PHYSICS

BOOKS - MTG PHYSICS (ENGLISH)

MECHANICAL PROPERTIES OF SOLIDS

Introduction

1. Solids which break above the elastic limit are called

A. brittle

B. ductile

C. Â malleable

D. elastic

Answer: A

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2. Out of the following the most plastic material is

A. Â iron

B. Â wood

C. Â rubber

D. Â plasticine

Answer: D

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3. Match the column I with column II.

Column I		Column II	
(A)	A body which regains its original shape after the removal of external forces.	(p)	Elasticity
(B)	A body which does not regain its original shape after the removal of external forces.	(q)	Elastic body
(C)	A body which does not show any deformation on applying external forces.	(r)	Plastic body
(D)	The property of the body to regain its original configuration when the deforming forces are removed.	(s)	Rigid body

A. Â A - q, B - r, C - s, D - p

B. A - p, B - q, C- r, D - s

C. Â A r, B - s, C - p, D- q

D. A -s, B - p, C-q, D - r

Answer: A

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4. The substance which shows partically no ealstic after effect is

A. copper

B. Â silver

C. rubber

D. quartz

Answer: D

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Elastic Behavior Of Solids

1. Two idential solid balls, one of ivory and the other of wet caly, are dropped from the same height on

the floor. Which one will rise to a greater height after striking the floor and why ?

A. ivory ball will rise to a greater height than wet clay ball.

B. ivory ball will rise to a lesser height than wet clay ball.

C. both balls will rise to the same height.

D. data is insufficient.

Answer: A

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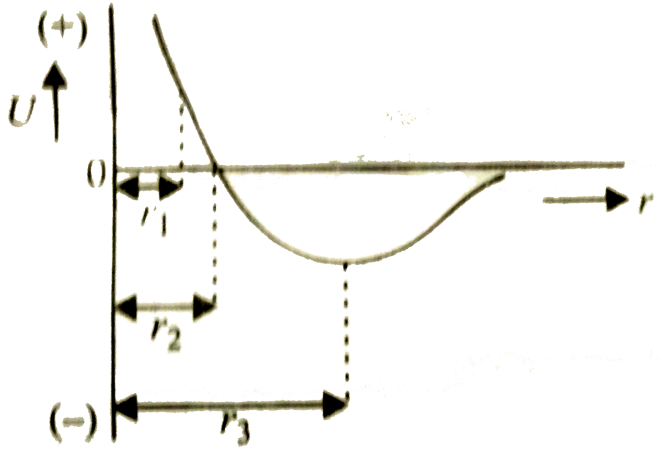
2. The potential energy U of two atoms of a diatomic molecule as a function of distance r between the atoms as shown in the given figure.



Read the following statement carefully.

1. The equilibrium separation distance between the atoms is equal to r_2.

2. At $r = r_1$, the force between the atom is repulsive.

. For$r > r_2$, the force between the atoms is

attractive

Which of the above statements is true ?

A. 1 only

B. Â 2 only

C. Â 3 only

D. 2 and 3

Answer: B

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Stress And Strain

1. Which of the following statements is incorrect?

A. When a material is under tensile stress, the restoring forces are caused by interatomic attraction while under compressional stress, the restoring force is due to interatomic repulsion.

B. The stretching of a coil is determined by its shear modulus.

C. Rubber is more elastic than steel.

D. Â Shearing stress plays an important role in the buckling of shafts.

Answer: C

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2. Shear stress plays is related to

A. length

B. area

C. volume

D. shape

Answer: D

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3. If the volume of a wire remains constant when subjected to tensile stress, the value of Poisson's ratio of the material of the wire is

A. 0.1

B. 0.2

C. 0.4

D. 0.5

Answer: D

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4. Fluids can develop

A. Â longitudinal strain only

B. langitudinal and shearing strain

C. longitudinal, shearing and volumetric strain

D. Â volumetric strain only

Answer: D

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5. Which of the following statements is correct regarding poissen's ratio?

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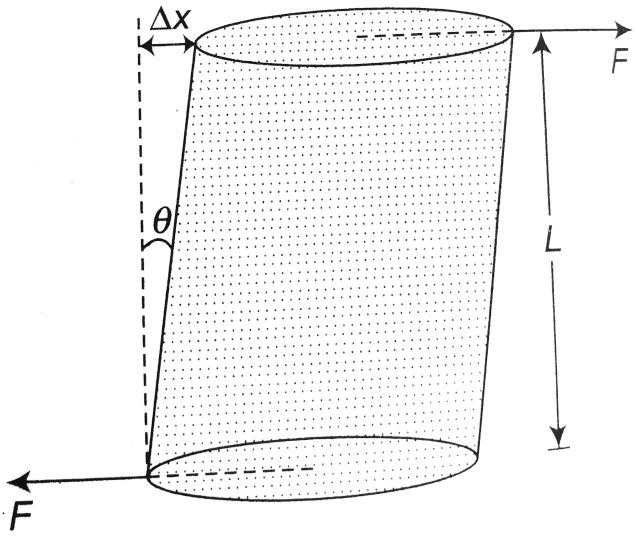

6.

If two equal and opposite defirming forces are applied parallel to the cross sectional area of the cylinder as shown in the figure, there is a relative displacement between the oppsite faces of the cylinder. The ratio of Ax to L is known as

A. loagitudinal strain

B. Â volumetric strain

C. Shearing strain

D. Poisson's ratio

Answer: C

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7. Stress is a__quantity.

A. scalar

B. vector

C. tensor

D. dimensionless

Answer: C

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8. The breaking stress of a wire depends on

A. Â length of the wire

B. radius of the wire

C. material of the wire

D. shape of the cross-section

Answer: C

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9. A wire is suspended from the ceiling and stretched under the action of weight F suspended from its other end. The force exerted by the ceiling on it is equal and opposite to the weight.

A. Tensile stress at any cross section A of the wire is $\frac{F}{A}$.

B. Tensile stress at any cross section is zero.

C. Tensile stress at any cross section A of the wire is $\frac{2F}{A}$.

D. Tension at any cross section A of the wire is 2F.

Answer: A

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Hooke S Law

1. In which year Robert Hooke presented his law of elasticity?

A. 1672

B. Â 1674

C. 1676

D. 1678

Answer: C

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

A. decreases

B. increases

C. becomes zero

D. remains constant

Answer: D

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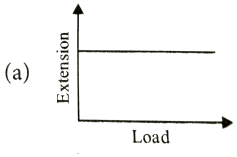
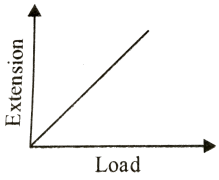
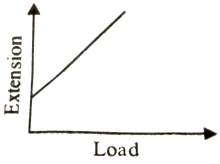
3. Within elastic limit, which of the following graphs correctly represents the variation of extension in the length of wire with the external load?

A. 

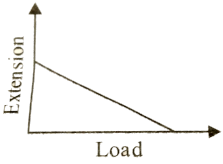
B.



C.



D.



Answer: B

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Stress Strain Curve

1. Substances which can be stretched to cause large strairs are called

A. isomers

B. plastomers

C. elastomers

D. polymers

Answer: C

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2. The breaking stress for a wire of unit cross-section is called

A. yield point

B. elastic fatigue

C. tensile strength

D. Young's modulus

Answer: C

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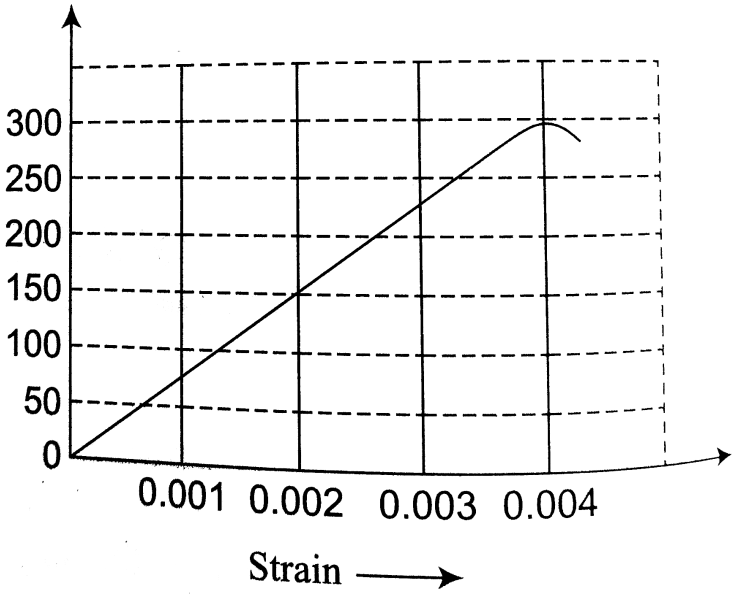

3. Figure shows the strain stress curve for a given material. The Young's modulus of the material is

A. $5 \times 10^9 Nm^{-2}$

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

C. $7.5 \times 10^9 Nm^{-2}$

D. $7.5 \times 10^{10} Nm^{-2}$

Answer: D

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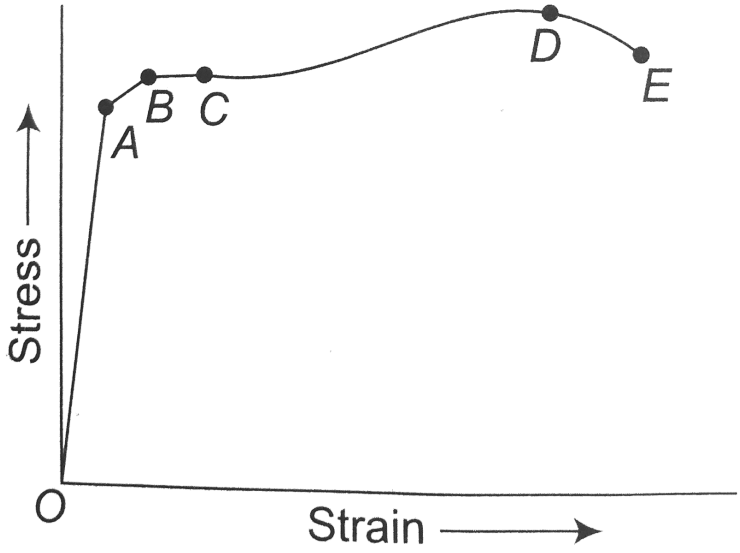
4.



The stress strain graph for a metal wire is as shown in the figure. In the graph, the region in which

Hooke's law is obeyed, the ultimate strength and fracture are represented by

A. OA, C, D

B. OB, D, E

C. OA, D, E

D. OB, C, D

Answer: C

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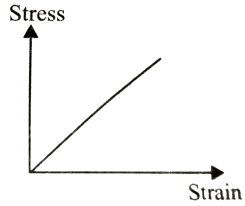
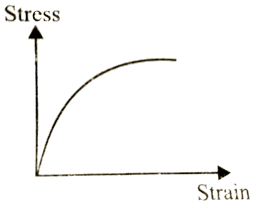
5. Which of the following is the graph showing stress-strain variation for elastomers ?

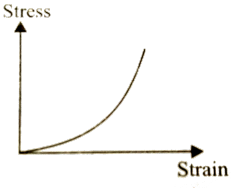
A.



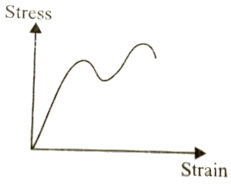
B.



C.



D.



Answer: C

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Elastic Moduli

1. The ratio of tensile stress to the longitudinal strain is defined as

A. Bulk modulus

B. Young's modulus

C. Shear modulus

D. Compressibility

Answer: B

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2. Which of the following statements is incorrect?

A. Young's modulus and shear modulus are relevant only for solids.

B. Â Bulk modulus is relevant for solids, liquids and gases.

C. Metals have larger values of Young's modulus than elastomers.

D. Alloys have larger values of Young's modulus than metals.

Answer: D

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3. For a perfectly rigid body

A. Young's modulus is infinite and bulk modulus is zero.

B. Young's modulus is zero and bulk modulus is infinite.

C. Young's modulus is infinite and bulk modulus is also infinite.

D. Young's modulus is zero and bulk modulus is also zero.

Answer: C

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4. Identical springs of stecl and copper $(Y_{\text{Steel}} > Y_{\text{copper}})$ are equally stretched.

A. Â Less work is done on copper spring.

B. Less work is done on steel spring.

C. Equal work is cone on both the springs.

D. Data is incomplete.

Answer: B

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5. Let Y_s and Y_A represent Young's modulus for steel and aluminium respectively. It is said that steel is more elastic than aluminium.Therefore, it follows that

A. $Y_s = Y_A$

B. $Y_s < Y_A$

C. $Y_s > Y_A$

D. $\frac{Y_S}{Y_A} = 0$

Answer: C

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6. Which of the following substances has highest value of Young's modulus?

A. Aluminium

B. Iron

C. Copper

D. Steel

Answer: D

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7. If the work done in stretching a wire by $1mm$ is $2J$, then work necessary for stretching another wire of same material but with double radius of cross - section and half of the length by $1mm$ is

A. 16J

B. 8J

C. 4J

D. $\frac{1}{4}J$

Answer: A

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8. The following four wires are made of the same material which of these will have the largest extension when the same tension is applied

A. L=100 cm, r= 0.2 mm

B. L=200 cm, r =0.4 mm

C. L 300 cm, r =0.6 mm

D. L 400 cm, r= 0.8 mm

Answer: A

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9. Four identical hollow cylindrical cloumns of steel support a big structure of mass 50.000 kg. the inner and outer radii of each column are 30 cm and 60 cm respectively. Assume the load distribution to be

uniform , calculate the compressional strain of each column. the Young's modulus of steel is $2.0 \times 10^{11} Pa.$

A. $\frac{Mg}{\pi\left(R_2^2 - R_1^2\right)Y}$

B. $\frac{Mg}{4\pi\left(R_2^2 - R_1^2\right)Y}$

C. $\frac{Mg}{\pi\left(R_1^2 - R_2^2\right)Y}$

D. $\frac{Mg}{4\pi\left(R_1^2 - R_2^2\right)Y}$

Answer: B

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

A. $\frac{1}{2}\frac{(\text{Stress})}{Y}$

B. $\frac{1}{2}\frac{(\text{Stress})^2}{Y}$

C. $\frac{1}{2}\frac{(\text{Stress})^2}{Y^2}$

D. $\frac{1}{2}\frac{(\text{Stress})}{Y^2}$

Answer: B

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11. Two wires of the same material and length but diameter in the ratic 1: 2 are stretched by the same load. The ratio of elastic potential energy per unit volume for the two wires is

A. $1:1$

B. $2:1$

C. $4:1$

D. $16:1$

Answer: D

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12. Young's modulus of a wire depends on

A. diameter of the wire

B. mass hanging from the wire

C. length of the wire

D. Â material of the wire

Answer: D

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13. A light rod of length 2 m is suspended from 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 0.1 cm sq. and the other of brass of cross-section 0.2 cm sq. Along the rod at what distance a weight may be hung to produce equal stresses in the wires?

$(Y_{\text{Steel}} = 2 \times 10^{11} Nm^{-2}, Y_{\text{Bass}} = 1 \times 10^{11} Nm^{-2})$

A. $\frac{4}{3}m$ from steel wire

B. $\frac{4}{3}m$ from brass wire

C. $1m$ from steel wire

D. $\frac{1}{4}m$ from brass wire

Answer: A

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14. In the question number 36, at which distance a weight may be hung along the rod, in order to produce equal strains in both the wires?

A. $\frac{4}{3}m$ from steel wire

B. $\frac{4}{3}m$ from brass wire

C. 1 m from steel wire

D. $\frac{1}{4}m$ from brass wire

Answer: C

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15. 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. $\frac{l}{4}$

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

C. l

D. 2l

Answer: C

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16. The radii and Young's moduli of two uniform wires A and B are in the ratio $2:1$ and $1:2$ respectively. Both wires are subjected to the same longitudinal force. If the increase in length of the wire A is one percent, the percentage increase in length of the wire B is

A. 1.0

B. 1.5

C. 2.0

D. 3.0

Answer: C

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17. A steel cable with a radius 2 cm supports a chairlift at a ski area. If the maximum stress is not to exceed $10^8 Nm^{-2}$, the maximam load the cable can support

A. $4\pi \times 10^5 N$

B. $4\pi \times 10^4 N$

C. $2\pi \times 10^5 N$

D. $2\pi \times 10^4$

Answer: B

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18. A steel rod of length 1 m and radius 10 mm is stretched by a force 100 kN along its length. The stress produced in the rod is $Y_{Steel} = 2 \times 10^{11} Nm^{-2}$

A. $3.18 \times 10^{6} Nm^{-2}$

B. $3.18 \times 10^{7} Nm^{-2}$

C. $3.18 \times 10^{8} Nm^{-2}$

D. $3.18 \times 10^{9} Nm^{-2}$

Answer: C

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19. In the question number 11, the percentage strain produced in the rod is

A. Â 0.04%

B. 0.0008

C. Â 0.16%

D. Â 0.24 %

Answer: C

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20. A steel wire can support a maximum load of W before reaching its elastic limit. How much load can another wire, made out of identical steel, but with a radius one half the radius of the first wire, support before reaching its elastic limit?

A. W

B. $\frac{W}{4}$

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

D. $4W$

Answer: C

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21. A uniform rod of mass m. length L, area of cross-sectiCn A is rotated about an axis passing through one of its ends and perpendicular to its length with constant angular velocity $omega$ in a horizontal plane If Y is the Young's modulus of the material of rod, the increase in its length due to rotation of rod is

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

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

C. $\frac{m\omega^2 L^2}{3AY}$

D. $\frac{2m\omega^2 L^2}{AY}$

Answer: C

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22. A wire stretches by a certain amount under a load. If the load and radius are increased to four times, find the stretch caused in the wire.

A. l

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

C. $\frac{l}{3}$

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

Answer: D

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23. A cord of mass m length L, area of cross section A and Young's modulus y is hanging from a ceiling with the help of a rigid support. The elogation developed in the wire due to its own weight is

A. $\frac{mgl}{YA}$

B. $\frac{mgl}{2YA}$

C. $\frac{2mgl}{YA}$

D. $\frac{2mgl}{3YA}$

Answer:

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24. In the question number 46, if the mass M is hung the free end of the wire, then the extension produc in the wire is

A. $\frac{\mu g L^2 + MgL}{2YA}$

B. $\frac{2\mu g L^2 + MgL}{YA}$

C. $\frac{\mu g L^2 + 2MgL}{2YA}$

D. $\frac{\mu g L^2 + MgL}{YA}$

Answer: C

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25. A 14.5 kg mass, fastened to the end of a steel wire of unstretched length 1m, is whirled in a vertical circle with an angular velocity of $2rev./s$ at the bottom of the circle. The cross-sectional area of

the wire is $0.065cm^2$. Calculate the elongation of the wire when the mass is at the lowest point of its path $Y_{steel} = 2 \times 10^{11} Nm^{-2}$.

A. 0.52 mm

B. 1.87 mm

C. 2.52 mm

D. 3.52 mm

Answer: C

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26. A wire of length L and area of cross-section A, is stretched by a load. The elongation produced in the wire is I. If Y is the Young's modulus of the material of the wire, then the force constant of the wire is

A. $\frac{YL}{A}$

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

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

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

Answer: C

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27. A metal wire of length L_1 and area of cross section A is attached to a rigid support. Another metal wire of length L_2 and of the same cross sectional area is attached to the free end of the first wire. A body of mass M is then suspended from the free end of the second wire, if Y_1 and Y_2 are the Young's moduli of the wires respectively the effective force constant of the system of two wires is

A. $\frac{[(Y_1Y_2)A]}{[2(Y_1L_2+Y_2L_1)]}$

B. $\frac{[(Y_1Y_2)A]}{(L_1L_2)^2}$

C. $\frac{[(Y_1Y_2)A]}{(Y_1L_2+Y_2L_1)}$

D. $\frac{\left[(Y_1Y_2)^{1/2}A\right]}{(L_2+L_1)^{1/2}}$

Answer: C

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28. The area of a cross-section of steel wire is $0.1cm^{-2}$ and Young's modulus of steel is $2x10^{11}Nm^{-2}$. The force required to stretch by 0.1% of its length is

A. 1000 N

B. 2000 N

C. Â 4000 N

D. 5000N

Answer: d

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29. A stone of mass m is tied to one end of a wire of length L. The diameter of the wire is D and it is suspended vertically. The stone is now rotated in a horizontal plane and makes an angle θ with the vertical. If Young's modulus of the wire is Y, Then the increase in the length of the wire is

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

B. $\frac{4mgl}{\pi D^2 Y \sin\theta}$

C. $\frac{4mgl}{\pi D^2 Y \cos\theta}$

D. $\frac{4mgl}{\pi D^2 Y \tan\theta}$

Answer: C

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30. When the load on a wire is slowly increased from $3kgwt$ to $5kgwt$, the elongation increases from 0.61 to $1.02mm$. The work done during the extension of wire is

A. $16 \times 10^{-3} J$

B. $8 \times 10^{-2} J$

C. $20 \times 10^{-2} J$

D. $11 \times 10^{-3} J$

Answer: A

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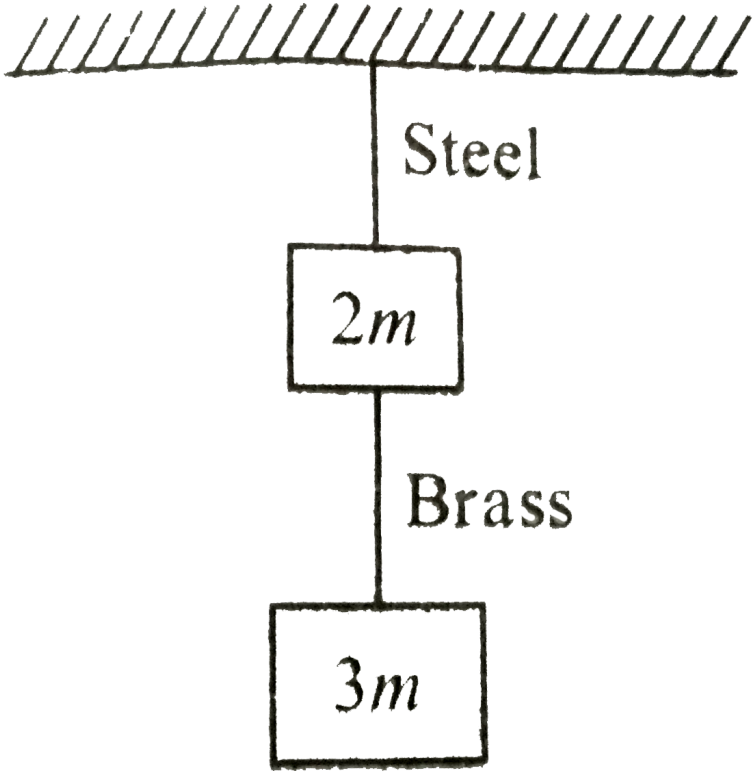
31. If the ratio of diameters,lengths and Young's moduli of steel and brass wires shown in the figure are p, q and r respectively . Then the corresponding

ratio of increase in their lenghts would be



A. $\frac{3q}{5p^2r}$

B. $\frac{5q}{3p^2r}$

C. $\frac{3q}{5pr}$

D. $\frac{5q}{3pr}$

Answer: B

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32. A copper wire of length 2.4 m and a steel wire of length 1.6 m, both of diameter 3 mm, are connected end to end. When stretched by a load, the net elongation found to be 0.7 mm. The load appled is $\left(Y_{\text{Copper}} = 1.2 \times 10^{11} Nm^{-2}, Y_{\text{steel}} = 2 \times 10^{11} Nm^{-2}\right)$

A. $1.2 \times 10^2 N$

B. $1.8 \times 10^2 N$

C. $2.4 \times 10^2 N$

D. $3.2 \times 10^2 N$

Answer: B

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33. In the question number 55, the ratio of elongation of steel to the copper wires is

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

B. $\frac{2}{5}$

C. $\frac{3}{2}$

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

Answer: B

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34. A steel wire of length 4.5 m and cross-sectional area $3 \times 10^{-5} m^2$ stretches by the same amount as a copper wire of length 3.5 m and cross-sectional area of $4x10^{-5} m^2$ under a given load. The ratio of the Young's modulus of steel to that of copper is

A. 1.3

B. 1.5

C. 1.7

D. 1.9

Answer: C

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35. The young's modulus of a wire of length (L) and radius (r) is Y. If the length is reduced to $\frac{L}{2}$ and radius $\frac{r}{2}$, then its young's modulus will be

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

B. Y

C. 2Y

D. 4Y

Answer: B

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36. A Copper wire and steel of the same diameter and length are connected end to end and a force is applied, which stretches their combined length by 1 cm. The two wires will have

A. the same stress and strain

B. the same stress but different strain

C. the same strain but different stress

D. different strains and stress

Answer: B

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37. Which of the following apparatus is used to determine the Young's modulus of the material of a gives given wires?

A. Searle

B. sonometer

C. Metre bridge

D. Resonance tube

Answer: A

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38. How does Young's modulus change with rise in temperature?

A. 1) increases

B. 2) decreases

C. 3) remains unchanged

D. 4) None of these

Answer: B

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39. The length of a rubber cord is l_1 m when the tension is 4 N and l_2 m when the tension is 6 N.The length when the tension is 9 N, is

A. $(2.5l_2 - 1.5l_1)m$

B. $(6l_2 - 1.5l_1)m$

C. $(3l_1 - l_2)m$

D. $(3.5l_2 = -2.5l_1)m$

Answer: A

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40. The ratio of shearing stress to the shearing strain is defined as

A. Young's modulus

B. bulk modulus

C. shear modulus

D. compressibility

Answer: C

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41. The shear modulus is also known as

A. bulk modulus

B. Young's modulus

C. modulus of rigidity

D. Possion's ratio

Answer: C

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42. Which one of the following statements is correct? In the case of

A. shearing stress there is charge in volume.

B. hydraulic stress there is no change in shape.

C. shearing stress there is no change in shape.

D. hydraulic stress there is no change in volume.

Answer: B

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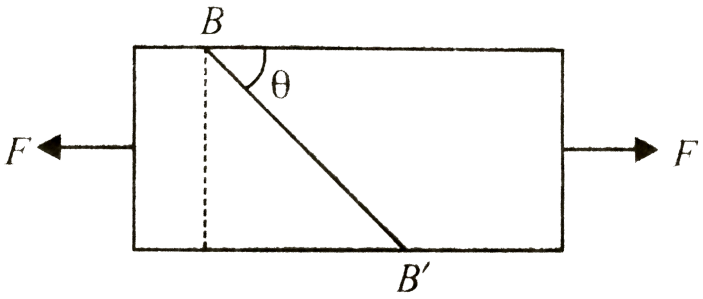
43. A bar of cross- sectional area A is is subjected two equal and opposite tensile forces at its ends as shown in figure. Consider a plane BB' making an angle θ with length. The ratio of tensile stress to the shearing stress on the plane BB' is



A. 1. $\tan\theta$

B. 2. $\sec\theta$

C. 3. $\cot\theta$

D. 4. $\cos\theta$

Answer: A

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44. In the question rumber 66, for what value of θ, shearing stress is maximum?

A. 0°

B. 30°

C. 45°

D. 90°

Answer: C

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45. Two parallel and opposite forces each 5000 N are applied tangentially to the upper and lower faces of a cubical metal block of side 25 cm. the angle of shear is (The shear modulus of the metal is 80 Gpa)

A. $10^{-4} rad$

B. $10^{-5} rad$

C. $10^{-6} rad$

D. $10^{-7} rad$

Answer: C

Watch Video Solution

46. The edges of an aluminum cube are $10cm$ long. One face of the cube is firmly fixed to a vertical wall. A mass of $100kg$ is then attached to the opposite face of the cube. Shear modulus of aluminum is $25 \times 10^9 Pa$, the vertical deflection in the face to which mass is attached is

A. $4 \times 10^{-5} m$

B. $4 \times 10^{-6} m$

C. $4 \times 10^{-7} m$

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

Answer: C

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47. For most materials the Youngs modulus is n times the modulus of rigidity, where n is

A. 2

B. 3

C. 4

D. 5

Answer: B

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48. A square lead slab of side 50 cm and thickness 10 cm is subjected to a shearing force (on its narrow face) of $9 \times 10^4 N$. The lower edge is riveted to the floor. How much will the upper edge be displaced? (Shear modulus of lead $= 5.6 \times 10^9 Nm^{-2}$)

A. 0.16mm

B. 1.6mm

C. 0.16 cm

D. 1.6 cm

Answer: A

Watch Video Solution

49. The metal cube of side 10 cm is subjected to a shearing stress of $10^4 Nm^{-2}$. The modulus of rigidity if the top of the cube is displaced by 0.05 cm with respect to its bottom is

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

B. $10x^5 Nm^{-2}$

C. $1 \times 10^7 Nm^{-2}$

D. $4 \times 10^5 Nm^{-2}$

Answer: A

Watch Video Solution

50. For an ideal iquid

A. bulk modulus is infinite and shear modulus is zero.

B. bulk modulus is zero and shear modulus is inifinite.

C. bulk moduius is infinite and shear modulus is also infinite

D. bulk modulus is zero and shear modulus is also zero.

Answer: A

Watch Video Solution

51. Which of the following statements is incorrect?

A. The bulk modulus for solids is much larger than for liquids.

B. Gases are least compressible.

C. For a system in equilibrium, the value of bulk modulus is always positive.

D. The SI unit of bulk modulus is same that of pressure.

Answer: B

 Watch Video Solution

52. A sphere contracts in volume by $0.01\,\%$ when taken to the bottom of sea $1km$ keep. 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. $4.9 \times 10^{10} Nm^{-2}$

B. $9.8 \times 10^{10} Nm^{-2}$

C. $4.9 \times 10^{9} Nm^{-2}$

D. $9.8 \times 10^{9} Nm^{-2}$

Answer: B

Watch Video Solution

53. The bulk modulus of water if its volume changes from $100 litres$ to 99.5 litre under a pressure of $100 atm$ is (Take $1 atm = 10^5 Nm^{-2}$)

A. $2 \times 10^7 Nm\&^{-2}$

B. $2 \times 10^8 Nm\&^{-2}$

C. $2 \times 10^9 Nm\&^{-2}$

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

Answer: C

Watch Video Solution

54. The average depth of indian Ocean is about 3000 m. The fractional compression, $\frac{\triangle V}{V}$ of water at the bottom of the ocean is (Given Bulk modulus of the water $= 2.2 \times 10^9 Nm^{-2}$ and $g = 10ms^{-2}$)

A. $0.82\,\%$

B. $0.91\,\%$

C. $1.36\,\%$

D. $1.24\,\%$

Answer: C

Watch Video Solution

55. The density of water at the surface of ocean is ρ. If the bulk modulus of water is B, then the density of ocean water at depth, when the pressure at a depth is αp_0 and p_0 is the atmospheric pressure is

A. $\frac{\rho K}{k - nP_0}$

B. $\frac{\rho K}{K + nP_0}$

C. $\frac{\rho K}{K - (n-1)P_0}$

D. $\frac{\rho K}{(K + (n-1)P_0)}$

Answer: C

Watch Video Solution

56. If stress-strain relation for volametric change is in the from $\frac{\Delta V}{V_0} = KP$ where P is applied uniform pressure, then K stands for

A. shear modulus

B. compressibility

C. Young's modulus

D. bulk modulus

Answer: B

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57. Out of solids , liquids and gases, which one has all the three types of modulus ofelasticity and why gases have only bulk modulus of elasticity.

A. Solids

B. Liquids

C. Gases

D. Both solids and liquids

Answer: A

Watch Video Solution

58. A glass slab is subjected to a pressure of 10 atm. The fractional change in its volume is (Bulk modalus of glass $= 37 \times 10^9 Nm^{-2}, 1atm = 1 \times 10^5 Nm^{-2}$)

A. 2.7×10^{-2}

B. 2.7×10^{-3}

C. 2.7×10^{-4}

D. 2.7×10^{-5}

Answer: D

Watch Video Solution

59. To What depth must a rubber ball be taken in deep sea so that its volume is decreased y 0.1 %. (The bulk modulus of rubber is $9.8 \times 10^8 Nm^{-2}$, and the density of seac water is $10^3 kgm^{-3}$.)

A. 100 m

B. 18 m

C. 90 m

D. 180 m

Answer: C

Watch Video Solution

60. The compressibility of water is $5 \times 10^{-10} m^2 / N$. If it is subjected to a pressure of 15 MPa, the fractional decrease in volume will be-

A. 10 cc

B. 24 cc

C. 15 cc

D. 12 cc

Answer: B

Watch Video Solution

61. How much pressure should be applied on a litre of water if it is to be compressed by 0.1%?

(Bulk modulus of water= 2100 MPa)

A. 2100 kPa

B. 210 kPa

C. 2100 Mpa

D. 210MPa

Answer: A

Watch Video Solution

62. Â The volume change of a solid copper cube 10 cm on an edge, when subjected to a pressure of 7 MPa is

(Bulk modulus of copper 140 GPa)

A. $5 \times 10^{-2} cm^3$

B. $10 \times 10^{-2} cm^3$

C. $15 \times 10^{-2} cm^3$

D. $8 \times 10^{-1} cm^3$

Answer: D

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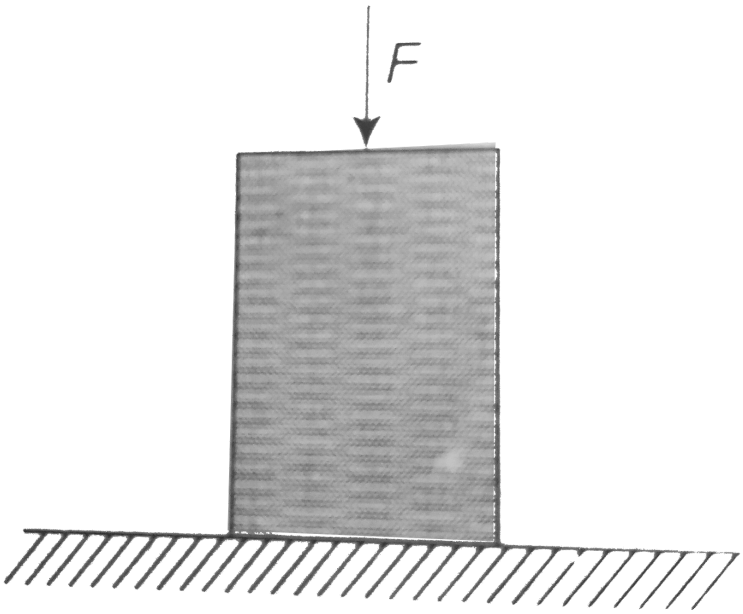

63.

A metal cylinder of length L is subjected to a uniform compressive to a uniform compressive force F as shown in the figure. The material of the

cylinder has Young's modulus Y and poisson's ratio σ The change in volume of the cylinder is

A. $\frac{sigamFL}{Y}$

B. $\frac{(1-\sigma)FL}{Y}$

C. $\frac{(1+2\sigma)FL}{Y}$

D. $\frac{(1-2\sigma)FL}{Y}$

Answer: D

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

A. 2.4

B. 1.2

C. 0.4

D. 0.2

Answer: D

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65. A material has Poisson's ratio 0.50. 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. 0.4

Answer: D

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66. The relation between Y. η and B is

A. $\frac{1}{Y} = \frac{1}{3\eta} + \frac{1}{9B}$

B. $\frac{9}{Y} = \frac{1}{\eta} + \frac{3}{B}$

C. $\frac{1}{\eta} = \frac{1}{B} + \frac{1}{Y}$

D. $\frac{9}{Y} = \frac{3}{\eta} + \frac{1}{B}$

Answer: D

Watch Video Solution

67. A material has a Poisson's ratio 0.3. It suffers a uniform longitudinal strain 4.5×10^{-3}, calculate

the percentage change in its volume.

A. $0.15\ \%$

B. $0.02\ \%$

C. $0.24\ \%$

D. $0.18\ \%$

Answer: C

Watch Video Solution

68. One end of a nylon rope of length 4.5 m and diameter 6 mmis fixed to a tree limb. A monkey

weighing 100 N jumps to catch the free end and stays there. Find the elongation of the rope and the corresponding change in the diameter. Young modulus of nylon =0.2.

A. $1.327\mu m$

B. $0.151umm$

C. $0.625\mu m$

D. $0.425\mu m$

Answer: A

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69. In question number 91, what will be the change in the diameter of the rope ?

A. $8.8 \times 10^{-9} m$

B. $7.4 \times 10^{-9} m$

C. $6.4 \times 10^{-8} m$

D. $5.6 \times 10^{-9} m$

Answer: A

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Applications Of Elastic Behaviour Of Materials

1. Assuming that shear stress at the base of a mountain is equal to the force per unit area due to its weight. Calculate the maximum possible height of a mountain on the earth if breaking stress of a typical rock is $3 \times 10^{8} Nm^{-3}$ and its density $3 \times 10^{-3} kgm^{-3}$. (Take $g = 10ms^{-2}$)

A. 4 Km

B. 8 Km

C. 10 Km

D. 16 Km

Answer: C

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2. With what minimum acceleration can a fireman slide down a rope whose breaking strength is $(2/3)$ of his weight?

A. $\frac{g}{2}$

B. $\frac{2}{3}g$

C. $\frac{3}{2}g$

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

Answer: D

Watch Video Solution

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

A. Y^2

B. Y

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

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

Answer: C

Watch Video Solution

4. Two strips of metal are riveted together at their ends by four rivets, each of diameter 6mm. What is the maximum tension that can be exterted by the riveted strip if the shearing stress on the rivet is not to exceed $6.9 \times 10^7 Pa$? Assume that each rivet is to carry one quarter of the load .

A. $2 \times 10^3 N$

B. $3.9 \times 10^3 N$

C. $7.8 \times 10^3 N$

D. $15.6 \times 10^3 N$

Answer: C

Watch Video Solution

5. A spring is made of steel and not of copper because

A. steel is more elastic than copper

B. steel is less elastic than copper

C. steel is more plastic than copper

D. steel is less plastic than copper

Answer: A

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6. By the method of dimensions, test the accuracy of the equation : $\delta = \frac{mgl^3}{4bd^3Y}$ where δ is depression in the middle of a bar of length I, breadth b, depth d, when it is loaded in the middle with mass m. Y is Young's modulus of material of the bar.

A. $\frac{Wl^3}{4bd^3Y}$

B. $\frac{Wb^3}{4dl^3Y}$

C. $\frac{Wd^3}{4lb^3Y}$

D. $\frac{Wl^3}{bd^3Y}$

Answer: A

Watch Video Solution

7. 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. $\frac{r_1^3}{r_2^3}$

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

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

Answer: C

Watch Video Solution

8. Match the column I with Column II.

Column I		Column II	
(A)	The shape of rubber heel changes under stress	(p)	Young's modulus of elasticity is involved
(B)	In a suspended bridge, there is a strain in the ropes by the load of the bridge	(q)	Bulk modulus of elasticity is involved
(C)	In an automobile tyre, when air is compressed, the shape of tyre changes	(r)	Modulus of rigidity is involved
(D)	A solid body is subjected to a deforming force	(s)	All the moduli of elasticity are involved

A. A-q,B-r, C-s,D-p

B. A-p, B-q, C-r, D-s

C. A-r, B-q, C-p, D-s

D. A-r, B-p, C-q, D-s

Answer: D

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Hots

1. A steel bar $ABCD$ $40cm$ long is made up of three parts AB, BC and CD, as shown in figure. The rod is subjected to a pull of $25kN$. Determine the stress in the the parts and the total extension of the rod.

Young's modulus for steel $= 2 \times 10^{11} Nm^{-2}$.

A. 0.0637 mm

B. 0.0647 mm

C. 0.0657 mm

D. 0.0667 mm

Answer: A

Watch Video Solution

2. Three elastic wires PQ, PR and PS support a body P of mass M, as shown in figure. The wires are of the some material and cross sectional area, the middle one being vertical. Find the loads by each wire.

A. $Mg/1+2\cos^2\theta$

B. $Mg/1+2\cos^3\theta$

C. $Mg\cos^2\theta/1+2\cos^3\theta$

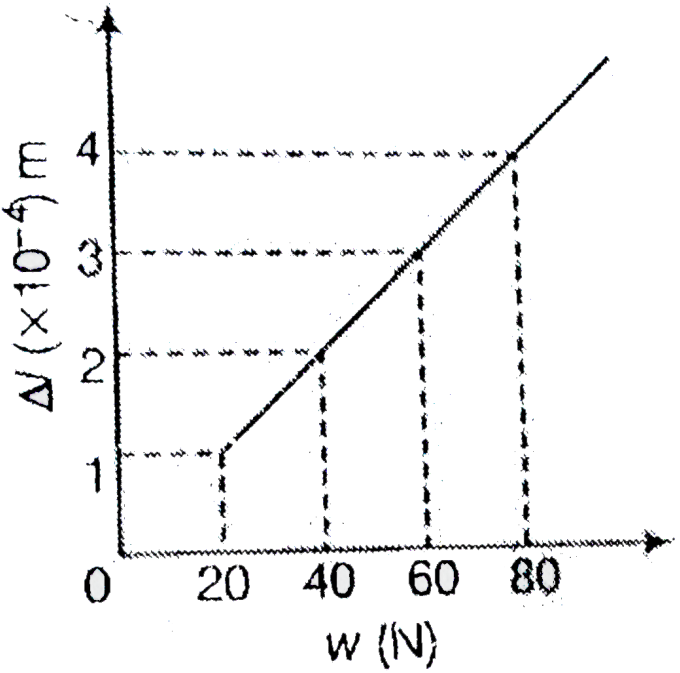
D. $Mg\cos\theta/1+2\cos^3\theta$

Answer: B

View Text Solution

3. The adjacent graph shows the extension Δl of a wire of length 1m, suspended from the f top of a roof at one end and with a loaf w connected to the other end. If the cross-sectional area of the wire is $10^6 m^2$ calculate the young's modulus of the

material of the wire .



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

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

C. $3 \times 10^{-12} N/m^2$

D. $2x10^{-13} N/m^2$

Answer: A

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4. 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. $Mg / 2AK$

B. $Mg/3AK$

C. Mg/AK

D. $2Mg/3AK$

Answer: B

Watch Video Solution

5. One end of a horizontal thick copper wire of length 2L and radius 2R is welded to an end fo another horizontal thin copper wire of lenth L and radius R. When the arrangement is stretched by applying forces at two ends, the ratio of the

elongation in the thin wire to that in the thick wire is

A. 0.25

B. Â 0.50

C. Â 2.00

D. 4.00

Answer: C

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6. Two opposite forces $F_1 = 120N$ and $F_2 = 80N$ act on an elastic plank of modulus of elasticity $Y = 2x10^{11} N/m^2$ and length $l = 1m$ placed over a smooth horizontal surface. The cross-sectional area of the plank is $S = 0.5m^2$. The change in length of the plank is $x \times 10^{-11} m$. Find the value of x.

A. A. 100

B. B. 150

C. C. 200

D. B. 1.1

Answer: A

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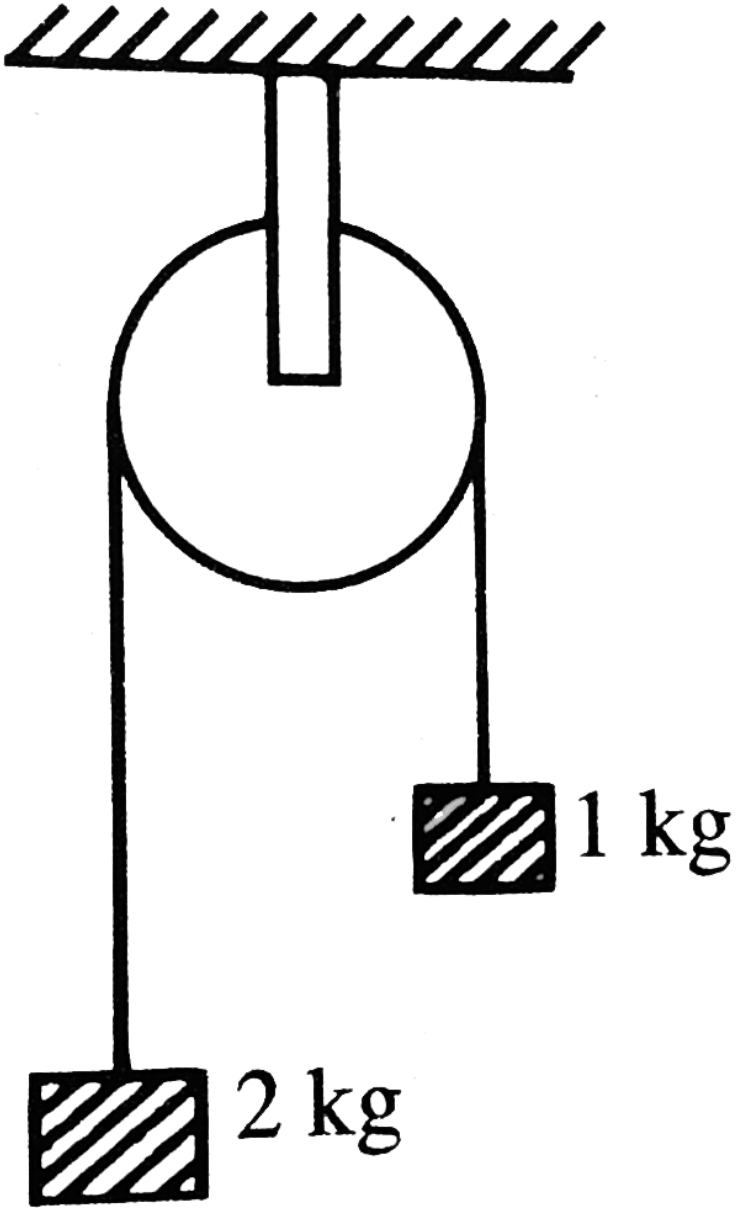
7. Two blocks of masses $1kg$ and $2kg$ are connected by a metal wire going over a smooth pulley as shown in figure.

The breaking stress of the metal is $(40/3\pi) \times 10^6 N/m^2$. If $g = 10ms^{-2}$, then what should be the minimum radius of the wire used if it

is not to break?



A. 0.5 mm

B. 1 mm

C. 1.5 mm

D. 2 mm

Answer: B

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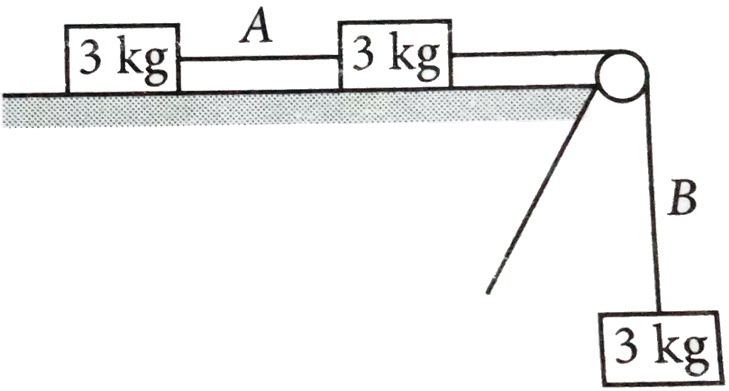
8. Three equal masses 3 kg are connected by massless string of cross sectional area $0.005cm^{-2}$ and Young's modulus $2 \times 10^{11} N/m^{-2}$. In the

absence of friction the longitudes strain in the wire



A. A is 10^{-4}

B. B is 2×10^{-4}

C. Both (a) and (b)

D. None the these

Answer: C

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Ncert

1. Modulus it rigidity of ideal liquids is

A. infinity

B. zero

C. unity

D. some finite small non-zero constant value.

Answer: B

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2. The maximum load a wire can withstand without breaking, when its length is reduced to half of its original length, will

A. be double

B. be half

C. be four times

D. remain same.

Answer: D

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3. The temperature of a wire is doubled. The Young's modulus of elasticity

A. also double

B. become four times

C. remain same

D. decrease.

Answer: D

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4. A spring is stretched by applying a load to its free end. The strain produced in the spring is

A. volumetric

B. shear

C. longitudinal and shear

D. longitudinal.

Answer: C

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5. A rigid bar of mass M is supported symmetrically by three wires each of length l. Those at each end are of copper and the middle one is of iron. The ratio of their diameters, if each is to have the same tension, is equal to

A. $\frac{Y_{\text{copper}}}{Y_{\text{iron}}}$

B. $\sqrt{\frac{Y_{\text{copper}}}{Y_{\text{iron}}}}$

C. $\frac{Y_{\text{iron}}^2}{Y_{\text{copper}}^2}$

D. $\frac{Y_{\text{iron}}}{Y_{\text{copper}}}$

Answer: B

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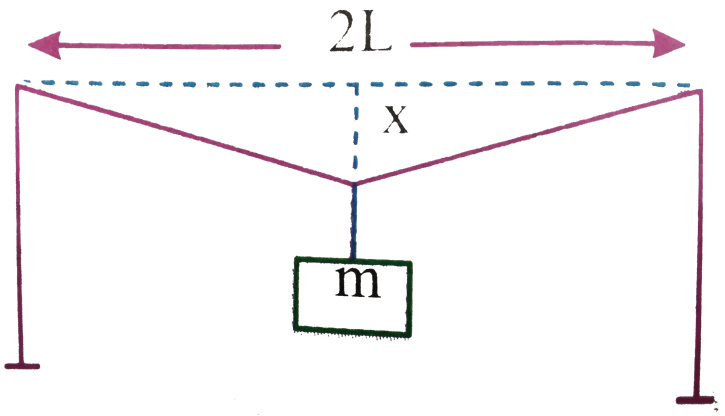
6. A mild steel wire of length $2L$ is strethched, within its elastic limit horizontally between two pillars(figure). A mass of m is suspended form the midpont of the wire. Strain in the wire is



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

B. $\frac{x}{L}$

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

D. $\frac{x^2}{2L}$

Answer: A

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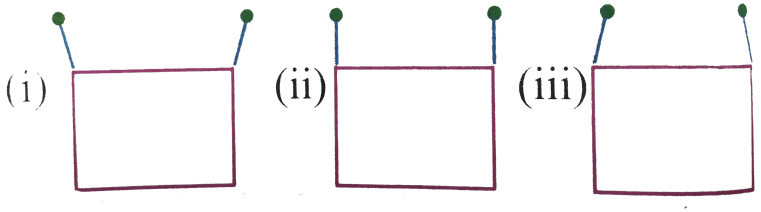
7. A recantangular frame is to be suspended symmetrically by two strings of equal length on two supports (figure).It can be done in one of the following three ways then tension will be minimum :



A. the same in all cases

B. least in (i)

C. least in(ii)

D. least in (iii)

Answer: C

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8. Consider two cylindrical rods of indentical dimesnions, one of rubber and the other of steel. Both the rods are fixed rigidiy at one end to the

roof. A mass M is attached to each of the free ends at the centre of the rods.

A. Both the rods will elongate but there shall be no perceptible change in shape

B. The steel rod will elongate and change shape butÂ the rubber rod will only elongate.

C. The steel rod will elongate without any perceptible change in shape, but the rubber rod will elongate and the shape of the bottom edge will change to an ellipse.

D. The steel rod will elongate, without any perceptible change in shape, but the rubber rod will elongate with the shape of the bottom edge tapered to a tip at the centre.

Answer: D

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Corner

1. Assertion : If we apply force to a lump of putty or mud, they have no gross tendency to regain their

previous shape.

Reason : This type of substances are called plastic substances.

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2. Assertion : Steel and brass are more elastic than copper and aluminium

Reason: That's why they are preferred in heavy-duty machines and in structural designs.

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3. Assertion : The compressibility of solids is less than that of gases and liquids.

Reason : There is tight coupling between the neighbouring atoms in solids.

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4. Assertion: In spring ball model. displace any ball form the its

View Text Solution

5. Assertion : Stress is the internal force per unit area of a body.

Reason : Rubber is less elastic than steel.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion and reason both are false

Answer: C

6. Assertion : Spring balances show correct readings even after they had been used for a long time interval.

Reason : On using for long time, spring balances losses its elastic strength.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion is false but the reason is true

Answer: A

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7. Assertion: A solid sphere placed in the fuid under high pressure is compressed uniformly on all sides.

Reason: The volume of solid sphere will decrease with change of its geometrical shape.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion and reason both are false

Answer: C

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8. Assertion : Hydrostatic pressure is a vector quantity.

Reason : Pressure is force divided by area, and force is a vector quantity.

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9. Assertion : For small deformations, the stress and strain are proportional to each other.

Reason: A class of solids called elastomers does not obey Hooke's law.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Both assertion and reason are false.

Answer: B

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10. Assertion : The materials which have very small range of plastic extension are called brittle material.

Reason: If the stress is increased beyond the elastic limit, the material will break.

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11. Assertion: The stress-strain behaviour varies from material to material.

Reason: A rubber can be pulled to several time its original length and still returns to its origin shape.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Both assertion and reason are false.

Answer: B

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12. Assertion : To increase the length of a thin steel wire of $0.1cm^2$ corss sectional area by $0.1\,\%$, a force of 2000 N is required, its $Y = 200 \times 10^9 Nm^{-2}$.

Reson : It is calculated by $Y = \dfrac{F/L}{A \times \Delta L}$

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13. Assertion : Strain is a unitless quantity.

Reason : Strain is equivalent to force

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. Assertion is true but Reason is false.

D. Both Assertion and Reason are false.

Answer: C

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14. Assertion : The maximum height of a mountain on earth can be estimated from the elastic behaviour of rocks.

Reason : At the base of mountain, the pressure less than elastic limit of earths supporting material.

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15. Assertion : A hollow shaft is found to be stronger than a solid shaft made of same material.

Reason : The torque required to produce a given twist in hollow cylinder is greater than that required to twist a solid cylinder of same size and material.

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Higher Order Thinking Skills

1. A steel bar $ABCD$ $40cm$ long is made up of three parts AB, BC and CD, as shown in figure. The rod is subjected to a pull of $25kN$. Determine the stress in the the parts and the total extension of the rod. Young's modulus for steel $= 2 \times 10^{11} Nm^{-2}$.

A. 0.0637 mm

B. 0.0647 mm

C. 0.0657 mm

D. 0.0667 mm

Answer: A

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2. Three elastic wires PQ, PR and PS support a body P of mass M, as shown in figure. The wires are of the some material and cross sectional area, the middle one being vertical. Find the loads by each wire.

A. $Mg/1+2\cos^2\theta$

B. $Mg/1+2\cos^3\theta$

C. $Mg\cos^2\theta/1+2\cos^3\theta$

D. $Mg\cos\theta/1+2\cos^3\theta$

Answer: B

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3. The adjacent graph shows the extension Δl of a wire of length 1m, suspended from the f top of a roof at one end and with a loaf w connected to the other end. If the cross-sectional area of the wire is $10^6 m^2$ calculate the young's modulus of the

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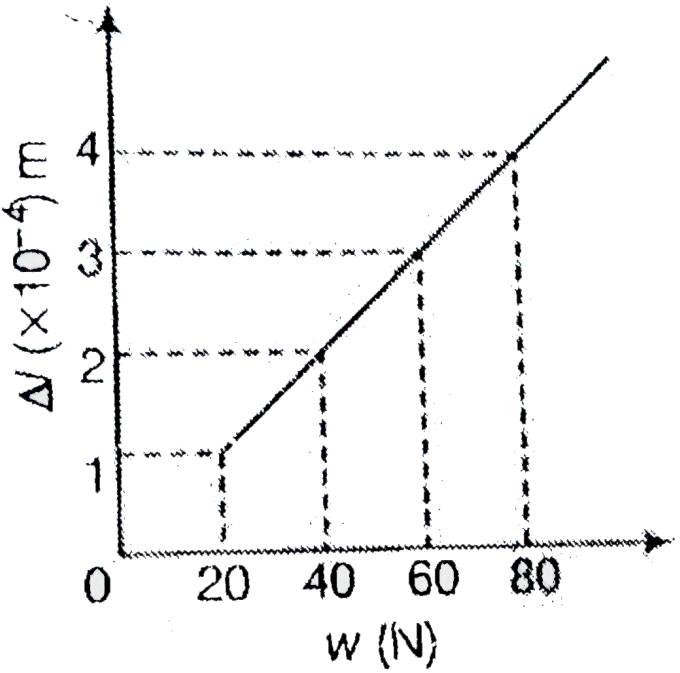

A. $2 \times 10^{11} N/m^2$

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

C. $3 \times 10^{-12} N/m^2$

D. $2x10^{-13} N/m^2$

Answer: A

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4. 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. $Mg / 2AK$

B. $Mg/3AK$

C. Mg/AK

D. $2Mg/3AK$

Answer: B

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5. One end of a horizontal thick copper wire of length 2L and radius 2R is welded to an end fo another horizontal thin copper wire of lenth L and radius R. When the arrangement is stretched by applying forces at two ends, the ratio of the

elongation in the thin wire to that in the thick wire is

A. 0.25

B. Â 0.50

C. Â 2.00

D. 4.00

Answer: C

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6. Two opposite forces $F_1 = 120N$ and $F_2 = 80N$ act on an elastic plank of modulus of elasticity $Y = 2x10^{11} N/m^2$ and length $l = 1m$ placed over a smooth horizontal surface. The cross-sectional area of the plank is $S = 0.5m^2$. The change in length of the plank is $x \times 10^{-11} m$. Find the value of x.

A. A. 100

B. B. 150

C. C. 200

D. B. 1.1

Answer: A

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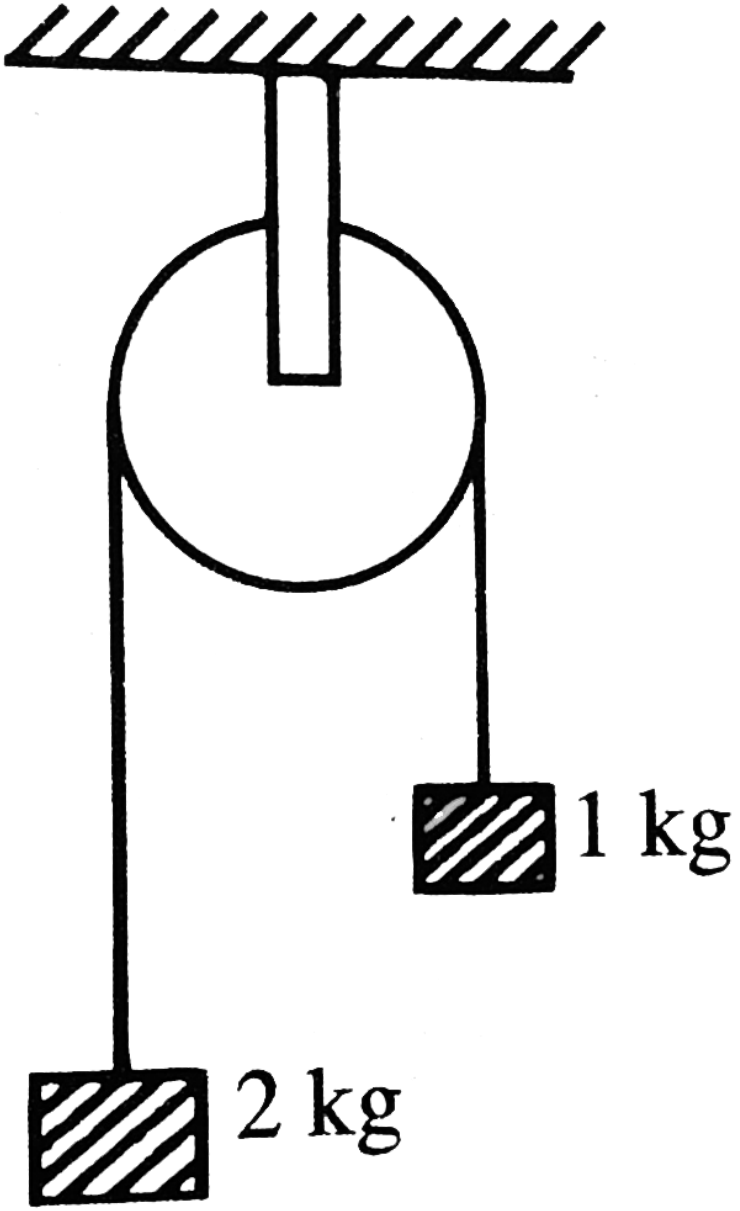
7. Two blocks of masses $1kg$ and $2kg$ are connected by a metal wire going over a smooth pulley as shown in figure.

The breaking stress of the metal is $(40/3\pi) \times 10^6 N/m^2$. If $g = 10ms^{-2}$, then what should be the minimum radius of the wire used if it

is not to break?



A. 0.5 mm

B. 1 mm

C. 1.5 mm

D. 2 mm

Answer: B

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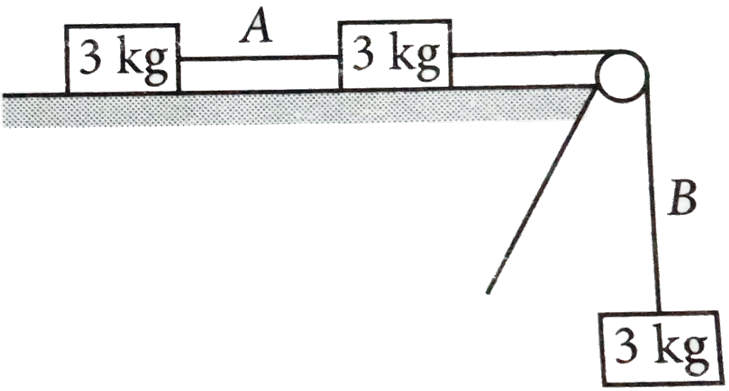
8. Three equal masses 3 kg are connected by massless string of cross sectional area $0.005cm^{-2}$ and Young's modulus $2 \times 10^{11} N/m^{-2}$. In the

absence of friction the longitudes strain in the wire



A. A is 10^{-4}

B. B is 2×10^{-4}

C. Both (a) and (b)

D. None the these

Answer: C

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Ncert Exemplar

1. Modulus it rigidity of ideal liquids is

A. infinity

B. zero

C. unity

D. some finite small non-zero constant value.

Answer: B

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2. The maximum load a wire can withstand without breaking, when its length is reduced to half of its original length, will

A. be double

B. be half

C. be four times

D. remain same.

Answer: D

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3. The temperature of a wire is doubled. The Young's modulus of elasticity

A. also double

B. become four times

C. remain same

D. decrease.

Answer: D

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4. A spring is stretched by applying a load to its free end. The strain produced in the spring is

A. volumetric

B. shear

C. longitudinal and shear

D. longitudinal.

Answer: C

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5. A rigid bar of mass M is supported symmetrically by three wires each of length l. Those at each end are of copper and the middle one is of iron. The ratio of their diameters, if each is to have the same tension, is equal to

A. $\frac{Y_{\text{copper}}}{Y_{\text{iron}}}$

B. $\sqrt{\frac{Y_{\text{copper}}}{Y_{\text{iron}}}}$

C. $\frac{Y_{\text{iron}}^2}{Y_{\text{copper}}^2}$

D. $\frac{Y_{\text{iron}}}{Y_{\text{copper}}}$

Answer: B

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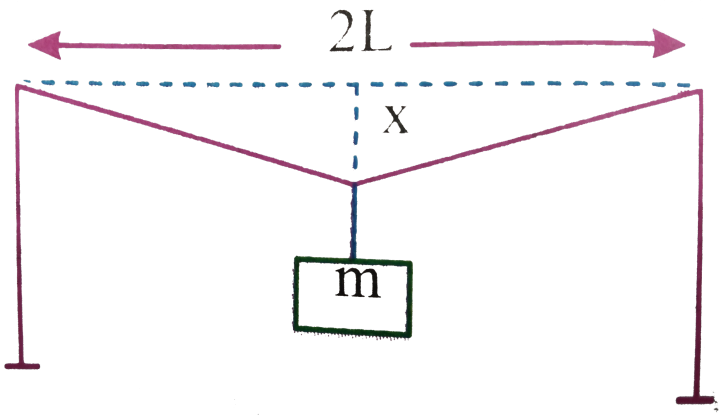
6. A mild steel wire of length $2L$ is strethched, within its elastic limit horizontally between two pillars(figure). A mass of m is suspended form the midpont of the wire. Strain in the wire is



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

B. $\frac{x}{L}$

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

D. $\frac{x^2}{2L}$

Answer: A

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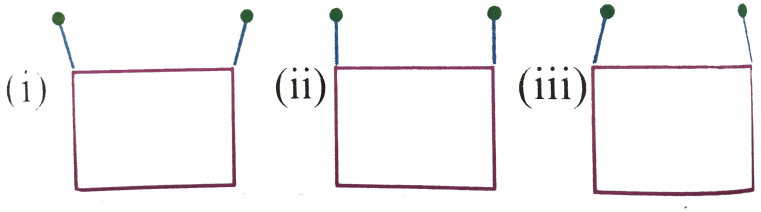
7. A recantangular frame is to be suspended symmetrically by two strings of equal length on two supports (figure).It can be done in one of the following three ways then tension will be minimum :



A. the same in all cases

B. least in (i)

C. least in(ii)

D. least in (iii)

Answer: C

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8. Consider two cylindrical rods of indentical dimesnions, one of rubber and the other of steel. Both the rods are fixed rigidiy at one end to the

roof. A mass M is attached to each of the free ends at the centre of the rods.

A. Both the rods will elongate but there shall be no perceptible change in shape

B. The steel rod will elongate and change shape butÂ the rubber rod will only elongate.

C. The steel rod will elongate without any perceptible change in shape, but the rubber rod will elongate and the shape of the bottom edge will change to an ellipse.

D. The steel rod will elongate, without any perceptible change in shape, but the rubber rod will elongate with the shape of the bottom edge tapered to a tip at the centre.

Answer: D

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Assertion And Reason

1. Assertion : If we apply force to a lump of putty or mud, they have no gross tendency to regain their

previous shape.

Reason : This type of substances are called plastic substances.

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2. Assertion : Steel and brass are more elastic than copper and aluminium

Reason: That's why they are preferred in heavy-duty machines and in structural designs.

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3. Assertion : The compressibility of solids is less than that of gases and liquids.

Reason : There is tight coupling between the neighbouring atoms in solids.

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4. Assertion: In spring ball model. displace any ball form the its

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5. Assertion : Stress is the internal force per unit area of a body.

Reason : Rubber is less elastic than steel.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion and reason both are false

Answer: C

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6. Assertion : Spring balances show correct readings even after they had been used for a long time interval.

Reason : On using for long time, spring balances losses its elastic strength.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion is false but the reason is true

Answer: A

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7. Assertion: A solid sphere placed in the fuid under high pressure is compressed uniformly on all sides.

Reason: The volume of solid sphere will decrease with change of its geometrical shape.

A. Both assertion and reason are true and the reason is the correct explanation of the assertion

B. Both assertion and reason are true but the reason is not the correct explanation of the assertion

C. The assertion is true but the reason is false

D. The assertion and reason both are false

Answer: C

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8. Assertion : Hydrostatic pressure is a vector quantity.

Reason : Pressure is force divided by area, and force is a vector quantity.

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9. Assertion : For small deformations, the stress and strain are proportional to each other.

Reason: A class of solids called elastomers does not obey Hooke's law.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Both assertion and reason are false.

Answer: B

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10. Assertion : The materials which have very small range of plastic extension are called brittle material.

Reason: If the stress is increased beyond the elastic limit, the material will break.

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11. Assertion: The stress-strain behaviour varies from material to material.

Reason: A rubber can be pulled to several time its original length and still returns to its origin shape.

A. Both assertion and reason are true and reason is the correct explanation of assertion.

B. Both assertion and reason are true but reason is not the correct explanation of assertion.

C. Assertion is true but reason is false.

D. Both assertion and reason are false.

Answer: B

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12. Assertion : To increase the length of a thin steel wire of $0.1cm^2$ corss sectional area by $0.1\,\%$, a force of 2000 N is required, its $Y = 200 \times 10^9 Nm^{-2}$.

Reson : It is calculated by $Y = \dfrac{F/L}{A \times \Delta L}$

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13. Assertion : Strain is a unitless quantity.

Reason : Strain is equivalent to force

A. Both Assertion and Reason are true and Reason is the correct explanation of Assertion.

B. Both Assertion and Reason are true but Reason is not the correct explanation of Assertion.

C. Assertion is true but Reason is false.

D. Both Assertion and Reason are false.

Answer: C

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14. Assertion : The maximum height of a mountain on earth can be estimated from the elastic behaviour of rocks.

Reason : At the base of mountain, the pressure less than elastic limit of earths supporting material.

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15. Assertion : A hollow shaft is found to be stronger than a solid shaft made of same material.

Reason : The torque required to produce a given twist in hollow cylinder is greater than that required to twist a solid cylinder of same size and material.

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Others

1. In which year Robert Hooke presented his law of elasticity?

A. 1672

B. Â 1674

C. 1676

D. 1678

Answer: C

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

A. decreases

B. increases

C. becomes zero

D. remains constant

Answer: D

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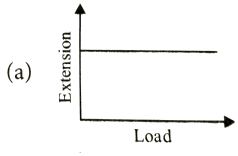
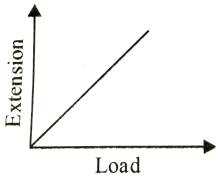
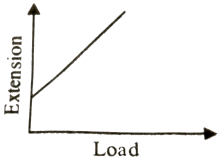
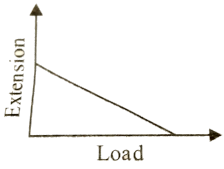
3. Within elastic limit, which of the following graphs correctly represents the variation of extension in the length of wire with the external load?

A. 

B. 

C. 

D. 

Answer: B