

India's Number 1 Education App

PHYSICS

BOOKS - DISHA PHYSICS (HINGLISH)

MECHANICAL PROPERTIES OF FLUIDS

Physics

1. Length of a wire is doubled, when $20 imes10^8N/m^2$ stress is applied on it. Its Young's modulus of elasticity in N/m2 will be

A. $20 imes10^8$

- B. $20 imes10^9$
- ${\rm C.}\,20\times10^{10}$
- D. $10 imes10^8$

Answer:



2. A steel wire of uniform cross-sectional area $2mm^2$ is heated upto 50° and clamped rigidly at two ends . If the temperature of wire falls to

 30° then change in tension in the wire will be , if coefficient of linear expansion of steel is $1.1 imes10^{-5}/^\circ C$ and young's modulus of elasticity of steel is $2 imes10^{11}N/m^2$

A. 44N

B. 88N

C. 132N

D. 22 N



3. The workdone in increasing the length of a one metre long wire of cross - sectional area $1mm^2$ through 1mm will be $\left(Y=2 imes 10^{11} Nm^{-2}\right)$:

A. 250J

B. 10J

C. 5J

D. 0.1J





4. A spring is stretched by 3cm when a load of 5.4×10^6 dyne is suspended from it. Work done will be-

A. $8.1 imes 10^6 J$

B. $8.1 imes 10^6 J$

 $\text{C.}\,8.0\times10^{6}~\text{erg}$

D. $8.1 imes 10^6$ erg

5. A wire of length 1m and area of cross section $4 \times 10^{-8} m^2$ increases in length by 0.2 cm when a force of 16 N is applied. Value of Y for the material of the wire will be

A. $2 imes 10^6 N/m^2$

B. $2 imes 10^{11} kg/m^2$

C. $2 imes 10^{11}N/mm^2$

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



6. The volume of a solid rubber ball when it is carried from the surface to the bottom of a 200 m deep lake decreases by 0.1%. The value for bulk modulus of elasticity for rubber will be

A. $2 imes 10^9$ Pa

B. $2 imes 10^6$ Pa

C.
$$2 imes 10^4$$
Pa

D. $2 imes 10^{-4}$ Pa

Answer:

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7. A steel wire is 4.0 m long and 2 mm in diameter. Young's modulus of steel is $1.96 \times 10^{11} N/m^2$. If a mass of 20 kg is suspended from it the elongation produced will be-

A. 2.54 mm

B. 1.27 mm

C. 0.64 mm

D. 0.27 mm

Answer:



8. A brass rod is to support a load of 400 N. If its elastic limit is $4.0 imes10^8N/m^2$ its minimum diameter must be -

A. 1.13 mm

B. 2.26 mm

C. 3.71 mm

D. 4.52 mm

Answer:



9. A 4.0 m long copper wire of cross sectional area $1.2cm^2$ is stretched by a force of $4.8 imes 10^3$ N stress will be -

A. $4.0 imes 10^7 N/mm^2$

$\texttt{B.}\,4.0\times10^7 KN/m^2$

C. $4.0 imes10^7N/m^2$

D. None of these

Answer:



10. A copper rod 2m long is stretched by 1mm.

Strain will be -

A. 10^{-4} , volumetric

B. $5 imes 10^{-4}$, volumetric

C. $5 imes 10^{-4}$, longitudinal

D. $5 imes 10^{-3}$, volumetric

Answer:

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11. A wire of cross sectional area $3mm^2$ is just stretched between two fixed points at a temperature of 20° . Determine the tension

when the temperature falls to $20\,^\circ$ C . Coefficient of linear of expansion $lpha=10^{-5}\,/\,^\circ C$ and Y = $2 imes10^{11}N/m^2$.

A. 120KN

B. 20 N

C. 120 N

D. 102 N

Answer:

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12. 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.
$$3.3 imes10^{-5}$$

B. $5.6 imes10^{-4}$

C. $7.5 imes 10^{-3}$

D. $1.5 imes10^{-2}$



13. The Young's modulus of steel is $2 \times 10^{11} N/m^2$ and its coefficient of linear expansion is 1.1×10^{-5} per deg. The pressure to be applied to the ends of a steel cylinder to keep its length constant on raising its temperature by $100^{\circ} C$, will be -

A. $5.5 imes 10^4 N/m^2$

B. $1.8 imes 10^6 N/m^2$

C. $2.2 imes 10^8 N/m^2$

D. $2.0 imes 10^{11}N/m^2$



14. For a given material the Young's modulus is2.4 times that of its rigidity modulus. ItsPoisson's ratio is

A. 1.2

B. 1.02

C. 0.2



15. A wire of length 1m is stretched by a force of 10N. The area of cross-section of the wire is $2 imes10^{-6}m^2$ and Y is $2 imes10^{11}N/m^2$. Increase in length of the wire will be -

A.
$$2.5 imes 10^{-5}$$
 cm

B. $2.5 imes 10^{-5}$ mm

 ${\sf C.2} imes 10^{-5}~{
m m}$

D. None of these

Answer:

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16. A stress of $1kg/mm^2$ is applied on a wire. If the modulus of elasticity of the wire is $10^{10} dyne/cm^2$, then the percentage increase in the length of the wire will be

A. 0.007

B. 0.0098

C. 98

D. 9.8

Answer:

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17. A metallic wire is suspended by suspending weight to it. If S is longitudinal strain and Y its young's modulus of elasticity then potential energy per unit volume will be

A.
$$\frac{1}{2}Y^{2}S^{2}$$

B. $\frac{1}{2}Y^{2}S$
C. $\frac{1}{2}YS^{2}$
D. $2YS^{2}$



18. The lengths and radii of two wires of same material are respectively L, 2L, and 2R, R. Equal weights are applied on then. If the elongations

produced in them are l_1 and l_2 respectively

then their ratio will be

A. 2:1

- **B**. 4:1
- C. 8:1
- D.1:8



19. 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. 1:2

- B. 2:1
- C. 1: 4
- D.4:1



20. A rod of length I and area of cross-section A is heated from $0^{\circ}C$ to $100^{\circ}C$. The rod is so placed that it is not allowed to increase in length, then the force developed is proportional to

A. I

 $\mathsf{B.}\,l^{-1}$

C. A



21. Which statements are false for a metal? (1) $Y < \eta$ (2) $Y = \eta$ (3) $Y < 1/\eta$ (4) $Y > \eta$

A. 1, 2 and 3 are correct

B. 1 and 2 are correct



D. 1 and 3 are correct

Answer:

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22. Which of the following relations are false

(1)
$$3Y = K(1 - \sigma)$$

(2) $\sigma = (6K + \eta)Y$
(3) $K = \frac{9\eta K}{Y + \eta}$
(4) $\sigma = \frac{0.5Y - \eta}{\eta}$

- A. 1, 2 and 3 are correct
- B. 1 and 2 are correct
- C. 2 and 4 are correct
- D. 1 and 3 are correct



23. A bar of cross section A is subjected to equal and opposite tensile forces F at its ends. Consider a plane through the bar making an

angle θ with a plane at right angles to the bar

as shown in figure.



The tensile stress at this plane in terms of F, A and θ is

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



24. A bar of cross section A is subjected to equal and opposite tensile forces F at its ends. Consider a plane through the bar making an angle θ with a plane at right angles to the bar as shown in figure.



In the above problem, for what value of θ is

the tensile stress maximum ?

A. Zero

B. 90°

C. 45°

D. $30^{\,\circ}$



25. A bar of cross section A is subjected to equal and opposite tensile forces F at its ends. Consider a plane through the bar making an angle θ with a plane at right angles to the bar as shown in figure.



The shearing stress at the plane, in terms of F,

A and θ is

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

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

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26. Statement -1 : Steel is more elastic than rubber.

Statement -2 : Under given deforming force,

steel is deformed less than rubber.

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



27. Statement -1 : Bulk modulus of elasticity (K) represents incompressibility of the material.
Statement -2 : Bulk modulus of elasticity is proportional to change in pressure.

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 False, Statement - 2 is True. D. Statement - 1 is True, Statement -2 is False. **Answer:** Watch Video Solution

28. In the following questions, a statement of assertion is followed by a statement of reason. Mark the correct choice as (a) If both assertion and reason are true and reason is the correct explanation of assertion. (b) If both assertion and reason are true but reason is not the correct explanation of assertion. (c) If assertion is true but reason is false. (d) If assertion and reason are false. Q. Assertion: The bridges are declared unsafe

after long use.

Reason: Elastic strength of bridges losed with

time.

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 False, Statement - 2 is

True.

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

False.

