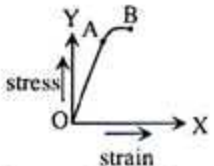
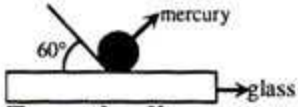


Chapter-7: Structural Properties of Matter

- The area of cross section and breaking mass of a wire are 1mm^2 and 40kg respectively. The breaking stress of the wire is — [All Board-18]
 - $4 \times 10^{-6}\text{Nm}^{-2}$
 - $3.92 \times 10^{-4}\text{Nm}^{-2}$
 - $4 \times 10^7\text{Nm}^{-2}$
 - $3.92 \times 10^8\text{Nm}^{-2}$
- When a large raindrop splits into a large number of smaller drops, the total — [D.B.-16]
 - surface area of the drops decreases
 - surface area of the drops increases
 - volume decreases
 - surface area remains unchanged
- Which of these are the units of surface energy? [D.B.-16]
 - $\text{N}\cdot\text{m}$
 - $\text{N}^{-1}\cdot\text{m}$
 - $\text{N}\cdot\text{m}^{-2}$
 - $\text{N}\cdot\text{m}^{-1}$
- What are the dimensions of Young's modulus? [D.B.-16]
 - $[Y] = \text{ML}^{-2}\text{T}^{-1}$
 - $[Y] = \text{ML}^{-1}\text{T}^{-1}$
 - $[Y] = \text{ML}^{-1}\text{T}^{-2}$
 - $[Y] = \text{M}^{-1}\text{L}^{-1}\text{T}^{-1}$
- The dimension of the coefficient of viscosity is— [R.B., Ctg.B., B.B.-17]
 - $[\text{ML}^{-2}\text{T}^{-1}]$
 - $[\text{ML}^{-1}\text{T}^{-1}]$
 - $[\text{ML}^{-1}\text{T}^{-2}]$
 - $[\text{MLT}^{-1}]$
- What are the units for the coefficient of viscosity? [D.B.-16; C.B.-15]
 - $\text{N}\cdot\text{m}\cdot\text{s}^{-1}$
 - $\text{N}\cdot\text{m}^{-1}\cdot\text{s}$
 - $\text{N}^{-1}\cdot\text{m}^{-1}\cdot\text{s}$
 - $\text{N}\cdot\text{s}\cdot\text{m}^{-2}$
- How much force would be needed to extend a wire of cross-section 1cm^2 by its original length? [$Y = 2 \times 10^{11}\text{N/m}^2$] [R.B.-16]
 - $2 \times 10^7\text{N}$
 - $4 \times 10^7\text{N}$
 - $2 \times 10^5\text{N}$
 - $4 \times 10^5\text{N}$
- The Poise is the unit of which of the following? [Dj.B.-17]
 - Young's modulus
 - surface tension
 - Modulus of viscosity
 - compressibility
- Which of the following shows the relationship between surface tension (T) and surface energy (E)? [R.B.-16]
 - $E = 2T$
 - $E = T$
 - $E = \frac{T}{2}$
 - $E = \frac{T}{4}$
- 

What does the slope of the line OA represent in the graph? [C.B.-16]

 - inclination point
 - Young's modulus
 - breaking point
 - permanent deformation
- Which of these is the inverse quantity of bulk modulus? [Ctg.B.-16]
 - Poisson's ratio
 - compressibility
 - Young's modulus
 - modulus of rigidity
- The breaking stress of a material is $4.9 \times 10^8\text{N}\cdot\text{m}^{-2}$. What is the minimum mass which will break a wire of cross-sectional area of 1mm^2 , made from this material? [Ctg.B.-16]
 - 0.5kg
 - 5kg
 - 10kg
 - 50kg
- The coefficient of viscosity of a gas varies — [Ctg.B.-16]
 - proportionately with absolute temperature
 - as the inverse of absolute temperature
 - as the square root of absolute temperature
 - as the inverse of the square root of absolute temperature
- When the surface area of a liquid is increased by 1 unit, what is the work done called? [S.B.-16]
 - surface tension
 - viscosity
 - surface energy
 - volume stress
- A maximum of $72.8 \times 10^{-3}\text{N}$ force is required to pull a horizontal wire of length 0.5m from the surface of water against its weight. What is the surface tension of water? [J.B.-16]
 - $145.6 \times 10^{-3}\text{N}\cdot\text{m}^{-1}$
 - $72.8 \times 10^{-3}\text{N}\cdot\text{m}^{-1}$
 - $14.56 \times 10^{-2}\text{N}\cdot\text{m}^{-1}$
 - $7.28 \times 10^{-3}\text{N}\cdot\text{m}^{-1}$
- In which state is the intermolecular forces between molecules the minimum? [J.B.-16]
 - liquid
 - plasma
 - solid
 - gas
- What is the work done in forming a bubble of radius 5cm ? [$T = 3 \times 10^{-2}\text{N}\cdot\text{m}^{-1}$] [B.B.-16]
 - $0.88 \times 10^{-3}\text{J}$
 - $0.98 \times 10^{-3}\text{J}$
 - $1.88 \times 10^{-3}\text{J}$
 - $2.88 \times 10^{-1}\text{J}$
- What is the ratio of the tensile stress to tensile strain within the elastic limit, called? [D.B.; Ctg.B.-15]
 - Young's modulus
 - bulk modulus
 - modulus of rigidity
 - Poisson's ratio
- The net force between the molecules of a material is zero when — [D.B.-15]
 - $r = r_0$
 - $r < r_0$
 - $r > r_0$
 - $r \gg r_0$
- For which one of the following cases does Van der Waals' forces exist? [R. B.-2015]
 - bonding between sodium and chloride ions
 - attractions between oxygen molecules
 - attractions between silicon molecules
 - bonding between copper atoms
- What are the dimensions of the coefficient of viscosity? [R.B.-15]
 - MLT^{-1}
 - ML^{-1}T
 - $\text{ML}^{-1}\text{T}^{-1}$
 - M^{-1}LT
- What is the radius of a sphere of influence? [R.B.-15]
 - 10^{-15}m
 - 10^{-10}m
 - 10^{-9}m
 - 10^{-8}m
- For what value of angle of contact between a liquid and a solid will the liquid not wet the solid? [R.B.-15]
 - 0°
 - 40°
 - 60°
 - 120°
- When some detergent is mixed with water, what happens to its surface tension? [Dj.B.-15]
 - increases
 - decreases
 - remains unchanged
 - becomes zero
- What is a unit change within a material called?
 - stress
 - strain
 - breaking stress
 - fatigue
- What do we call the force at which a wire breaks?
 - elastic limit
 - breaking load
 - tolerant limit
 - inclination point
- What is the value of Young's modulus for iron?
 - $2 \times 10^{11}\text{N}$
 - $2 \times 10^{11}\text{N}\cdot\text{m}^{-1}$
 - $2 \times 10^{10}\text{N}\cdot\text{m}^{-1}$
 - $2 \times 10^{11}\text{N}\cdot\text{m}^{-2}$
- What is another name for the bulk modulus?
 - compressibility
 - incompressibility
 - shear modulus
 - elastic modulus
- Which of these is true in case of Poisson's ratio?
 - $1 < \sigma < 0.5$
 - $-1 < \sigma < 0.5$
 - $-1 < \sigma < 1$
 - $-1 < \sigma < -0.5$
- What is the stress on a wire of cross-section 0.01cm^2 subjected with a force of $2 \times 10^4\text{N}$?
 - $2 \times 10^6\text{N}\cdot\text{m}^{-2}$
 - $2 \times 10^8\text{N}\cdot\text{m}^{-2}$
 - $2 \times 10^{10}\text{N}\cdot\text{m}^{-2}$
 - $2 \times 10^{12}\text{N}\cdot\text{m}^{-2}$
- If the breaking stress of a wire is $4.9 \times 10^8\text{N}\cdot\text{m}^{-2}$ and cross-section $1 \times 10^{-6}\text{m}^2$, what is its breaking load?
 - 0.49 N
 - 4.9 N
 - 49 N
 - 490 N

32. A metal sphere of radius 200mm is falling through a liquid with terminal velocity $2.1 \times 10^{-2} \text{ m}\cdot\text{s}^{-1}$. If the coefficient of viscosity of the liquid is $0.003 \text{ N}\cdot\text{s}\cdot\text{m}^{-2}$, what is the viscous force exerted by the liquid?
 (a) $1.57 \times 10^{-3} \text{ N}$ (b) $2 \times 10^{-3} \text{ N}$
 (c) $2.37 \times 10^{-4} \text{ N}$ (d) $3.5 \times 10^{-3} \text{ N}$ **c**
33. Calculate the height ascended by water in a capillary tube of diameter 0.2mm. The surface tension of water is $72 \times 10^{-3} \text{ N}\cdot\text{m}^{-1}$.
 (a) 0.0367m (b) 0.147m
 (c) 0.267m (d) 0.490m **b**
34. What happens when the temperature of a body increases?
 (a) its elasticity increases
 (b) its elasticity decreases
 (c) it becomes perfectly plastic
 (d) it becomes perfectly rigid **b**
35. Why does a drop of water assume a spherical shape?
 (a) due to elasticity (b) due to viscosity
 (c) because of gravity
 (d) because of surface tension **a**
36. The Young's modulus of a wire depends on which of the following properties listed?
 (a) radius (b) length
 (c) material (d) the applied force **c**
37. What is Young's modulus for a completely rigid body?
 (a) 0 (b) 1 (c) 2 (d) ∞ **d**
38. What is the work done in extending a wire?
 (a) $W = \frac{1}{2} Fl$ (b) $W = Fl$
 (c) $W = 2Fl$ (d) $W = \frac{1}{2} Fl^2$ **a**
39. How much force should be exerted on a steel wire of cross-sectional area $1 \times 10^{-4} \text{ m}^2$ in order to double its length? ($Y = 2 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$)
 (a) $2 \times 10^6 \text{ N}$ (b) $2 \times 10^7 \text{ N}$
 (c) $2 \times 10^8 \text{ N}$ (d) $2 \times 10^9 \text{ N}$ **b**
40. A tennis ball is rising with uniform velocity from the bottom of water to the surface. Which of the following relations is correct?
 (a) weight = upthrust + viscous force
 (b) weight = upthrust
 (c) weight + viscous force = upthrust
 (d) weight = viscous force **c**
41. Which of the following properties of a body cannot be changed with an applied force?
 (a) length (b) mass
 (c) shape (d) volume **b**
42. The length of a wire changes from 10m to 10.5m when subjected to an applied force. What is the lateral strain?
 (a) 20 (b) 10.5 (c) 10 (d) 0.05 **d**
43. How much more is the inner pressure of a raindrop of radius 0.002m than the outer pressure? The surface tension of water is $7.28 \times 10^{-2} \text{ N}\cdot\text{m}^{-1}$.
 (a) 728 Pa (b) 72.8 Pa
 (c) 7.28 Pa (d) 0.728 Pa **b**
44. For which property of a material does water stick to the surface of glass?
 (a) surface tension (b) adhesion
 (c) viscosity (d) cohesion **b**
45. If a capillary tube is dipped in glycerine, then— [S.B.-15]
 i. the angle of contact between glycerine and glass is acute
 ii. the surface of the liquid becomes concave
 iii. the angle of contact between glycerine and glass is acute
 Which one of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **a**
46. If a glass capillary tube is dipped into mercury, the mercury column inside the tube falls, because —
 i. mercury cannot wet the glass tube
 ii. the horizontal component of surface tension is negative
 iii. the angle of contact is $0^\circ < \theta < 90^\circ$
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **a**
47.  [D. B.-2016]
 From the diagram —
 i. cohesive force > adhesive force
 ii. adhesive force > cohesive force
 iii. the angle of contact is 60°
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **a**
48. The angle of contact depends upon — [S.B.-16]
 i. the type of the liquid and solid
 ii. the height of the liquid
 iii. the purity of the liquid and the solid
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **c**
49. Poisson's ratio — [S.B.-16]
 i. is the ratio of extension and lateral strain
 ii. has no units
 iii. has a value from -1 to 0.5
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **b**
50. The most common property of honey is — [J.B.-15]
 i. rigidity ii. viscosity
 iii. surface tension
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **c**
51. Compressibility —
 i. is the ratio of bulk stress to bulk strain
 ii. is the inverse of the bulk modulus
 iii. is the ratio of bulk strain to bulk stress
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **b**
- Answer questions 52 and 53 with reference to the following context:
 If a metal ring is dipped in water, then a thin film of soap forms on the ring.
52. If a loop of wet yarn is placed gently on the soap film, how will it remain on the film?
 (a) as a square (b) as a circle
 (c) as an ellipse (d) irregularly **d**
53. If the film of soap inside the loop is popped—
 i. the inward force on the loop disappears
 ii. a set of forces acts radially inward at every point along the loop
 iii. the loop becomes a circle, immediately
 Which of the following is correct?
 (a) i and ii (b) i and iii
 (c) ii and iii (d) i, ii and iii **c**

Read the following paragraph and answer questions 54 and 55.

A wire of diameter D and length L is fixed at one end. The wire extends by a length of x when a load is applied. x is half of L . [C.B.-16]

54. If $Y = 2.0 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$, what is the stress?
Ⓐ $0.25 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$ Ⓑ $0.5 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$
Ⓒ $1 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$ Ⓓ $4 \times 10^{11} \text{ N}\cdot\text{m}^{-2}$
55. If an equal magnitude of mass is suspended from the wire of the same material, having a diameter $2D$ and length $3L$ —
i. Poisson's ratio remains unchanged
ii. extension would be $\frac{3x}{4}$
iii. there would be a change in stress
Which of the following is correct?
Ⓐ i and ii Ⓑ i and iii

Ⓒ ii and iii

Ⓓ i, ii and iii

Ⓓ

Read the following excerpt and answer questions 56 and 57.

When an iron sphere of radius $2 \times 10^{-4} \text{ m}$ falls through a particular liquid of density $0.87 \times 10^3 \text{ kg}\cdot\text{m}^{-3}$, it reaches a terminal velocity of $4 \times 10^{-2} \text{ m}\cdot\text{s}^{-1}$. The density of iron is $7.8 \times 10^3 \text{ kg}\cdot\text{m}^{-3}$.

[D.B.-15]

56. The viscosity of the liquid is —
Ⓐ $1.5 \times 10^{-2} \text{ N}\cdot\text{s}\cdot\text{m}^{-2}$ Ⓑ $1.5 \times 10^{-2} \text{ N}\cdot\text{s}^{-1}\cdot\text{m}^{-2}$
Ⓒ $6.7 \times 10^{-2} \text{ N}\cdot\text{s}\cdot\text{m}^{-2}$ Ⓓ $6.7 \times 10^{-2} \text{ N}\cdot\text{s}^{-1}\cdot\text{m}^{-2}$
57. If the metal sphere falls through a liquid of density $1.87 \times 10^3 \text{ kg}\cdot\text{m}^{-3}$, how many times more will the coefficient of viscosity of the second liquid be more than the first?
Ⓐ 4 Ⓑ 3 Ⓒ 2 Ⓓ the same
- (Correct Ans: 0.86 times)

Teachingbd24.com