}{\Delta l_1}$.

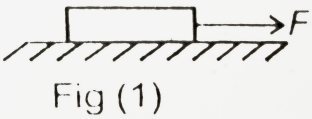

Fig (1)

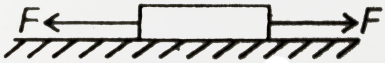

Fig (2)

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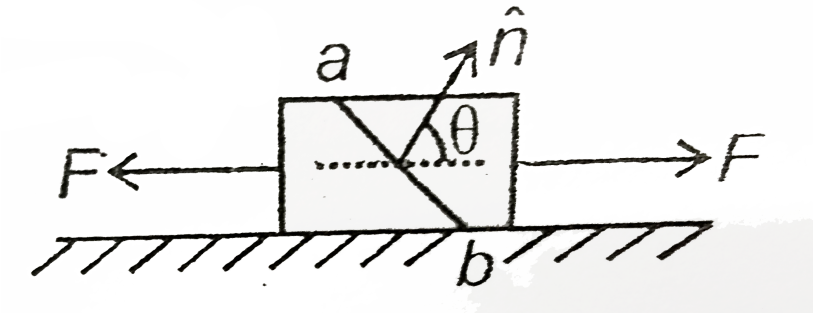
2. A rod area of cross section A is being acted upon by two forces F - F as shown in figure. Consider a section ab of rod whose normal makes angle θ with horimontal. The shear stress upon this section is maximum when $\theta = \frac{180^\circ}{n}$. Find n.



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Assignment Section H

1. STATEMENT - 1 : A metallic rod placed upon smooth surface is heated. The strain produced is ZERO.

STATEMENT - 2 : Strain is non-zero only when stress is developed in the rod.

STATEMENT - 3 : Two metallic rods of length l_1 and l_2 and coefficient of linear expansion α_1 and α_2 are heated such that the difference of their length ramains same at ALL termperatures Then $\frac{\alpha_1}{\alpha_2} = \frac{l_2}{l_1}$

A. TTT

B. FTF

C. FFT

D. FFF

Answer: A

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2. STATEMENT - 1 : A metallic rod is clamped between two fixed support. The rod is heated but not allowed to bend. Tensile stress is developed in it.

STATEMENT - 2 : A metallic rod is fixed between two rigid supports. The rod is heated. The strain produced in the rod is ZERO because there is no change in length

STATEMENT - 3 : The practical value of Poisson's ratio lies between 0 and 0.5.

A. a. TTT

B. b. FTF

C. c. FFT

D. d. FFF

Answer: C

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Assignment Section I

1. A wire gets elongated by 4 mm when a block of mass 2 kg is suspended from it. Now, the block is immersed in water, the wire contracts by 1 mm. Find the density of block when the density of water is $1000kg/m^3$.

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2. Two wires one of copper and other of iron having same cross-section area and lengths 2 m and 1.5 m respectively are fastened end and stretched by a load 10 N. If copper wire is stretched by 2mm then find the total extension of combined wire, $Y_{Cu} = 1 \times 10^{11} N/m^2$ and $Y_{Fe} = 3 \times 10^{11} N/m^2$.

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3. A uniform bar of length 2 m and cross-sectional area $50cm^2$ is subjected to a tensile load 100 N. If Young's modulus of material of bar is $2 \times 10^7 N/m^2$ and poisson's ratio is 0.4, then determine the volumetric strain.

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4. A wire having a length 1 m and cross-section area $3mm^2$ is suspended at one of its ends from a ceiling. What will be its strain energy due to its own weight, if the density and Young's modulus of the material of the wire be $10g/cm^3$ and $1.2 \times 10^{11} N/m^2$ respectively.

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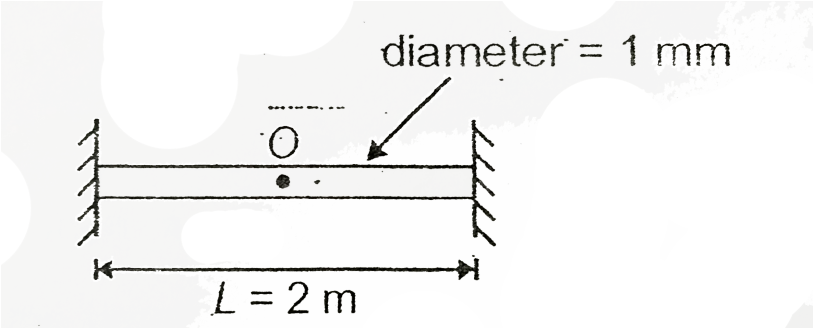
Assignment Section J

1. Find the net vertical displacement of point O, when a mass of 2.5 kg is suspended from the mid-point O of the rod shown $\left(Y = 2 \times 10^{11} N/m^2\right)$.



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2. A heavy metallic rod of non-uniform mass distribution, is hanged vertically from a rigid support. The linear mass density varies as $\lambda_{(x)} = k \times x$ where x is the distance measured along the length of rod, from its lower end. Find extension in rod due to its own weight.

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Exercise

1. Breaking stress depends on

A. Length of wire

B. Area of cross-section of wire

C. Both (1) & (2)

D. Independent of length and area of cross-section

Answer:

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2. Which of the following is perfectly plastic?

A. Plasticine

B. Quartz fibre

C. Steel

D. Rubber

Answer:

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3. The length of an elastic string is Xm when the tension is 8 N, and Y m when the tension is 10 N. The length in metres when the tension is 18 N is

A. 4X.-5Y

B. 5Y-4X

C. 9x - 4Y

D. 4Y - 9X

Answer:

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4. When a load of 10 kg is hung from the wire, then extension of 2m is produced. Then work done by restoring force is

A. 200 J

B. 100 J

C. 50 J

D. 25 J

Answer:

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5. Substances which can be elastically stretched to large value of strain are called

A. Isomers

B. Isodiapheres

C. Plastomers

D. Elastomers

Answer:

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6. A force F doubles the length of wire of cross-section a The Young modulus of wire is

A. $\frac{F}{a}$

B. $\frac{F}{3}a$

C. $\frac{F}{2}a$

D. $\frac{F}{4}a$

Answer:

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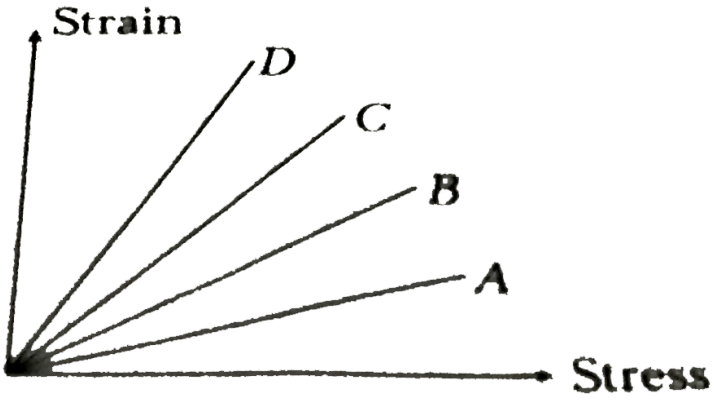
7. Stress-strain curve for four metals are shown in figure. The maximum Young's modulus of elasticity is for metal



A. A

B. B

C. C

D. D

Answer:

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8. Breaking stress for a material is $2 \times 10^8 N/m^2$. What maximum length of the wire of this material can be taken t the wire does not break by own weight? Density of material = $5 \times 10^3 kg/m^3$

A. 1 km

B. 2 km

C. 3 km

D. 4 km

Answer:

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9. Young modulus of elasticity for a gas is

A. Unity

B. Infinite

C. Zero

D. None of these

Answer:

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10. On mixing impurities, the elasticity of a material

A. May change

B. Never changes

C. Remains the same

D. Changes by a factor of 5

Answer:

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11. Elasticity of a rigid body is

A. Unity

B. Zero

C. Infinite

D. Can't predict

Answer:

Watch Video Solution

12. If Young modulus is three times of modulus of rigidity, then Poisson ratio is equal to

A. 0.2

B. 0.3

C. 0.4

D. 0.5

Answer:

Watch Video Solution

13. In case of bending of a beam, depression depends on Young modulus of elasticity Y as

A. $\propto Y$

B. $\propto Y^2$

C. $\propto Y^{-1}$

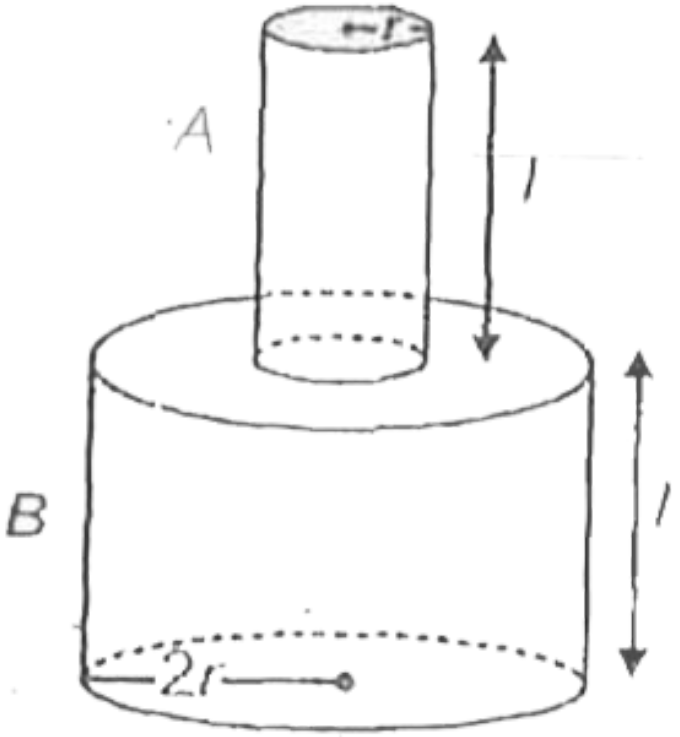
D. $\propto Y^{-2}$

Answer:

Watch Video Solution

14. Two metallic cylinder made of same material and radii r and 2r are joined as shown in figure. If top end is ved and lower end of cylinder B is twisted by angle Theta, then angle of twist for cylinder A is (both

cylinder have fixed and



A. $\frac{15}{16}\theta$

B. $\frac{16}{15}\theta$

C. 17θ

D. $\frac{16}{17}\theta$

Answer:

Watch Video Solution

15. A force Fis tangentially applied on the upper face of a cube of side b and whose lower face is fixed. If modulus of rigidity is n then upper surface of cube is shifted to

A. $\frac{F}{nb}$

B. $\frac{n}{F}b$

C. $\frac{nb}{F}$

D. $\frac{Fb}{n}$

Answer:

Watch Video Solution

16. A rubber ball is taken to depth 1 km inside water so that its volume reduces by 0.05%, What is the bulk. modulus for rubber?

A. $2 \times 10^8 N/m^2$

B. $2 \times 10^9 N/m^2$

C. $2 \times 10^{10} N/m^2$

D. $2 \times 10^{11} N/m^2$

Answer:

Watch Video Solution

17. In case of a liquid

A. Only bulk modulus is defined

B. Only bulk modulus and Young's modulus are defined

C. Only bulk modulus and shear modulus are defined

D. All the three modulit (Bulk, Young's and Shear) are defined

Answer:

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18. Elastic forces

A. Are always conservative

B. Are not always conservative

C. Are never conservative

D. None of these

Answer:

Watch Video Solution

19. When a beam is bent

A. Only extensional strain is produced

B. Only compressional strain is produced

C. Both extensional as well as compressional strain is produced

D. Compressional as well as extensional strain is never produced

Answer:

Watch Video Solution

20. isothermal elasticity of an ideal gas is

A. P

B. λP

C. Zero

D. ∞

Answer:

Watch Video Solution

Assignment Section A

1. If we add impurity into a matter then elasticity

A. Decreases

B. Increases

C. Remains constant

D. May increase or decrease

Answer:

Watch Video Solution

2. SHEAR STRAIN

A. Solids

B. Liquids

C. Gases

D. All of these

Answer:

Watch Video Solution

3. The ratio of radii of two wires of same material is $2:1$. If these wires are stretched by equal force the ratio of stresses produced in them is

A. $2:1$

B. $1:2$

C. $1:4$

D. $4:1$

Answer:

Watch Video Solution

4. A load of 20 kg produces an extension of 1 mm in a wire 3 m in length and 1 mm in diameter.l Calculate Young's modulus of elesticity of wire.

A. $3.25 \times 10^{10} Nm^{-2}$

B. $7.48 \times 10^{12} Nm^{-2}$

C. $7.48 \times 10^{10} Nm^{-2}$

D. $7.48 \times 10^{10} Nm^{-2}$

Answer:

Watch Video Solution

5. Young's modulus depends upon

A. Stress applied on material

B. Strain produced in material

C. Temperature of material

D. All of these

Answer:

Watch Video Solution

6. What is the Young's modulus for a perfect rigid body?

A. 1

B. Less than 1

C. Zero

D. Infinite

Answer:

Watch Video Solution

7. The breaking stress of aluminium is $7.5 \times 10^7 Nm^{-2}$ Find the greatest length of aluminum wire that can hang vertically without breaking Density of aluminium is $2.7 \times 10^3 kgm^{-3}$

A. $283 \times 10^3 m$

B. $28.3 \times 10^3 m$

C. $2.83 \times 10^3 m$

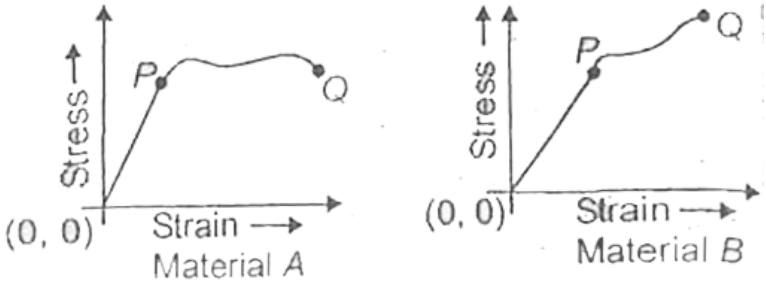
D. $0.283 \times 10^3 m$

Answer:

Watch Video Solution

8. The stress-strain graphs for two materials A and are shown in figure.

The graphs are drawn to the same scale. Select the correct statement



A. Material A has greater Young's Modulus

B. Material Ais ductile

C. Material B is brittle

D. All of these

Answer:

Watch Video Solution

9. A steel wire of diameter 2 mm has a breaking strength of 4×10^5N. What is the breaking strength of similar steel wire of diameter $1.5mm$?

A. $2.3 \times 10^5 N$

B. $2.6 \times 10^5 N$

C. $3 \times 10^5 N$

D. $1.5 \times 10^5 N$

Answer:

Watch Video Solution

10. A Steel wire is $1m$long and $1mm^2$ in area of cross-section. If it takes $200N$ to streach this wire by $1mm$, the forces that will be required to stretch the wrie of the same material and cross-sectional area form a length of $10m$ to $1002cm$

A. 1000N

B. 200N

C. 400N

D. 2000N

Answer:

Watch Video Solution

11. A wire 2 m in length suspended vertically stretches by. 10 mm when mass of 10 kg is attached to the lower end. The elastic potential energy gain by the wire is (take g = $10m/s^2$)

A. 0.5 J

B. 5 J

C. 50 J

D. 500 J

Answer:

Watch Video Solution

12. A wire of length L and cross-sectional area A is made of a material of Young's modulus Y. IF the wire is stretched by an amount x, the workdone is

A. $\frac{Yax^2}{L}$

B. $\frac{Yax^2}{2L}$

C. $\frac{2Yax^2}{L}$

D. $\frac{4Yax^2}{L}$

Answer:

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13. A spherical ball contracts in volume by $0.02\,\%$ when subjected to a normal uniform pressure of 200 atmospheres. Then Bulk modulus (in N/m^2) of the material of the ball is

(Atomospheric pressure $= 10^5 N/m^2$)

A. $1.01 \times 10^{11} Nm^{-2}$

B. $1.01 \times 10^{12} Nm^{-2}$

C. $1.01 \times 10^{10} Nm^{-2}$

D. $1.0 \times 10^{13} Nm^{-2}$

Answer:

Watch Video Solution

14. What is the percentage increase in length of a wire of diameter 2.5 mm, stretched by a force of 100 kg wt ? Young's modulus of elasticity of wire $= 12.5 \times 10^{11} \text{dyne/cm}^2$

A. 0.0016

B. 0.0032

C. 0.0008

D. 0.0012

Answer:

Watch Video Solution

15. Two exactly similar wires of steel and copper are stretched by equal force. If the total elongation is 2 cm, then how much is the elongation in steel and copper wire respectively? Given, $Y_{\text{steel}} = 20 \times 10^{11} \text{dyne/cm}^2$, $Y_{\text{copper}} = 12 \times 10^{11} \text{Dyne/cm}^2$

A. 1.25 cm 0.75 cm

B. 0.75 cm 1.25 cm

C. 1.15 cm 0.85cm

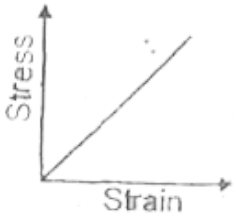
D. 0.85 cm 1.15 cm

Answer:

Watch Video Solution

16. Which of the following graphs represents stress-strain variation for elastomers?

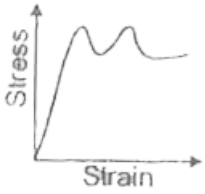
A.



B.

C.

D.



Answer:

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17. A steel rod has a radius 10 mm and a length of 1.0 m. A force stretches it along its length and produces a strain of 0.32%. Young's

modulus of the steel is $2.0 \times 10^{11} Nm^{-2}$. What is the magnitude of the force stretching the rod?

A. 100.5 kN

B. 201 kN

C. 78 kN

D. 150 kN

Answer:

Watch Video Solution

18. The elastic limit of steel is $8 \times 10^{8} Nm^{-2}$ and its Young modulus $2 \times 10^{11} Nm^{-2}$. Find the maximum elongation of a half meter steel wire that can be given without exceeding the elastic limit.

A. 2 mm

B. 4 mm

C. 1 mm

D. 8 mm

Answer:

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19. As shown in figure, by combining together copper and steel wires of same length and same diameter, a force F is applied at one of their end. The combined length is increased by 2 cm. The wires will have

A. Same stress and same strain

B. Different stress and different strair

C. Different stress and same strain

D. Same stress and different strain

Answer:

Watch Video Solution

20. Select the correct alternative(s).

A. Elastic forces are not always conservative

B. Elastic forces are always conservative

C. Elastic forces are conservative only when Hooke's law is obeyed

D. Elastic forces are not conservative

Answer:

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21. A metallic rod of length l and cross-sectional area A is made of a material of Young's modulus Y. If the rod is elongated by an amount y,then the work done is proportional to

A. y

B. $\frac{1}{y}$

C. y^2

D. $\frac{1}{y^2}$

Answer:

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22. The Poisson's ratio of a material is 0.5. If a force is applied to a wire of this material, there is a decrease in the cross-sectional area by 4%. The percentage increase in the length is

A. 0.01

B. 0.02

C. 0.025

D. 0.04

Answer:

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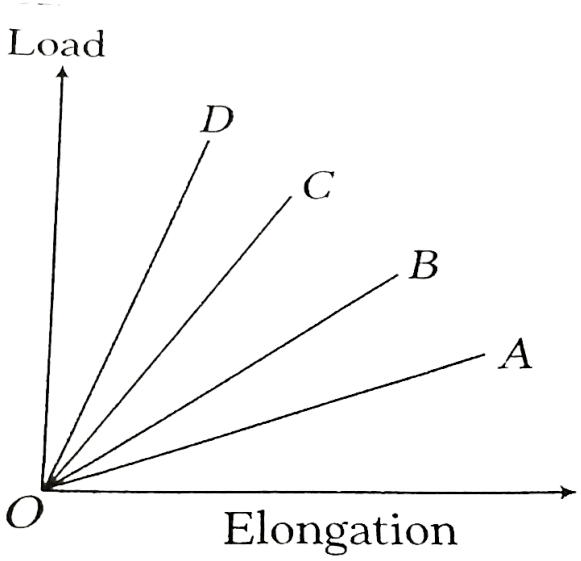
23. The load versus elongation graph for four wires of the same material is shown in the figure. The thickest wire is represented by the line



A. OC

B. OD

C. OA

D. OB

Answer:

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24. A uniform heavy rod of weight W, cross sectional area a and length L is hanging from fixed support. Young modulus of the material of the rod is Y. Neglect the lateral contraction. Find the elongation of the rod.

A. $W\frac{L}{Y}A$

B. $W\frac{L}{2}YA$

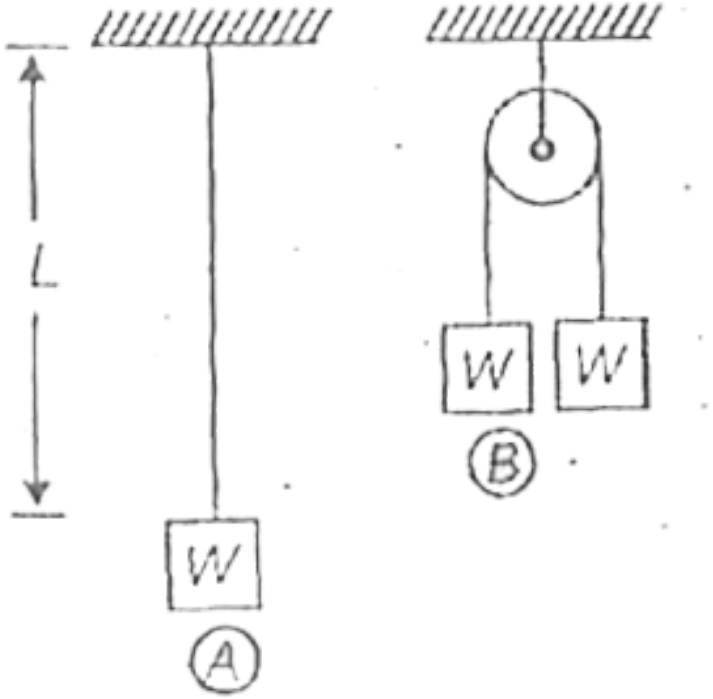
C. $W\frac{L}{4}YA$

D. $3W\frac{L}{4}YA$

Answer:

Watch Video Solution

25. If in case A, elongation in wire of length L is l then for same wire elongation in case B will be



A. $4l$

B. $2l$

C. l

D. $\frac{l}{2}$

Answer:

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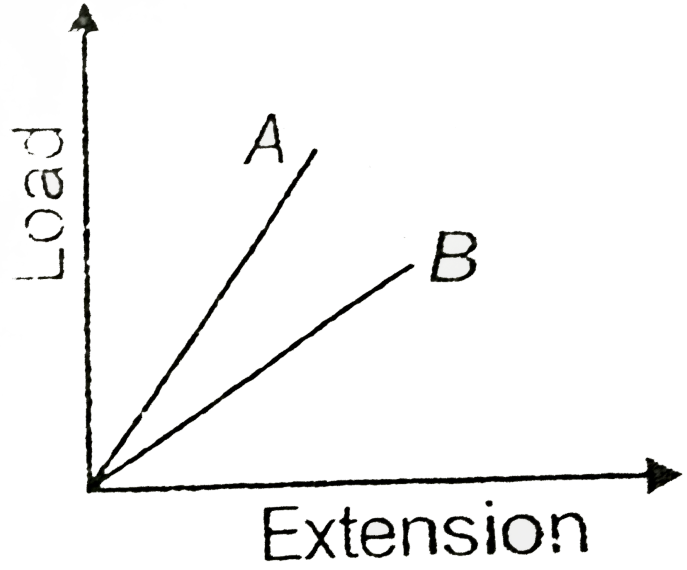
26. In the given figure, if the dimensions of the two wires are same but materials are different, then Young's modulus is



A. More for A than B

B. More for B than A

C. Equal for A and B

D. None of these

Answer:

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27. If the Bulk modulus of lead is $8.0 \times 10^9 N/m^2$ and the initial density of the lead is $11.4 g/cc$, then under the pressure of $2.0 \times 10^8 N/m^2$, the density of the lead is

A. 11.3 g/cc

B. 11.5 g/cc

C. 11.6 g/cc

D. 11.7 g/cc

Answer:

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28. Two wires A and B of same material have radii in the ratio $2:1$ and lengths in the ratio $4:1$. The ratio of the normal forces required to produce the same change in the lengths of these two wires is

A. $1:1$

B. $2:1$

C. $1:2$

D. $1:4$

Answer:

Watch Video Solution

29. For a given material, the Young's modulus is 2.4 times that of the modulus of rigidity. Its Poisson's ratio is

A. 0.2

B. 0.4

C. 1.2

D. 2.4

Answer:

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30. When the temperature of a gas is $20^\circ C$ and pressure is changed from $P_1 = 1.01 \times 10^5 Pa$ to $P_2 = 1.165 \times 10^5 Pa$, then the volume changes by $10\,\%$. The Bulk modulus is

A. $1.55 \times 10^5 Pa$

B. $1.01 \times 10^5 Pa$

C. $1.4 \times 10^5 Pa$

D. $0.115 \times 10^5 Pa$

Answer:

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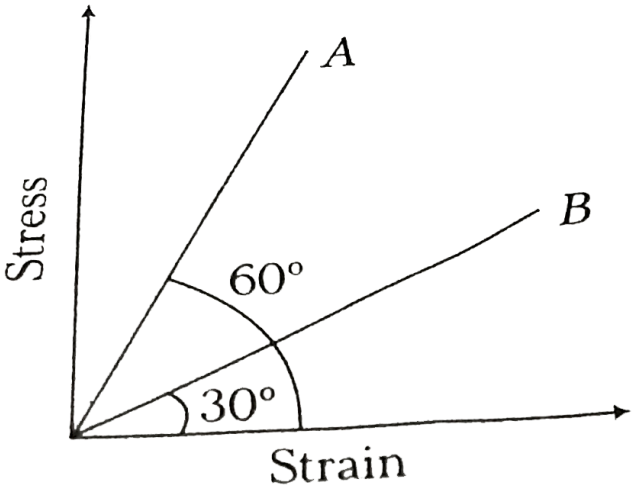
31. The stress versus strain graphs for wires of two material A and B are as shown in the figure. If Y_A and Y_B are the Young's modulii of the material, then



A. $Y_B = 2Y_A$

B. $Y_A = 3Y_B$

C. $Y_B = 3Y_A$

D. $Y_A = Y_B$

Answer:

Watch Video Solution

32. Hooke's law is applicable for

A. Elastic materials only

B. Plastic materials only

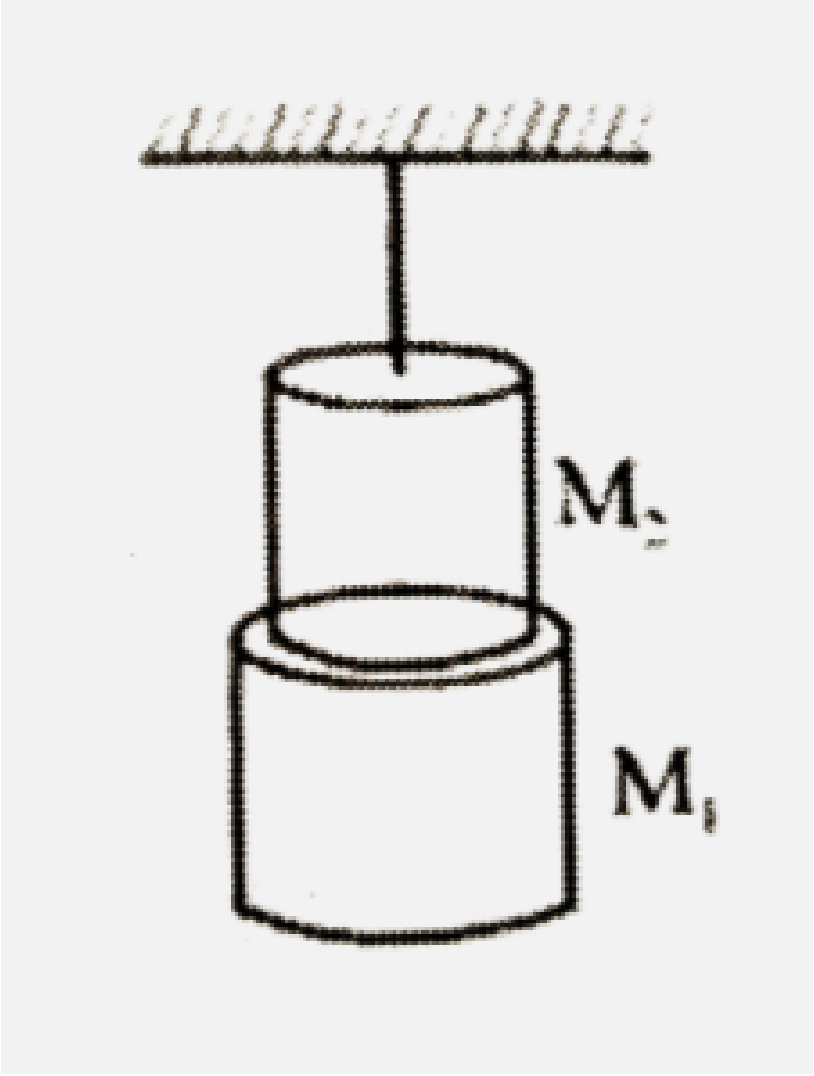
C. Elastomers only

D. All of these

Answer:

Watch Video Solution

33. The length of wire, when M_1 is hung from it, is l_1 and is l_2 with both M_1 and M_2 hanging. The natural length of wire is :-



A. $\frac{M_1}{M_2}(l_1 - l_2) + l_1$

B. $\frac{M_2 l_1 - M_1 l_2}{M_1 + M_2}$

C. $\frac{l_1 + l_2}{2}$

D. $\sqrt{l_1 l_2}$

Answer:

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34. When a load of 10 kg is suspended on a metallic wire, its length increase by 2 mm. The force constant of the wire is

A. $3 \times 10^4 N/m$

B. $2.5 \times 10^3 N/m$

C. $5 \times 10^4 N/m$

D. $7.5 \times 10^3 N/m$

Answer:

Watch Video Solution

35. A rod of length / and radius r is held between two rigid walls so that it is not allowed to expand. If its temperature is increased, then the

force developed in it is proportional to

A. l

B. $\frac{1}{l}$

C. r^2

D. r^3

Answer:

Watch Video Solution

36. If the temperature of a wire of length $2m$ and area of cross-section $1cm^2$ is increased from 0°C to 80°C and is not allowed to increase in length, then force required for it is $\left(Y = 10^{10} N/m^2,\ \propto\ = 10^{-6}/^\circ C\right)$

A. $80N$

B. $160N$

C. $400N$

D. $120N$

Answer:

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37. The elastic energy stored per units volume in a streched wire is

A. $Y\frac{S}{2}$

B. $\frac{S^2Y}{2}$

C. $\frac{S^2}{2Y}$

D. $\frac{S}{2}Y$

Answer:

Watch Video Solution

38. 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 1 mm. Then the energy stored in the wire is

A. 0.1J

B. 0.2 J

C. 0.4 J

D. 10 J

Answer:

Watch Video Solution

39. Work done by restoring force in a string within elastic limit is -10 J. Maximum amount of heat produced in the string is

A. 1 0 J

B. 20 J

C. 5 J

D. 15 J

Answer:

Watch Video Solution

40. The work done per unit volume to stretch the length of area of cross-section $2mm^2$ by 2% will be $\left[Y = 8 \times 10^{10} N/m^2\right]$

A. $40MJ/m^3$

B. $16MJ/m^3$

C. $64MJ/m^3$

D. $32MJ/m^3$

Answer:

Watch Video Solution

41. Which of the following affecs the elasticity of a substance

A. Change in temperature

B. Impurity in substance

C. Hammering

D. All of these

Answer:

Watch Video Solution

42. Select the wrong definition

A. Deforming Force - force that changes configuration of body

B. Elasticity - property of regaining original configuration

C. Plastic body - which can be easily melted

D. Elastic limit - beyond which property of elasticity vanishes

Answer:

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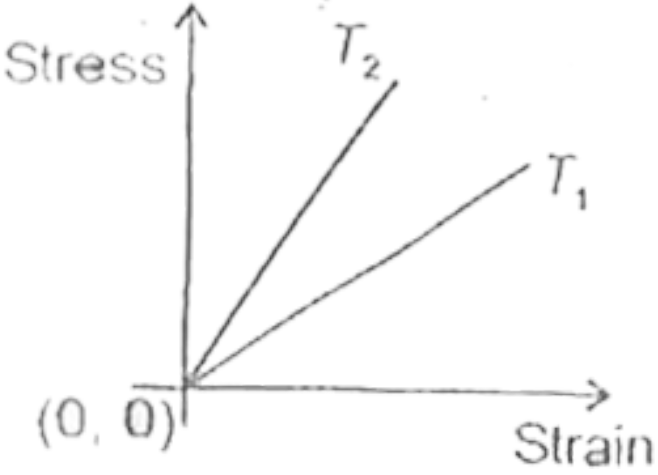
43. Figure shows graph between stress and strain for a uniform wire at two different temperatures. Then



A. $T_1 > T_2$

B. $T_2 > T_1$

C. $T_1 = T_2$

D. None of these

Answer:

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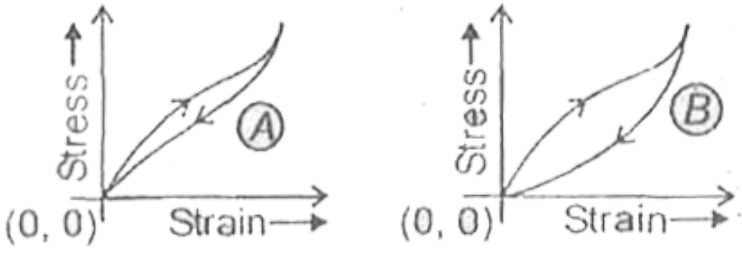
44. Two different types of rubber are found to have the stress-strain curves as shown. Thenbr>



A. A is suitable for shock absorber

B. B is suitable for shock absorber

C. B is suitable for car tyres

D. None of these

Answer:

Watch Video Solution

45. The ratio of adiabatic to isothermal elasticity of a diatomic gas is

A. 1.67

B. 1.4

C. 1.33

D. 1.27

Answer:

Watch Video Solution

46. A uniform cube is subjected to volume compression. If each side is decreased by 2% , then bulk strain is

A. 0.03

B. 0.02

C. 0.06

D. 0.12

Answer:

Watch Video Solution

47. When a rubber ball is taken to the bottom of a sea of depth $1400m$ the volume decreases by 2%. The Bulk modulus of rubber ball is (density of water is $1g/cm^3$ and $g = 10m/s^2$

A. $7 \times 10^8 N/m^2$

B. $6 \times 10^8 N/m^2$

C. $14 \times 10^8 N/m^2$

D. $9 \times 10^8 N/m^2$

Answer:

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48. A spherical ball contracts in volume by 0.02%, when subjected to a normal uniform pressure of 50 atmosphere. The Bulk modulus of its material is

A. $3 \times 10^{10} N/m^2$

B. $2 \times 10^{10} N/m^2$

C. $2.5 \times 10^{10} N/m^2$

D. $1 \times 10^{13} N/m^2$

Answer:

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49. A steel plate of face area $4cm^2$ and thickness $0.5cm$ is fixed rigidly at the lower surface. A tangential force of $10N$ is applied on the upper

surface. Find the lateral displacement of the upper surface with respect to the lower surface. Rigidity modulus of steel $= 8.4 \times 10^{10} Nm^{-2}$.

A. 5×10^{-5}m

B. $5 \times 10^{-6} m$

C. $2.5 \times 10^{-3} m$

D. $2.5 \times 10^{-4} m$

Answer:

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50. The poisson's ratio cannot have the value

A. 0.7

B. 0.2

C. 0.1

D. 0.5

Answer:

Watch Video Solution

51. A material has Poissons ratio 0.5. If a uniform rod of it suffers a longitudinal strain of 2×10^{-3}, then the percentage change in volume is

A. 0.02

B. 0.03

C. 0.05

D. 0

Answer:

Watch Video Solution

52. When a uniform metallic wire is stretched the lateral strain produced in it is β .if σ and Y are the Poisson's ratio and Young's modulus for wire, then elastic potential energy density of Wire is

A. $\frac{Y\beta^2}{2}$

B. $\frac{Y\beta^2}{2\sigma^2}$

C. $\frac{Y\sigma\beta^2}{2}$

D. $\frac{Y\sigma^2}{2\beta}$

Answer:

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53. The substances having very short plastic region are

A. Ductile

B. Britlle

C. Malleable

D. All of the these

Answer:

Watch Video Solution

54. Correct pair is

A. Change in shape - Longitudinal strain

B. Change in volume - Shear strain

C. Change in length - Bulk strain

D. Reciprocal of Bulk modulus - Compressibility

Answer:

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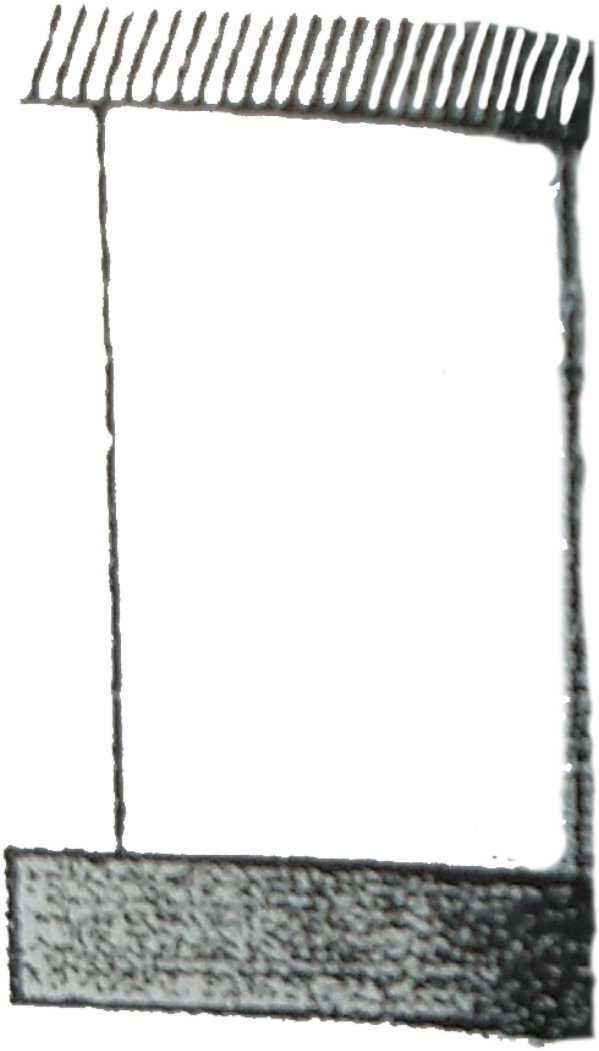
Assignment Section B

1. Two wires of equal length and cross-section area suspended as shown in figure. Their Young's modulus are Y_1 and Y_2 respectively. The

equavalent Young's modulus will be



A. $Y_1 + Y_2$

B. $\frac{Y_1 + Y_2}{Y_1 + Y_2}$

C. $\frac{Y_1 + Y_2}{2}$

D. $\sqrt{Y_1 Y_2}$

Answer:

Watch Video Solution

2. A uniform rod of length L, has a mass per unit length λ and area of cross section A. The elongation in the rod is l due to its own weight, if it suspended form the celing of a room. The Young's modulus of the rod is

A. $\frac{2\lambda g L^2}{AY}$

B. $\frac{\lambda g L^2}{AY}$

C. $\frac{\lambda g L^2}{4AY}$

D. $\frac{\lambda g L^2}{2AY}$

Answer:

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3. A solid sphere of radius R made of a material of bulk modulus K is surrounded by a liquid in a cylindrical container. A massless piston of area A floats on the surface of the liquid. When a mass M is placed on the piston to compress the liquid the fractional change in the radius of the sphere, $\delta R / R$, is .....

A. $\frac{Mg}{AB}$

B. $\frac{Mg}{4AB}$

C. $\frac{Mg}{3AB}$

D. $\frac{Mg}{2AB}$

Answer:

Watch Video Solution

4. A sphere contracts in volume by 0.01 % , when taken to the bottom of sea 1 km deep. The bulk modulus of the material of the sphere is (Given density of sea water may be taken as $1.0 \times 10^3 kgm^{-3}$)

A. $9.8 \times 10^6 N/m^2$

B. $1.2 \times 10^{10} N/m^2$

C. $9.8 \times 10^{10} N/m^2$

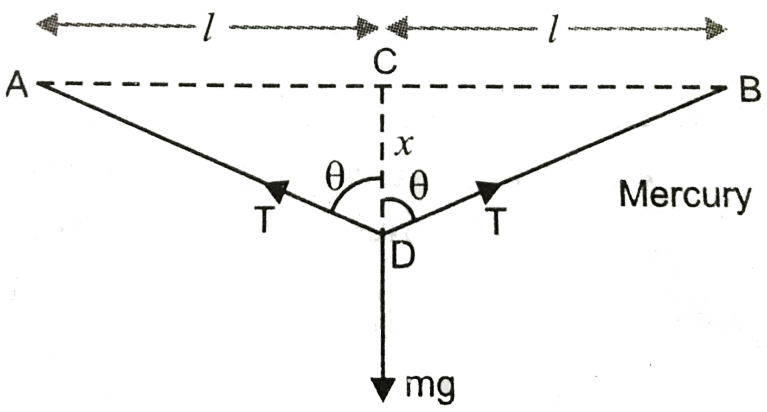
D. $9.8 \times 10^{11} N/m^2$

Answer:

Watch Video Solution

5. A mild steel wire of length 1.0 m and cross-sectional are $0.5 \times 10^{-2} cm^2$ is streached, well within its elastic limit, horizontally between two pillars. A mass of 100 g is suspended from the mid point of the wire, calculate the depression at the mid point.

$g = 10ms^{-2}, Y = 20 \times 10^{11} Nm^{-2}$.



A. $\left(\frac{Mg}{YA}\right)^{1/3}$

B. $\left(\frac{Mg}{lA}\right)^{1/3}$

C. $\left(\frac{Mgl^3}{YA}\right)^{1/3}$

D. $\left(\frac{Mg}{2YA}\right)$

Answer:

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6. A rigid bar of mass 15 kg is supported symmetrically by three wires each 2.0 m long. Those at each end are of copper and the middle one is of iron. Determine the ratios of their diameters if each is to have the same tension.

A. $\sqrt{\frac{11}{19}}$

B. $\sqrt{\frac{19}{11}}$

C. $\sqrt{\frac{30}{11}}$

D. $\sqrt{\frac{11}{30}}$

Answer:

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7. The volume change of a solid copper cube 20 cm on an edge, when subjected to a pressure of 14 MPa is

(Bulk modulus of copper 140 GPa)

A. $5 \times 10^{-8} m^3$

B. $4 \times 10^{-8} m^3$

C. $2 \times 10^{-8} m^3$

D. $8 \times 10^{-7} m^3$

Answer:

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8. Three bars having length $l, 2l$ and $3l$ and of cross-section $A, 2A$ and $3A$ are joined rigidly end to end Compound rod is subjected to a stretching force F. The increase in length of rod is (Young's modules of material is Y, and bars are massless)

(A) $\frac{13Fl}{2AY}$

(B) $\frac{Fl}{AY}$

(C) $\frac{9Fl}{AY}$

(D) $\frac{3Fl}{AY}$

A. $\frac{13Fl}{2AY}$

B. $\frac{Fl}{AY}$

C. $\frac{9Fl}{AY}$

D. $\frac{3Fl}{AY}$

Answer:

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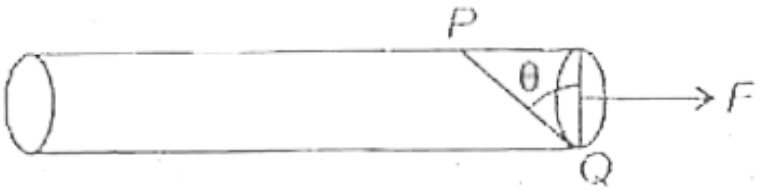
9. A force F is applied along a rod of transverse Sectional area A. The normal stress to a section PO inclined to transverse section is



A. $\frac{F\sin\theta}{A}$

B. $\frac{F}{A}\cos\theta$

C. $\frac{F}{2A}\sin 2\theta$

D. $\frac{F}{A}\cos^2\theta$

Answer:

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10. The strain energy stored in a body of volume V due to shear strain is ϕ (shear modulus is n)

A. $\frac{\phi^2 V}{2n}$

B. $\frac{\phi V^2}{2n}$

C. $\frac{\phi^2 V}{n}$

D. $\frac{1}{2}n\phi^2 V$

Answer:

Watch Video Solution

11. A vertical hanging bar of length l and mass m per unit length carries a load of mass M at lower end, its upper end is clamped to a rigid support.The tensile stress a distance x from support is ($A \rightarrow$ area of cross - section of bar)

A. $\frac{Mg + mg(l - x)}{A}$

B. $\frac{Mg}{A}$

C. $\frac{Mg + mgl}{A}$

D. $\frac{(M + m)gx}{Al}$

Answer:

Watch Video Solution

12. A metal wire having Poisson's ratio $\frac{1}{4}$ and Young's modulus $8 \times 10^{10} N/m^2$ is stretched by a force, which produces a lateral strain

of $0.02\,\%$ in it. The elastic potential energy stored per unit volume in wire is [in $\frac{J}{m^3}$']

A. 2.56×10^4

B. 1.78×10^6

C. 3.72×10^2

D. 2.18×10^5

Answer:

Watch Video Solution

13. An ideal gas has adiabatic exponent γ. It expands according to the law $P = \alpha$V, where is α constant. For this process, the Bulk modulus of the gas is

A. P

B. $\frac{P}{\propto}$

C. $\frac{\propto}{P}$

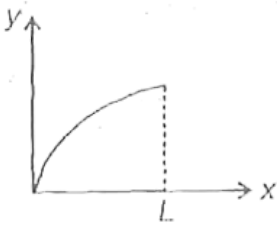
D. $(1 - \propto)P$

Answer:

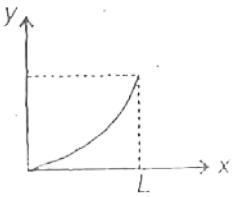
Watch Video Solution

14. Which of the following curve represents the correctly distribution of elongation (y) along heavy rod under its own weight, length of rod L, X distance of point from lower end?

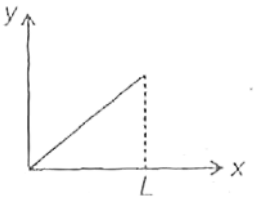
A.



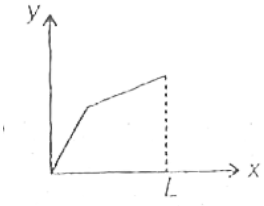
B.



C.



D.



Answer:

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15. The length of a metal wire is l_1 when the tension in it is T_1 and is l_2 when the tension is T_2. The natural length of the wire is

A. $\sqrt{l_1 + l_2}$

B. $\frac{l_1 T_2 - l_2 T_1}{T_2 - T_1}$

C. $\frac{l_2 T_2 - l_1 T_1}{T_1 + T_2}$

D. $\frac{l_1 + l_2}{2}$

Answer:

Watch Video Solution

16. A wire can sustain a weight of 15 kg: If it cut into four equal parts, then each part can sustain a weight

A. 5 kg

B. 45 kg

C. 15 kg

D. 30 kg

Answer:

Watch Video Solution

17. Two wire A and B are stretched by same force. If for A and B, $Y_A : Y_B = 1:2, r_A : r_B =$ 3: 1 and $l_A : l_B$=4:1,then ratio of their

extension $\frac{\Delta l_A}{\Delta l_B}$ will be

A. 0.42569444444444

B. $11:7$

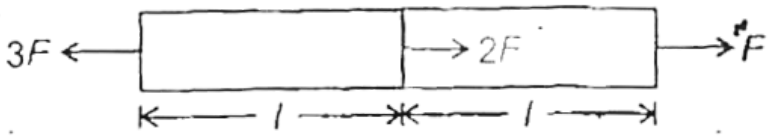
C. $8:9$

D. $6:5$

Answer:

Watch Video Solution

18. A bar is subjected to axial forces as shown. is the modulus of elasticity of the bar is E and A is it cross-section area. Its elongation will be



A. $\frac{Fl}{AE}$

B. $\frac{2Fl}{AE}$

C. $\frac{3Fl}{AE}$

D. $\frac{4Fl}{AE}$

Answer:

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19. A metal ring of initial radius r and cross-sectional area A is fitted onto a wooden disc of radius R > r. If Youngs modules of metal is Y then tension in the ring is

A. $\frac{AYR}{r}$

B. $\frac{AY(R-r)}{r}$

C. $\frac{Y}{A}\left(\frac{R-r}{r}\right)$

D. $\frac{yr}{AR}$

Answer:

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20. A material has normal density ρ and bulk modulus K. The increase in the density of the material when it is subjected to an external pressure P from all sides is

A. $\frac{\rho P}{2B}$

B. $\frac{\rho B}{2P}$

C. $\frac{\rho P}{B-P}$

D. $\frac{\rho B}{B-P}$

Answer:

Watch Video Solution

21. A wire of length $5m$ is twisted through 30^0 at free end If the radius of wire is $1mm$, the shearing strain in the wire is

A. 30°

B. 0.36

C. 1°

D. 0.18°

Answer:

Watch Video Solution

22. One end of a uniform wire of length L and of weight W is attached rigidly to a point in the roof and a weight W_1 is suspended from its lower end. IF S is the area of cross-section of the wire, the stress in the wire at a height 3L/4 from its lower end is

A. $\frac{w_1}{A}$

B. $\frac{\left(W_1 + \frac{W}{4}\right)}{A}$

C. `(W_1+3W/A)

D. $\frac{W_1 + W}{A}$

Answer:

Watch Video Solution

23. Two rods A and B of the same material and length have radii r_1 and $r_2$respective. When they are rigidly fixed at one end and twisted by the same torque applied at the other end, the ratio $\left[\frac{\text{the angle of twist at the end of A}}{\text{the angle of twist at the end of B}}\right]$ equal to

A. $\frac{r_1^2}{r_2^2}$

B. $\frac{r_2^2}{r_2^1}$

C. $\frac{r_2^4}{r_1^4}$

D. $\frac{r_4^1}{r_4^2}$

Answer:

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24. A uniform wire of length L and radius r is twist by an angle α. If modulus of rigidity of the wire is η, then the elastic potential energy stored in wire

A. $\frac{\pi\eta r^4\alpha}{2L^2}$

B. $\frac{\pi\eta r^4\alpha^2}{4L}$

C. $\frac{\pi\eta r^4\alpha}{4L^2}$

D. $\frac{\pi\eta r^4\alpha^2}{2L}$

Answer:

Watch Video Solution

25. What is called the ratio of the breaking stress and the working stress?

A. Elastic fatigue

B. Elastic after effect

C. Yield point

D. Power of safety

Answer:

Watch Video Solution

26. If δ is the depression produced in a beam of length L, breadth b and thickness d, when a load is placed at the mid point, then

A. $\delta \propto L^3$

B. $\delta \propto \frac{1}{b^3}$

C. $\delta \propto \frac{1}{d}$

D. All of these

Answer:

Watch Video Solution

Assignment Section C

1. The bulk modulus of a spherical object is B. If it is subjected to uniform pressure p, the fractional decrease in radius is

A. $\frac{P}{B}$

B. $\frac{B}{3p}$

C. $\frac{3p}{B}$

D. $\frac{P}{3B}$

Answer:

Watch Video Solution

2. The Young's modulus of steel of steel is twics that of brass. Cross - section, one of steel and another of brass are suspended from the same

roff. It we want the lower ends of the weight added to the steel and brass whires must be in the ratio of

A. $1:1$

B. $1:2$

C. $2:1$

D. $4:1$

Answer:

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3. The approximate depth of an ocean is $2700m$. The compressibility of water is $45.4 \times 10^{11} Pa^{-1}$ and density of water is $10^3 lg/m^3$. What fractional compression of water will be obtained at the bottom of the ocean?

A. 1.4×10^{-2}

B. 0.8×10^{-2}

C. 1.0×10^{-2}

D. 1.2×10^{-2}

Answer:

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4. Copper of fixed volume V is drawn into wire of length l. When this wire is subjected to a constant force F, the extension produced in the wire is Δl. Which of the following graphs is a straight line?

A. $\Delta l versus \frac{1}{l}$

B. $\Delta l versus l^2$

C. $\Delta l versus \frac{1}{l^2}$

D. $\Delta l verus l$

Answer:

Watch Video Solution

5. The following four wires of length L and radius r are made of the same material. Which of these will have the largest extension, when the samne tersion is applied?

A. L=400 cm, r=0.8mm

B. L=300 cm, r=0.6mm

C. L=200 cm, r=0.4mm

D. L=100 cm, r=0.2mm

Answer:

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6. A rope 1 cm 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

Answer:

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7. A wire of length L and radius r is clamped at one end. On stretching the other end of the wire with a force F, the increase in its length is 1. If another wire of same material but of length 2L and radius 2r is stretched with a force 2F, the increase in its leagth will be

A. l

B. 2l

C. 4l

D. $\frac{l}{2}$

Answer:

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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 M Pa is)

A. 8.4

B. 84

C. 92.4

D. 168

Answer:

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9. Which of the following relations is true?

A. $Y = 2\eta(1 - 2\sigma)$

B. $Y = 2\eta(1 + 2\sigma)$

C. $Y = 2\eta(1 + \sigma)$

D. $(1 - \sigma)2\eta = Y$

Answer:

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10. A 5 m long aluminium wire $\left(Y = 7 \times 10^{10} Nm^{-2}\right)$ of diameter 3 mm supports a 40 kg mass . In order to have the same elongation in a copper wire $\left(Y = 12 \times 10^{10} Nm^{-2}\right)$ of the same length under the same weight, the diameter should now be in mm.

A. 1.75

B. 1.5

C. 2.3

D. 5

Answer:

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11. Two steel wires of the same radius have their lengths in the ratio of $1:2$. If they are stretched by the same force, then the strains produced in the two wires will be in the ratio of

A. $2:1$

B. $1:1$

C. $1:2$

D. $1:4$

Answer:

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12. A steal wire of cross-section area $3 \times 10^{-6} m^2$ can withstand a maximum strain of 10^{-3} .Young's modulus of steel is $2 \times 10^{11} Nm^{-2}$ .The maximum mass this wire can hold is

A. 40 kg

B. 60 kg

C. 80 kg

D. 100 kg

Answer:

Watch Video Solution

13. The hollow shaft is..than a solid shaft of same mass, material and length

A. Less stiff

B. More stiff

C. Equally stiff

D. None of these

Answer:

Watch Video Solution

14. The bulk modulus for an incompresssible liquid is

A. Zero

B. Unity

C. Infinity

D. Between 0 and 1

Answer:

Watch Video Solution

15. A copper rod length L and radius r is suspended from the ceiling by one of its ends. What will be elongation of the rod due to its own weight when p and Y are the density and Young's modulus of the copper respectively?

A. $\frac{p^2gL^2}{2Y}$

B. $\frac{pgL^2}{2Y}$

C. $\frac{p^2g^2L^2}{2Y}$

D. $\frac{pgL}{2Y}$

Answer:

Watch Video Solution

16. Which of the folliwing substances has the highest elastictiy

A. Steel

B. Copper

C. Rubber

D. Sponge

Answer:

Watch Video Solution

17. When a wire of length $10m$ is subjected to a force of $100N$ along its length, the lateral strain produced is 0.01×10^{-3}. The Poisson's ratio was found to be 0.4. If the area of cross-section of wire is $0.025m^2$, its Young's modulus is

A. $1.6 \times 10^8 Nm^{-2}$

B. $2.5 \times 10^{10} Nm^{-2}$

C. $1.5 \times 10^{11} Nm^{-2}$

D. $16 \times 10^9 Nm^{-2}$

Answer:

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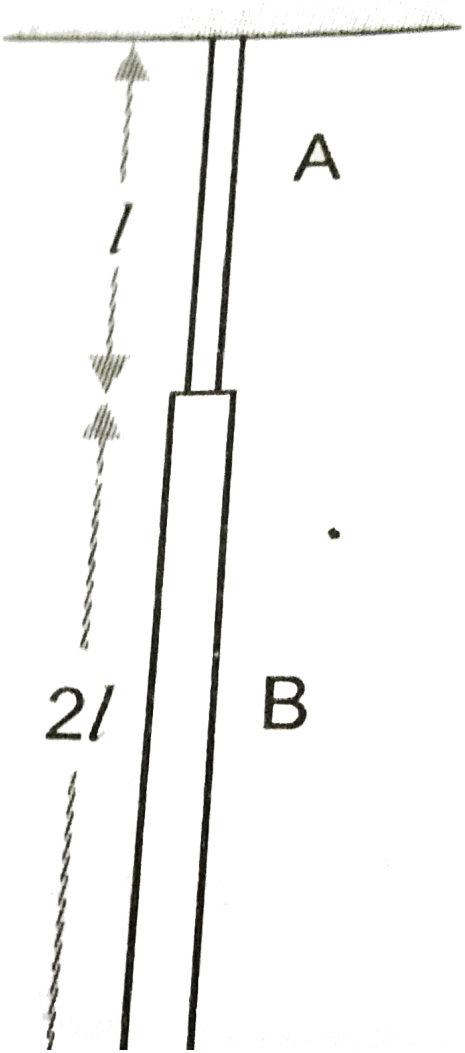
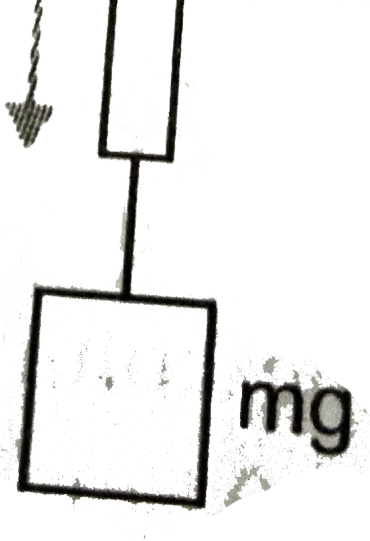
18. Two wire A and B of length l, radius r and length 2l, radius 2r having same Young's modulus Y are hung with a width mg, fig. What is the net elongation in the two wires?





A. $\frac{3mgl}{\pi r^2 Y}$

B. $\frac{2mgl}{3\pi r^2 Y}$

C. $\frac{3mgl}{2\pi r^2 Y}$

D. $\frac{3mgl}{4\pi r^2 Y}$

Answer:

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19. 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. $2 \times 10^9 Nm - 2$

B. $4 \times 10^9 Nm - 2$

C. $8 \times 10^9 Nm - 2$

D. $16 \times 10^9 Nm - 2$

Answer:

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20. A rod of length l and radius r is joined to a rod of length $l/2$ and radius $r/2$ of same material. The free end of small rod is fixed to a rigid base and the free end of larger rod is given a twist of θ°, the twist angle at the joint will be

A. $\frac{\theta}{4}$

B. $\frac{\theta}{2}$

C. $\frac{5\theta}{6}$

D. $\frac{8\theta}{9}$

Answer:

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21. The Young's modulus of the material of a wire is $2 \times 10^{10} Nm^{-2}$ If the elongation strain is 1% then the energy stored in the wire per unit volume is Jm^{-3} is

A. 10^6

B. 10^8

C. 2×10^6

D. 2×10^8

Answer:

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22. A weight is suspended from a long metal wire. If the wire suddenly breaks, its temperature

A. Remains the same

B. Decreases

C. increases

D. First decreases then Increases

Answer:

Watch Video Solution

23. A wire of natural length l, young's modulus Y and area of cross-section A is extended by x. Then, the energy stored in the wire is given by

A. $\frac{1}{2}\frac{YA}{l}x^2$

B. $\frac{1}{3}\frac{YA}{l}x^2$

C. $\frac{1}{2}\frac{Yl}{A}x^2$

D. $\frac{1}{2}\frac{YA}{l^2}x^2$

Answer:

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24. When a force is applied on a wire of uniform cross-sectional area 3×10^{-6} m and length 4 m, the increase in length is 1mm. Energy stored in it will be $\left(Y = 2 \times 10^{11} Nm^{-2}\right)$

A. 6250 J

B. 0.177 J

C. 0.075 J

D. 0.150 J

Answer:

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25. 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. $0.5YX^2$

B. $0.5Y^2X$

C. $2YX^2$

D. YX^2

Answer:

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26. A uniform metal rod of $2mm^2$ area of cross section is heated from $0^\circ C$ to $20^\circ C$. The coefficient of linear expansion of the rod is

$12 \times 10^{-6} / {}^{\circ} C$. Its Young's modulus of elasticity is $10^{11} N / m^2$, then the energy stored per unit volume of rod is,

A. $1440 Jm^{-3}$

B. $15750 Jm^{-3}$

C. $1500 Jm^{-3}$

D. $2880 Jm^{-3}$

Answer:

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27. A material has Poissons ratio 0.5. If a uniform rod of it suffers a longitudinal strain of 2×10^{-3}, then the percentage change in volume is

A. 0.6

B. 0.4

C. 0.2

D. Zero

Answer:

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28. When the length of a wire is increased by 5%, its radius decreases by 1%. The Poission's ratio for the material of the wire is

A. $+\frac{1}{2}$

B. $-\frac{1}{2}$

C. $+\frac{1}{5}$

D. $-\frac{1}{5}$

Answer:

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29. If Young's modulus of elasticity Y for a material is one and half times its rigidity coefficient η,the Poisson's ratio σ will be

A. $+\frac{2}{3}$

B. $-\frac{1}{4}$

C. $+\frac{1}{4}$

D. $-\frac{2}{3}$

Answer:

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Assignment Section D

1. According to Hooke's law of elasticity if stress is increased, the ratio of stress to strain

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statement,

Answer:

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2. A: Strain is a dimensionless quantity,

R: Strain is internal force per unit area of a body

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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3. A: Diamond is more elastic than rubber.

R: When same deforming force is applied diamond: deforms less than rubber.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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4. Statement-1: Young's modulus for a perfectly plastic body is zero

Statement-2: For a perfectly plastic body, restoring force is zero.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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5. Statement-1: The bridges are declared unsafe after a long use.

Statement-2: Elastic strength of bridges losses with time.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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6. Assertion: Spring balances show incorrect readings after using for a long time.

Reason : On using for a long time, springs in the balances lose their elastic strength.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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7. Assertion Modulus of elasticity does not depend upon the dimensions of material

Reason Modulus of elasticity is a material property.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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8. The adiabatic elasticity of a gas is equal to

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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9. A beam of metal supported at the two ends is loaded at the centre. The depression at the centre is proportional to

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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10. A:To minimise the depression in a beam. It is designed as "I" shape grider.

R:The "I"shape griders have large load bearing surface, which decrease the stress.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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11. A:Iron is more elastic than copper

R:Under a given deforming force Iron is deforemed less than copper

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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12. A: Lateral strain is directly proportional to the longitudinal strain within the elastic limit.

R:Poission ratio for a given material at a constant temperature is constant.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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13. Identical springs of steel and copper are equally stretched. On which, more work will have to be done?

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion,thyen mark(1).

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion,thyen mark(2).

C. If Assertion is true statement but Reason is false,then mark(3).

D. If both Assertion and Reason are false statement,then mark(4).

Answer:

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14. Assertion: With increase of temperature, elastic property of a substance decreases.

Reason: Elasticity is due to intermolecular forces which decreases with the increase of intermolecular distance.

A. If both Assertion & Reason are true and the reason is the correct explanation of the assertion

B. If both Assertion & Reason are true but the reason is not the correct explanation of the assertion

C. If Assertion is true statement but Reason is false

D. If both Assertion and Reason are false statement

Answer:

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