ELASTICITY

1. The lower surface of a cube is fixed. On its upper surface, force is applied at an angle of 30° from its surface. The change will be in its

(1) shape (2) size (3)volume (4) both shape and size

2. One end of 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 (L/ 4) from its lower end is

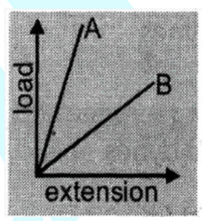
(1) $\frac{W_1}{s}$ (2) $\frac{\left[W_1 + \frac{W}{4}\right]}{s}$

(3) $\frac{\left[W_1 + \frac{3W}{4}\right]}{s}$ (4) $\frac{W_1 + W}{4}$

3. For steel, the breaking stress is 6×10^6 N/m^2 and the density is 8×10^3 kg/m^3. The maximum length of steel wire, which can be suspended without breaking under its own weight is
[g = 10 m/s^2]

(1) 140m (2) 120m (3) 75 m (4) 200m

4. The dimensions of two wires A and B are the same. But their materials are different. Their load-extension graphs are shown. If Y_A and Y_B are the values of Young's modulus of elasticity of A and B respectively then



(1) $Y_A > Y_B$ (2) $Y_A < Y_B$ (3)$Y_A = Y_B$ (4)$Y_B = 2Y_A$

5. If the density of the material increase, the value of Young's modulus

(1) increases (2) decreases
(3) first increases, then decreases (4) first decreases, then increases

6. A fixed volume of iron is drawn into a wire of length λ. The extension produced in this wire by a constant force F is proportional to –

(1) $\frac{1}{l^2}$ (2) $\frac{1}{l}$ (3) λ^2 (4) λ

7. A wire elongates by λ mm when a load W is hanged from it. If the wire goes over a pulley and two weights W each are hung at the two ends, the elongation of the wire will be (in mm)-

(1) λ (2) 2λ (3) zero (4) λ/2

8. The Young's modulus of a rubber string 8 cm long and density 1.5 kg/m^3 is 5×10^8 N/m^2, is suspended on the ceiling in a room. The increase in length due to its own weight will be :

(1) 9.6×10^{-5} m (2) 9.6×10^{-11} m (3) 9.6×10^{-3}m (4) 9.6m

9. A ball falling in a lake of depth 200m shows 0.1% decrease in its volume at the bottom. What is the bulk modulus of the material of the ball :
(1) 19.6×10^{8} N/m^2
(2) 19.6×10^{-10} N/m^2
(3) 19.6×10^{10} N/m^2
(4) 19.6×10^{-8} N/m^2

10. The pressure of a medium is changed from 1.01×10^{5} Pa to 1.165×10^{5} Pa and change in volume is 10% keeping temperature constant. The bulk modulus of the medium is :-
(1) 204.8×10^{5} Pa (2) 102.4×10^{5} Pa (3) 51.2×10^{5} Pa (4) 1.55×10^{5} Pa

11. Two wires of the same material and length but diameters in the ratio 1 : 2 are stretched by the same force. The potential energy per unit volume for the two wires when stretched will be in the ratio.
(1) 16 : 1 (2) 4 : 1 (3) 2 : 1 (4) 1: 1

12. A weight is suspended from a long metal wire. If the wire suddenly breaks, its temperature
(1) rises
(2) falls
(3) remains unchanged
(4) attains a value 0 K

13. A mass of 0.5 kg is suspended from wire, then length of wire increase by 3 mm then find out work done :
(1) 4.5×10^{3} J (2) 7.3×10^{3} J (3) 9.3×10^{-2} J (4) 2.5×10^{-2} J

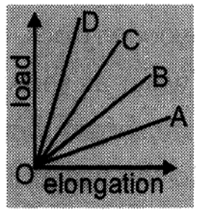
14. If the strain in a wire is not more than 1/1000 and $Y = 2 \times 10^{11}$ N/m^2, Diameter of wire is 1 mm. The modulus of brass is 9×10^{10} N/m^2. The force maximum weight hung from the wire is:- required to stretch by 0.1% of its length is :
(1) 110 N (2) 125 N (3) 157 N (4) 168 N

15. When a tension F is applied in uniform wire of length λ and radius r, the elongation produced is e. When tension 2F is applied, the elongation produced in another uniform wire of length 2λ and radius 2r made of same material is :-
(1) 0.5 e (2) 1.0 e (3) 1.5 e (4) 2.0 e

16. How much force is required to produce an increase of 0.2% in the length of a brass wire of diameter 0.6mm?
[Young's modulus for brass= 0.9×10^{11} N/m^2]
(1) Nearly 17 N
(2) Nearly 34 N
(3) Nearly 51 N
(4) Nearly 68 N

17. If the interatomic spacing in a steel wire is 2.8×10^{-10} m and $Y = 2 \times 10^{11}$ N/m^2 then steel force constant in N/m is-
(1) 5.6 (2) 56 (3) 0.56 (4) 560

18. The load versus elongation graph for four wires of the same material and same length is shown in the figure. The thinnest wire is represented by the line.



(l) OA (2) OB (3) OC (4) OD

19. The mean distance between the atoms of iron is 3×10^{-10} m and inter atomic force constant for iron is 7 N/m. The young's modulus of elasticity for iron is:
(1) 2.33×10^{5} N/m^2 (2) 23.3×10^{10} N/m^2
(3) 233×10^{10} N/m^2 (4) 2.33×10^{10} N/m^2

20. Cross section area of a steel wire ($Y = 2.0\times10^{11}$ N/m^2) is 0.1 cm^2. The required force, to make its length double will be -
(1) 2×10^{12} N (2) 2×10^{11} N (3) 2×10^{10} N (4) 2×10^{6} N

21. For a given material, the Young's modulus is 2.4 times that of rigidity modulus. Its Poisson's ratio is:
(1) 2.4 (2) 1.2 (3) 0.4 (4) 0.2

22. The diameter of a brass rod is 4 mm and Young's modulus of brass is 9×10^{10} N/m^2. The force required to stretch by 0.1% of its length is :
(1) $360\ \pi$N (2) 36 N (3) $144\pi \times 10^{3}$N (4) $36\pi \times 10^{5}$ N

23. Poisson's ratio can not have the value :
(1) 0.1 (2) 0.7 (3) 0.2 (4) 0.5

24. Two wires of the same length and material but different radii r_1 and r_2 are suspended from a rigid support both carry the same load at the lower end. The ratio of the stress developed in the second wire to that developed in the first wire is –
(1) $\frac{r_1}{r_2}$ (2) $\frac{r_1^2}{r_2^2}$ (3) $\left(\frac{r_1}{r_2}\right)^{5/2}$ (4) $\left(\frac{r_1}{r_2}\right)^{1/2}$

25. An increases in pressure required to decreases the 200 litres volume of a liquid by 0.004% in container is: (Bulk modulus of the liquid= 2100 M Pa)
(1) 188 kPa (2) 8.4 kPa (3) 18.8 kPa (4) 84 kPa

26. If 'S' is stress and 'Y is Young's modulus of material the energy stored in the wire per unit volume is
(1) $\frac{S}{2Y}$ (2) $\frac{2Y}{S^2}$ (3) $\frac{S^2}{2Y}$ (4) $2S^2Y$

27. For a constant hydraulic stress on an object, the fractional change in the object's volume $\left(\frac{\Delta V}{V}\right)$ and its bulk modulus (B) are related as :

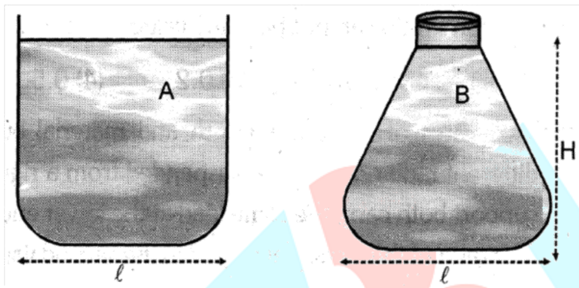
(1) $\frac{\Delta V}{V} \propto B$ (2) $\frac{\Delta V}{V} \propto \frac{1}{B}$ (3) $\frac{\Delta V}{V} \propto B^2$ (4) $\frac{\Delta V}{V} \propto B^{-2}$

28. A wire of length L and cross-sectional area A is made of a material of Young's modulus Y. The work done in stretching the wire by an amount x is given by:-

(1) $\frac{YAx^2}{L}$ (2) $\frac{YAx^2}{2L}$ (3) $\frac{YAL^2}{x}$ (4) $\frac{YAL^2}{2x}$

FLUIDS STATICS

29. Two vessels A and B have the same base area and contain water to the same height, but the mass of water in A is four times that in B. The ratio of the liquid thrust at the base of A to that at the base of B is:-

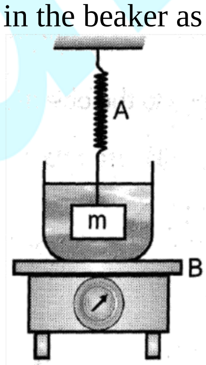


(1) 4 : 1 (2) 2 : 1 (3) 1 : 1 (4) 16 : 1

30. A cylinder is filled with a liquid of density d upto a height h. If the beaker is at rest, then the mean pressure on the wall is :-

(1) Zero (2) hdg (3) $\frac{h}{2}$dg (4) 2hdg

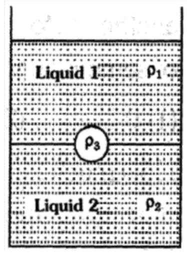
31. The spring balance A read 2 kg. with a block m suspended from it. A balance B reads 5 kg. when a beaker with liquid is put on the pan of the balance. The two balances are now so arranged that the hanging mass is inside the liquid in the beaker as shown in figure. In this situation :-



(1) The balance A will read more than 2 kg.
(2) The balance B will read more' than 5 kg.
(3) The balance A will read less than 2kg. and B will read more than 5 kg.
(4) The balance A and B will read 2 kg. and 5 kg. respectively.

32. A jar is filled with two non-mixing liquids 1 and 2 having densities ρ_1 and ρ_2, respectively A solid ball, made of a material of density ρ_3 , is dropped in. the jar. It comes to equilibrium in the position shown in the figure: Which of the following is true for ρ_1, ρ_2 & ρ_3

(1) $\rho_3 < \rho_1 < \rho_2$ (2) $\rho_1 > \rho_3 > \rho_2$
(3) $\rho_1 < \rho_2 < \rho_3$ (4) $\rho_1 < \rho_3 < \rho_2$



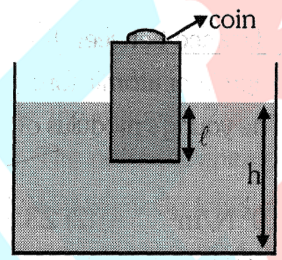
33. A boat having a length of 3 meter and breadth 2 meter floating on a lake. The boat sinks by one cm where a man gets on it. The mass of the man is

(1) 60 kg (2) 62 kg (3) 72 kg (4) 128 kg

34. If the density of a block is 981 kg/m^3 then it shall

(1) Sink in water
(2) float with some part emmersed in water
(3) float completely immersed in water
(4) float completely out of water.

35. A wooden block, with a coin placed on its, floats in water as shown in figure. The distance λ and h are shown there. After sometime the coin falls into the water. Then:-



(1) λ decreases and h increases (2) λ increases and h decreases
(3) both λ and h increase (4) both λ arid h decrease

36. A piece of ice is floating in a jar containing water. When the ice melts, then the level of water :-

(l) Rises (2) Falls
(3) Remains unchanged (4) Changes, erratically

37. A sample of metal weights 210 gram in air, 180 gram in water and 120 gram in an unknown liquid. Then :-

(1) the density of metal is 3 g/cm^3
(2) the density of metal is 7 g/ cm^3
(3) density of metal is 4 times the density of the unknown liquid
(4) the metal will float in water

38. 'Torr' is the unit of:-

(1) Pressure (2) Density (3) Volume (4) Flux

39. A sphere is floating in water its 1/3rd part is outside the water and when sphere is floating in unknown $\frac{3}{4}$th liquid, its part is outside the liquid then density of liquid is

(1) 4/9 gm/c.c. (2) 9/4 gm/c.c. (3) 8/3 gm/c.c. (4) 3/8 gm/c.c.

40. Which of the following works on Pascal's law?
(1) Sprayer (2) Venturimeter (3) Hydraulic lift (4) Aneroid barometer

41. An object of weight W and density ρ is submerged in a fluid of density ρ_1. Its appearent weight will be
(1) $W(\rho - \rho_1)$ (2) $\frac{(\rho - \rho_1)}{W}$ (3) $W\left(1 - \frac{\rho_1}{\rho}\right)$ (4) $W(\rho_1 - \rho)$

42. Which law states that the magnitude of pressure within fluid is equal in all parts ?
(1) Pascal's law (2) Gay-Lusac's law
(3) Dalton's law (4) Boyle's law

43. A body measures 5 N in air and 2 N when put in water. The buoyant force is
(1) 7 N (2) 9 N (3) 3 N (4) None of these

44. Hydraulic press is based upon
(1) Archimede's principle (2) Bernoulli's theorem
(3) Pascal's law (4) Reynold's number

45. A wooden block is taken to the bottom of a lake of water and then released. it rise up with a
(1) Constant acceleration (2) Decreasing acceleration
(3) Constant velocity (4) Decreasing velocity

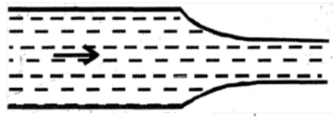
FLUID DYNAMICS

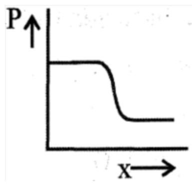
46. Two water pipes P and Q having diarneter 2×10^{-2} m and 4×10^{-2} m respectively are joined in series with the main supply line of water. The velocity of water flowing in pipe P is
(1) 4times that of Q (2) 2 times that of Q
(3) $\frac{1}{2}$ times that of Q (4) $\frac{1}{4}$ times that of Q

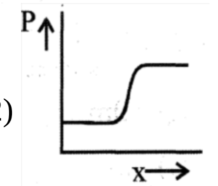
47. The cylindrical tube of a spray pump has a radius R, one end of which has n fine holes, each of radius r. If the speed of flow of the liquid in the tube is v, the speed of ejection of the liquid through the hole is :-
(1) $\frac{v}{n}\left(\frac{R}{r}\right)$ (2) $\frac{v}{n}\left(\frac{R}{r}\right)^{1/2}$
(3) $\frac{v}{n}\left(\frac{R}{r}\right)^{3/2}$ (4) $\frac{v}{n}\left(\frac{R}{r}\right)^{2}$

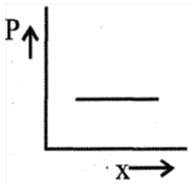
48. Water from a tap emerges vertically downwards with an initial speed of 1.0 m/s. The cross-sectional area of tap is 10^{-4} m^2. Assume that the pressure is constant throughout the stream of water and that the flow is steady, the cross-sectional area of stream 0.15 m below the tap is :-
(1) 5.0×10^{-4} m^2 (2) 1.0×10^{-4} m^2
(3) 5.0×10^{-5} m^2 (4) 2.0×10^{-5} m^2

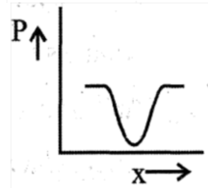
49. Water flows through a frictionless duct with a cross-section varying as shown in figure. Pressure P at points along the axis is represented by



(1) 

(2) 

(3) 

(4) 

50. A tank of height 5 m is full of water. There is a hole of cross sectional area 1 cm^2 in its bottom. The initial volume of water that will come out from this hole per second is

(1) 10^{-3} m^3/s (2) 10^4 m^3/s (3) 10 m^3/s (4) 10^{-2} m^3/s.

51. The pressure of water in a water pipe when tap is opened and closed is respectively 3×10^5 N/m^2 and 3.5×10^5 N/m^2. With open tap, the velocity of water flowing is

(1) 10 m/s (2) 5 m/s (3) 20 m/s (4) 15m/s

52. The flow speeds of air on the lower and upper surfaces of the wing of an aeroplane are v and $\sqrt{2}$v respectively. The density of air is p and surface area of wing is A The dynamic lift on the wing is :

(1) $\rho v^2 A$ (2) $\sqrt{2}\, \rho v^2$

(3) (1/2) $\rho v^2 A$ (4) $2\rho v^2 A$

53. An incompressible fluid flows steadily through a cylindrical pipe which has radius 2 Rat point A and radius Rat point B farther along the flow direction. If the velocity at point A is v, its velocity at point height h in air. The final velocity is B is:-

(1) 2v (2) v (3) $\frac{v}{2}$ (4) 4v

54. Water is flowing through a non-uniform radius tube. If ratio of the radius of entry and exit end of the pipe is 3 : 2 then the ratio of velocities of entring and exit liquid is:-

(1) 4 : 9 (2) 9 : 4 (3) 8 : 27 (4) 1 : 1

55. An aeroplane of mass 3×10^4 kg and total wing area of 120 m is in a level flight at some height. The difference in pressure between the upper and lower surfaces of its wings in kilopascals is ($g = 10 m/s^2$)

(1) 2.5 (2) 5.0 (3) 10.0 (4) 12.5

56. Scent sprayer is based on

(1) Charle's law (2) Archimede's principle

(3) Boyle's law (4) Bernoulli's theorem

57. Bernoulli's equation for steady, non-viscous, in compressible flow expresses the

(1) Conservation of angular momentum (2) Conservation of density
(3) Conservation of momentum (4) Conservation of mechanical energy.

58. Application of Bernoulli's theorem can be seen in
(1) Dynamic lift to aeroplane (2) Hydraulic press
(3) Speed Boat (4) None of these

59. The velocity of water flowing in a non-uniform tube is 20 cm/s at a point where the tube radius is 0.2 cm. The velocity at another point, where the radius is 0.1 cm is
(1) 80 cm/s (2) 40 cm/s (3) 20 cm/s (4) 5 cm/s

VISCOSITY

60. A small drop of water falls from rest through a large height h in air. The final velocity is
(1) almost independent of h (2) proportional to $\sqrt{h}$
(3) proportional to h (4) inversely proportional to h

61. Two drops of Equal radius are falling through air with a steady velocity 0f 5 cm/s. If the two drops coalesce, then its terminal velocity will be –
(1) $4^{1/3} \times 5$ cm/s (2) $4^{1/3}$ cm/s
(3) $5^{1/3} \times 4$ cm/s (4) $4^{2/3} \times 5$ cm/s

62. If the terminal speed of a sphere of gold (density = 19.5 kg/m^3) is 0.2 m/s in a viscous liquid (density = 1.5 kg/m^3), find the terminal speed of a sphere of silver (density = 10.5 kg/m^3) of the same size in the same liquid.
(1) 0.4 m/s (2) 0.133 m/s (3) 0.1 m/s (4) 0.2 m/s

63. Speed of 2 cm radius ball in a viscous liquid is 20 cm/s. Then the speed of 1 cm radius ball in the same liquid is
(1) 5 cm/s (2) 10 cm/s (3) 40 cm/s (4) 80 cm/s

64. The velocity of falling rain drop attain limited value because of
(1) surface tension (2) upthrust due to air
(3) viscous force exerted by air (4) air current

65. Poise is the unit of
(1) Pressure (2) Friction (3) Surface tension (4) Viscosity

66. Two rain drops falling through air have radii in the ratio 1 : 2. They will have terminal velocity in the ratio.
(1) 4 : 1 (2) 1 : 4 (3) 2 : 1 (4) 1 : 2

67. A sphere of mass M and radius R is falling in a viscous fluid. The terminal velocity attained by the falling object will be proportional to
(1) MR^2 (2) M/R (2)MR (4)M/R^2

68. A drop of water of radius 0.0015 mm is falling in air. If the coefficient of viscosity of air is 2.0×10^{-5} kg/(m-s), the terminal velocity of the drop will be
(The density of water = 1.0×10^3 kg/m^3 and g = 10 m/s^2)
(1) 1.0×10^{-4} m/s (2) 2.0×10^{-4} m/s

(3) 2.5×10^{-4} m/s (4) 5.0×10^{-4} m/s

SURFACE TENSION

69. Spiders and insects move and run about on the surface of water without sinking because :
(1) Elastic membrane is formed on water due to property of surface tension
(2) Spiders and insects are ligther
(3) Spiders and insects swim on water
(4) Spiders and insects experience rip-thrust

70. A thin liquid f.ilm formed between a U-shaped wire and a light slider supports a weight of 1.5×10^{-2} N (see figure). The length of the slider is 30 cm and its weight negligible the surface tension of the liquid film is :-

(1) 0.025 N/m (2) 0.0125 N/m (3) 0.1 N/m (4) 0.05 N/m

71. A liquid drop of diameter D breaks into 27 tiny drops. The resultant change in energy is-
(1) $2\pi TD^2$ (2) $4\pi TD^2$ (3) πTD^2 (4) None of these

72. The excess pressure inside an air bubble of radius r just below the surface of water is p_1. The excess pressure inside a drop of the same radius just outside the surface is p_2. If T is surface tension, then
(1) $p_1 = 2P_2$ (2) $p_1 = P_2$ (3) $P_2 = 2p_1$ (4) $P_2 = 0, P_1 \neq 0$

73. A water drop is divided into 8 equal droplets. The pressure difference between inner and outer sides of the big drop
(1) will be the same as for smaller droplet
(2) will be half of that for smaller droplet
(3) will be one-forth of that for smaller droplet
(4) will be twice of that for smaller droplet.

74. A false statement is:
(1) Angle of contact $\theta < 90°$, if cohesive : force < adhesive force $\times\sqrt{2}$
(2) Angle of contact $\theta > 90°$, if cohesive force > adhesive force $\times\sqrt{2}$
(3) Angle of contact $\theta = 90°$, if cohesive force = adhesive force $\times\sqrt{2}$
(4) If the radius of capillary is reduced to half, the rise of liquid column becomes four times.

75. If a capillary of radius r is dipped in water, the height of water that rises in it is hand its mass is M. If the radius of the capillary is doubled the mass of water that rises in the capillary will be
(1) 4M (2) 2M (3) M (4) $\frac{M}{2}$

76. On dipping a capillary of radius 'r' in water, water rises up to a height H and potential energy of water is u_1. If a capillary of radius 2r is dipped in water, then the potential energy is u_2. The ratio $\frac{u_1}{u_2}$ is

(1) 2 : 1 (2) 1 : 2 (3) 4 : l (4) 1 : 1

77. A vessel, whose bottom has round holes with diameter of 0.1 mm, is filled with water. The maximum height to which the water can be filled without leakage is :-
(S.T. of water = 75 dyne/cm, g = 1000 cm/s^2)

(l) 100 cm (2) 75 cm (3) 50 cm (4) 30 cm

78. In a surface tension experiment with a capillary tube water rises up to 0.1 m. If the same experiment is repeated on an artificial satellite which is revolving round the earth, water will rise in the capillary tube up to a height of

(1) 0.1m (2) 0.98 m
(3) 9.8m (4) full length of capillary tube

79. A soap bubble in vacuum has a radius of 3 cm and another soap bubble in vacuum has a radius of 4 cm. If the two bubbles coalesce under isothermal condition, then the radius of the new bubble is:

(1) 2.3 cm (2) 4.5 cm (3) 5 cm (4) 1 cm

80. The spherical shape of rain-drop is due to

(1) Density of the liquid (2) Surface tension
(3) Atmospheric pressure (4) Gravity

81. In a capillary tube, water rises by 1.2 mm. The height of water that will rise in another capillary tube having, half, the radius of the first is :

(1) 1.2mm (2) 2.4 mm (3) 0.6 mm (4) 0.4 mm

82. Water rises to a height h in a capillary at the surface of earth. On the surface of the moon the height of water column in the same capillary will be :

(1) 6h (2)1/6 h (3) h (4) Zero

83. Shape of meniscus for a liquid of zero angle of contact is-

(1) plane (2) parabolic (3) hemi-spherical (4) cylindrical

84. Due to capillary action a liquid will rise in a tube if angle of contact is

(1) acute (2) obtuse (3) 90° (4) 180°

85. Two droplets merge with each other and form a large droplet. In this process :

(1) Energy is liberated (2) Energy is absorbed
(3) Neither liberated nor absorbed (4) Some mass is converted into energy

86. Two capillary tubes of same diameter are put vertically one each in two liquids whose relative densities are 0.8 and 0.6 and surface tensions are 60 dyne/cm and 50 dyne/cm respectively. Ratio of heights of liquids in the two tubes h_1/h_2 is:

(1) $\frac{10}{9}$ (2) $\frac{3}{10}$ (3) $\frac{10}{3}$ (4) $\frac{9}{10}$

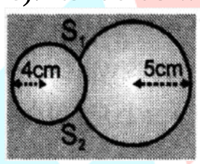
87. The property utilized in the manufacture of lead shots is:
(1) Specific weight of liquid lead
(2) Specific gravity of liquid lead
(3) Compressibility of liquid lead
(4) Surface tension of liquid lead

88. Surface tension of a liquid is 5 N/m. If its thin film is made in a ring of area 0.02 m^2, then its surface energy will be -
(1) 5×10^{-2} Joule
(2) 2.5×10^{-2} Joule
(3) 3×10^{-1} Joule
(4) 2×10^{-1} Joule

89. If one end of capillary tube is dipped into water then water rises up to 3cm. If the surface tension of water is 75×10^{-3} N/m then the diameter of capillary tube will be
(1) 0.1 mm
(2) 0.5 mm
(3) 1 mm
(4) 2 mm

90. If the surface tension of a liquid is T and its surface area is increased by A, then the surface energy of that surface will be increased by -
(1) AT
(2) A/T
(3) A^2T
(4) A^2T^2

91. Two soap bubbles of radii r_1 and r_2 equal to 4cm and 5 cm are touching each other over a common surface S_1S_2 (shown in figure). Its radius will be :-



(1) 4 cm.
(2) 20 cm.
(3) 5 cm.
(4) 4.5 cm.

92. The radius of a soap bubble is r. The surface tension of soap solution is T. Keeping temperature constant, the radius of the soap bubble is doubled, the energy necessary for this will be
(1) $24\ \pi r^2T$
(2) $8\ \pi r^2T$
(3) $12\ \pi r^2T$
(4) $16\ \pi r^2T$

93. A liquid does not wet the sides of a solid, if the angle of contact is
(1) Zero
(2) Obtuse (more than 90°)
(3) Acute (less than 90°)
(4) 45°

94. The excess of pressure inside a soap bubble than that of the outer pressure is :
(1) $\frac{2T}{r}$
(2) $\frac{4T}{r}$
(3) $\frac{T}{2r}$
(4) $\frac{T}{r}$

95. In a capillary tube experiment, a vertical 30 cm long capillary tube is dipped in water. The water rises up to a height of 10 cm due to capillary action. If this experiment is conducted in a freely falling elevator, the length of the water column becomes :
(1) 10 cm
(2) 20 cm
(3) 30 cm
(4) Zero

96. Radius of a capillary is 2×10^{-3} m. A liquid of weight 6.2×10^{-4} N may remain in the capillary. Then the surface tension of liquid will be :
(1) 5×10^{-3} N/m
(2) 5×10^{-2} N/m
(3) 5 N/m
(4) 50 N/m

97. A capillary tube of radius r can support a liquid of weight 6.28×10^{-4} N. If the surface tension of the liquid is 5×10^{-2} N/m. The radius of capillary must be:-
(1) 2×10^{-3}m
(2) 2×10^{-4} m
(3) 1.5×10^{-3}
(4) 12.5×10^{-4} m

98. Water rise in a capillary upto an extension height such that upward force of surface tension balances the force of 75×10^{-4} N. due to weight of water. If surface tension of water is 6×10^{-2} N/m. The internal circumference of the capillary must be:-
(1) 12.5×10^{-2} m (2) 6.5×10^{-2} m
(3) 0.5×10^{-2} m (4) 1.25×10^{-2} m

99. Two small drops of mercury, each of radius R, coalesce to form a single large drop. The ratio of the total surface energies before and after the change is:-
(1) $1 : 2^{1/3}$ (2) $2^{1/3} : 1$ (3) 2 : 1 (4) 1 : 2

100. Inside a drop excess pressure is maximum in:-
(1) 0.200 μm diameter (2) 20.0 μm diameter
(3) 200 μm diameter (4) 2.0 μm diameter

101. The diameter of one drop of water is 0.2 cm. The work done in breaking one drop into 1000 equal droplets will be :-
(surface tension of water = 7×10^{-2} N/m)
(1) 7.9×10^{-6} J (2) 5.92×10^{-6} J (3) 2.92×10^{-6} J (4) 1.92×10^{-6} J

102. If two bubble of radii 0.03 cm and 0.04 cm come in contact with each other then the radius of curvature of the common surface 'r' is given by.
(1) 0.03 cm (2) 0.06 cm (3) 0.12 cm (4) 0.24 cm

l 03. Work done in forming a soap bubble of radius R is W. Then work done is forming a soap bubble of radius '2R' will be :
(1) 2W (2) 4W (3) W/2 (3) W/4

104. At which angle liquid will not wet solid.
(1) Zero (2) acute (3) 45° (4) obtuse

105. Internal radius of a capillary tube is $\frac{1}{28}$ cm and surface tension of water 70 dyne/cm, if angle of contact is zero, then water will rise up in the tube upto height.
(1) 4 cm (2) 2 cm (3) 14 cm (4) 18 cm

106. Area of liquid film is 6×10 cm^2 and surface tension is T = 20 dyne/cm, what is the work done to change area up to 12×10 cm^2 :
(1) 120 joule (2) 120 erg (3) 1200 joule (4) 2400 erg

107. The work done in blowing a soap bubble of radius 0.2 m, given that the surface tension of soap solution is 60×10^{-3} N/m, is
(1) $24\pi \times 10^{-4}$ J (2) $8\pi \times 10^{-4}$ J
(3) $96\pi \times 10^{-4}$ J (4) $192\pi \times 10^{-4}$ J

108. Adding detergents to water helps in removing dirty greasy stains. This is because
(a) It increases the oil-water surface tension
(b) It decreases the oil-water surface tension
(c) It increases the viscosity of the solution

(d) Dirt is held suspended surrounded by detergent molecules

(1) (b) and (d) (2) (a) only (3) (c) and (d) (4) (d) only

109. The excess pressure inside a soap bubble A is twice that in another soap bubble B. The ratio of volumes of A and B is

(1) 1 : 2 (2) 1 : 4 (3) 1 : 8 (4) 1 : 16

110. Consider a soap film on a rectangular frame of wire of area 4×4 cm^2. If the area of the soap film is increased to 4×5cm^2, the work done in the process will be (The surface tension of the soap film is 3×10^{-2} N/m)

(1) 12×10^{-6} J (2) 24×10^{-6} J (3) 60×10^{-6} J (4) 96×10^{-6} J

ANSWER KEY

EXERCISE-I (Conceptual Questions)

1.	(4)	**2.**	(2)	**3.**	(3)	**4.**	(1)	**5.**	(1)	**6.**	(3)	**7.**	(1)
8.	(2)	**9.**	(1)	**10.**	(4)	**11.**	(1)	**12.**	(1)	**13.**	(2)	**14.**	(3)
15.	(2)	**16.**	(3)	**17.**	(2)	**18.**	(1)	**19.**	(4)	**20.**	(4)	**21.**	(4)
22.	(1)	**23.**	(2)	**24.**	(2)	**25.**	(4)	**26.**	(3)	**27.**	(2)	**28.**	(2)
29.	(3)	**30.**	(3)	**31.**	(3)	**32.**	(4)	**33.**	(1)	**34.**	(2)	**35.**	(4)
36.	(3)	**37.**	(2)	**38.**	(1)	**39.**	(3)	**40.**	(3)	**41.**	(3)	**42.**	(1)
43.	(3)	**44.**	(3)	**45.**	(1)	**46.**	(1)	**47.**	(4)	**48.**	(3)	**49.**	(1)
50.	(1)	**51.**	(1)	**52.**	(3)	**53.**	(4)	**54.**	(1)	**55.**	(1)	**56.**	(4)
57.	(4)	**58.**	(1)	**59.**	(1)	**60.**	(1)	**61.**	(1)	**62.**	(3)	**63.**	(1)
64.	(3)	**65.**	(4)	**66.**	(2)	**67.**	(2)	**68.**	(3)	**69.**	(1)	**70.**	(1)
71.	(1)	**72.**	(2)	**73.**	(2)	**74.**	(4)	**75.**	(2)	**76.**	(4)	**77.**	(4)
78.	(4)	**79.**	(3)	**80.**	(2)	**81.**	(2)	**82.**	(1)	**83.**	(3)	**84.**	(1)
85.	(1)	**86.**	(4)	**87.**	(4)	**88.**	(4)	**89.**	(3)	**90.**	(1)	**91.**	(2)
92.	(1)	**93.**	(2)	**94.**	(2)	**95.**	(3)	**96.**	(2)	**97.**	(1)	**98.**	(1)
99.	(2)	**100.**	(1)	**101.**	(1)	**102.**	(3)	**103.**	(2)	**104.**	(4)	**105.**	(1)
106.	(4)	**107.**	(4)	**108.**	(1)	**109.**	(3)	**110.**	(2)				