LEVEL # 1

ELASTICITY

Q.1 (a) Glass is more elastic than rubber
(b) Rubber is more elastic than glass
(c) Steel is more elastic than rubber
(d) Rubber is more elastic than steel
For the above statements–
(A) (a) and (b) are correct
(B) (a) and (c) are correct
(C) (b) and (c) are correct
(D) (b) and (d) are correct

Q.2 Two similar balls, one of which is made of ivory while the other, of clay, are dropped from the same height, then–
(A) the ivory ball will bounce to a greater height
(B) the caly ball will bounce to a greater height
(C) both the balls will bounce to the same height
(D) the ivory ball will not at all bounce

Q.3 Which of the following is not dimension less–
(A) Poisson ratio
(B) Sharing strain
(C) Longitudinal strain
(D) Volume stress

Q.4 The longitudinal extension of any elastic material is very small. In order to have an appreciable change, the material must be in the form of–
(A) thin block of any cross section
(B) thick block of any cross section
(C) long thin wire
(D) short thin wire

Q.5 The modulus of elasticity of a material does not depend upon–
(A) shape (B) temperature
(C) nature of material (D) impurities mixed

Q.6 A steel wire is stretched by 1 kg. wt. If the radius of the wire is doubled, its Young' s modulus will–
(A) remain unchanged
(B) become half
(C) become double
(D) become four times

Q.7 On stretching some substances, permanent elongation is caused, because–
(A) they are perfectly elastic
(B) they are perfectly plastic
(C) more stress acts on them
(D) their strain is infinite

Q.8 Out of the following whose elasticity is independent of temperature–
(A) steel (B) copper
(C) invar steel (D) glass

Q.9 A cable that can support a load W is cut into two equal parts. The maximum load that can be supported by either part is–
(A) $\frac{W}{4}$ (B) $\frac{W}{2}$
(C) W (D) 2 W

Q.10 Elasticity is the property which is caused by–
(A) the applied deforming forces
(B) gravitational force
(C) nuclear forces
(D) inter-molecular forces

Q.11 The effect of temperature on the value of Young' s modulus of elasticity for various substances in general is –
(A) it increases with increase in temperature
(B) remains constant
(C) decrease with rise in temperature
(D) sometimes increases and sometimes decreases with temperature

Q.12 The number of independent elastic constants of a solid is–
(A) 1 (B) 2 (C) 3 (D) 4

Q.13 The ratio of coefficient of isothermal and adiabatic elasticities of a gas is–
(A) γ (B) γ^2 (C) $1/\gamma$ (D) $1/\gamma^2$

Q.14 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) length 50 cm and diameter 0.5 mm
(B) length 100 cm and diameter 1 mm
(C) length 100 cm and diameter 2 mm
(D) length 300 cm and diameter 3 mm

Q.15 An iron rod of length ℓ and of cross-section area A is heated from 0ºC to 100ºC. If the rod neither expands nor bends, then the developed F is proportional to–
(A) ℓ (B) ℓ^0 (C) ℓ^{-1} (D) A^{-1}

Q.16 When a wire is stretched, an amount of work is done. What is the amount of work done in stretching a wire through 0.1 mm, if its length is 2m and area of cross-section, $10^{-6}m^2$ ($Y = 2 \times 10^{11}$ N/m^2)
(A) 5×10^{-1} J (B) 5×10^{-2} J
(C) 5×10^{-4} J (D) 5×10^{-5} J

Q.17 How many times is the adiabatic modulus of elasticity of gas as compared to its isothermal modulus of elasticity–
(A) two times (B) three times
(C) γ times (D) $1/\gamma$ times

Q.18 An iron bar of length ℓ cm and cross section A cm^2 is pulled by a force of F dynes from ends so as to produce an elongation ℓ cm. Which of the following statement is correct–
(A) elongation is inversely proportional to length
(B) elongation is directly proportional to cross section A
(C) elongation is inversely proportional to A
(D) elongation is directly proportional to Young's modulus

Q.19 The 'σ' of a material is 0.20. If a longitudinal strain of 4.0×10^{-3} is caused, by what percentage will the volume change–
(A) 0.48 % (B) 0.32 %
(C) 0.24 % (D) 0.50 %

Q.20 A cylinder is of length ℓ and diameter d. On stretching the cylinder, an increment $\Delta\ell$ in length and decrease Δd in diameter are caused. The Poisson ratio is–
(A) $\sigma = -\frac{\Delta\ell}{\ell}\times\frac{d}{\Delta d}$ (B) $\sigma = -\frac{\ell}{d}\times\frac{\Delta d}{\Delta\ell}$
(C) $\sigma = -\frac{\Delta\ell}{\ell}\times\frac{\Delta d}{d}$ (D) $\sigma = -\frac{\ell}{\Delta\ell}\times\frac{d}{\Delta d}$

Q.21 Steel is more elastic than rubber because for a given load the strain produced in steel as compared to that produced in rubber is–
(A) more (B) less
(C) equal (D) nothing can be said

Q.22 In a wire stretched by hanging a weight from its end, the elastic potential energy per unit volume in terms of longitudinal strain σ and modulus of elasticity Y is–
(A) $Y\sigma^2/2$ (B) $Y\sigma/2$
(C) $Y\sigma^2$ (D) $Y^2\sigma/2$

Q.23 The formula for compressibility of a gas is–
(A) PdV/V (B) (1/P) dP/dV
(C) $V.\frac{dP}{dV}$ (D) $\frac{1}{V}.\frac{dV}{dP}$

Questions based on Surface Tension

Q.24 Molecular force are -
(A) only adhesive
(B) only cohesive
(C) only repulsive
(D) cohesive and adhesive

Q.25 Forces responsible for surface tension differ from that of gravitational and electrostatic force because these are -
(A) electromagnetic
(B) weak forces.
(C) obeying inverse square law.
(D) both attractive and repulsive in character.

Q.26 The net force acting on a molecule inside the liquid is-
(A) directed upwards at the liquid surface.
(B) directed inwards at the liquid surface.
(C) zero
(D) infinite.

Q.27 Free sufrace of a liquid behaves as a stretched membrane and tends to assume the smallest possible area due to the-
(A) cohesive force
(B) adhesive force
(C) centrifugal force
(D) centripetal force

Q.28 The liquid surfaces have a tendency to contract, this phenomenon is due to-
(A) surface tension (B) viscosity
(C) friction (D) dispersion

Q.29 Surface tension may be defined as the mechanical work required to create an additional unit area of the liquid under-
(A) isobaric conditions
(B) isothermal conditions
(C) adiabatic conditions
(D) isometric conditions.

Q.30 The surface tension of a liquid depends on -
(A) contamination
(B) impurity dissolved in the liquid
(C) temperature
(D) all the above.

Q.31 If we increase the surface area of a soap film, the surface tension of the film -
(A) increases
(B) decreases
(C) remains the same
(D) becomes infinite

Q.32 When the temperature of liquid is increased/current flows through a liquid, then its surface tension-
(A) remains constant
(B) increases
(C) decreases.
(D) first increases then decreases

Q.33 The soap and the detergent make water suitable for washing clothes because they-
(A) make it rich in lather
(B) increase its density
(C) reduce its hardness
(D) reduce its surface tension

Q.34 Which of the following liquids has the maximum value of surface tension-
(A) water (B) soap-solution
(C) alcohol (D) mercury

Q.35 The surface tension of mercury at normal temperature and pressure is-
(A) 72 dyne/cm (B) 72 N/m.
(C) 453 dyne/cm (D) 435×10^{-3} N/m

Q.36 At critical temperature, the surface tension of a liquid-
(A) is zero
(B) is infinity
(C) is the same as that any other temperature.
(D) can not be determined.

Q.37 On wearing a rain coat on which some greasy material is coated, a person does not wet in rain because-
(A) the rain coat absorbs water
(B) the cohesive force of water is more.
(C) the adhesion between the rain coat and water becomes less.
(D) none of these.

Q.38 It is possible to join two metals by soldering due to the property of-
(A) diffusion (B) elasticity
(C) viscosity (D) surface tension.

Q.39 If there is a thin layer of water between two parallel plates then it is easier to seperate the plates by-
(A) displacing them parallel to their surface
(B) applying force perpendicular to the surface of the plates
(C) applying force in the some direction
(D) none of the above.

Q.40 The incorrect statement is -
(A) Tree gets water from earth through capillary action
(B) Towel absorbs water from our body by capillary action
(C) We get water in house tops through the action of surface tension
(D) Our teeth get blood from the body by capillary action

Q.41 Big liquid drops are not spherical due to -
(A) viscosity
(B) surface tension
(C) gravitational force.
(D) atmospheric pressure.

Questions based on Surface area and surface energy

Q.42 The length of a needle floating on water is 2.5 cm. The minimum force in addition to its weight needed to lift the needle above the surface of water will be (S.T. = 7.2×10^{-2}N/m)-
(A) 36×10^{-4} N (B) 10 N
(C) 9 N (D) 6 N

Q.43 W is the work done in forming a bubble of radius r, the work done in forming a bubble of radius 2r will be -
(A) 4W (B) 3W (C) 2W (D) W

Q.44 If W is the amount of work done in forming a soap bubble of volume V, then the amount of work done in forming a bubble of volume 2V from the same solution will be -
(A) W/2 (B) 2W
(C) $\sqrt{2}$ W (D) $4^{1/3}$ W

Q.45 A big drop of water whose diameter is 0.2 cm, is broken into 27000 small drops of equal volume. Work done in this process will be - (surface tension of water is 7×10^{-2} N/m).

(A) 5×10^{5} joule (B) 2.9×10^{-5} joule
(C) 2.55×10^{-5} joule (D) zero

Q.46 Several spherical drops of a liquid each of radius r coalesce to form a single drop of radius R. If T is the surface tension, then the energy liberated will be -

(A) $4\pi R^3 T\left(\frac{1}{r}-\frac{1}{R}\right)$ (B) $2\pi R^3 T\left(\frac{1}{r}-\frac{1}{R}\right)$

(C) $\frac{4}{3}\pi r^2 T\left(\frac{1}{r}-\frac{1}{R}\right)$ (D) $2\pi RT\left(\frac{1}{R}-\frac{1}{r}\right)$

Q.47 The work done in blowing a spherical soap bubble of diameter 2cm will be if the surface tension of soap solution is 2×10^{-2}N/m -

(A) 50.2×10^{-6} Joule (B) 50.2 Joule.
(C) 50.2×10^{-6} erg. (D) zero

Q.48 A soap bubble has radius r. The surface tension of the soap film is T. The energy needed to double the diameter of the bubble without change of temperature is -

(A) $4\pi r^2 T$ (B) $2\pi r^2 T$
(C) $12\pi r^2 T$ (D) $24\pi r^2 T$

Q.49 The surface energy of a liquid drop is u. It is sprayed into 1000 equal droplets. Then its surface energy becomes-

(A) u (B) 10 u
(C) 100 u (D) 1000 u

Q.50 Suppose that 64 raindrops combine into a single drop. The ratio of the total surface energy of the 64 drops to that of a single drop is- (For water T = 0.72 N/m = 0.072 Joule/m^2.)

(A) 4 (B) 10 (C) 2 (D) 8

Q.51 A liquid drop of diameter D is divided into 27 equal droplets. If the surface tension is T then the change in energy will be-

(A) $3\pi D^2 T$ (B) $\pi D^2 T$
(C) $2\pi D^2 T$ (D) $4\pi D^2 T$

Q.52 When two soap bubbles of radii r coalesce to form a single bubble then its radius will be-

(A) 0 (B) ∞ (C) $\frac{r}{2}$ (D) $\sqrt{2}\,r$

Q.53 How many free surfaces are there in a liquid film ?

(A) one (B) two
(C) three (D) infinite

Q.54 The number of free liquid surfaces in the air bubble inside a luquid is-

(A) one (B) two
(C) four (D) eight

Q.55 The total surface energy of liquid is-

(A) Surface tension x free surface area

(B) $\frac{\text{Surface tension}}{\text{free surface area}}$

(C) $\sqrt{\text{surface tension} \times \text{free surface area}}$

(D) 4 (surface tension × free surface area)

Questions based on Excess of pressure

Q.56 The volume of two soap bubbles are in the ratio 8 : 1. Then ratio of excess pressure inside the soap bubbles is-

(A) 8 : 1 (B) 1 : 8
(C) 2 : 1 (D) 1 : 2

Q.57 The excess of pressure inside a water drop is P_d and that inside an air bubble of same radius in water is P_b. Which of the following relation is correct ?

(A) $P_d = P_b$
(B) $2P_d = P_b$
(C) $P_d = 2P_d$
(D) none of the above

Q.58 The excess of pressure inside a drop of soap solution is P_d, and that inside a soap bubble of same radius is P_b. Which of the following relation is correct ?

(A) $P_d = P_b$ (B) $2P_d = P_b$
(C) $P_d = 2P_b$ (D) none of the above

Q.59 What will be the difference of pressure inside and outside a drop of water of radius 1.0 mm ? (The surface tension of water is 73 dyne/cm-)

(A) 146 N/m^2 (B) 73 N/m^2
(C) 7.3 N/m^2 (D) 200 N/m^2

Q.60 The pressure inside a small air bubble of 0.1 mm radius is -
[T = 0.072 N/m and atmospheric pressure $= 1.013 \times 10^5$ N/m^2].
(A) 2.027×10^5 N/m^2
(B) 1.013×10^5 N/m^2
(C) $2 \times .072 \times .001$ N/m^2
(D) 1.027×10^5 N/m^2

Q.61 If r, V and P are respectively the radius, volume and excess of pressure, for a bubble (or drop) then-
(A) $PV \propto r$ (B) $PV \propto 1/r$
(C) $PV \propto r^2$ (D) $PV \propto 1/r^2$

Q.62 The radius of curvature of common surface formed by contact of two soap bubbles of radii 3cm and 4cm respectively, will be-
(A) 7cm (B) 1cm
(C) 5cm (D) 12 cm

Questions based on Angle of contact

Q.63 The angle of contact for pure water and clean glass is -
(A) 0º (B) 90º (C) 180º (D) 360º

Q.64 If a liquid neither rises nor falls in a capillary, its angle of contact is -
(A) 0º (B) 180º (C) 90º (D) 45º

Q.65 The expression for excess pressure inside a soap bubble is -
(A) $P = \frac{2T}{r}$ (B) $P = \frac{T}{r}$
(C) $P = \frac{T}{4r}$ (D) $P = \frac{4T}{r}$

Q.66 The excess pressure inside an air bubble formed in a liquid is -
(A) $P = \frac{2T}{r}$ (B) $P = \frac{4T}{r}$
(C) $P = \frac{T}{r}$ (D) $P = \frac{T}{2r}$

Q.67 Two soap bubbles of radii 3 cm and 4 cm are kept in contact, then the radius of curvature of common surface will be -
(A) 5 cm (B) 7 cm
(C) 9 cm (D) 12 cm

Q.68 A drop of water and a soap bubble have the same radii. Surface tension of soap solution is half of that of water. The ratio of excess pressure inside the drop and bubble is -
(A) 1 : 2 (B) 2 : 1
(C) 1 : 4 (D) 1 : 1

Q.69 A liquid will not wet a solid surface if the angle of contact is -
(A) 0º (B) 30º (C) 45º (D) 120º

Q.70 The angle of contact for pure water and glass is-
(A) 0º (B) 180º (C) 90º (D) 120º

Q.71 The value of the angle of contact for pure water and mercury with the surface of glass respectively-
(A) 140º and 0º (B) 0º and 140º
(C) 0º and 90º (D) 90º and 0º

Q.72 The maximum value of angle of contact can be-
(A) 0º (B) 90º
(C) 180º (D) 360º

Q.73 A liquid rises in a capillary tube then its angle of contact θ is-
(A) $\theta > 90º$ (B) $\theta < 90º$
(C) $\theta = 90º$ (D) $\theta = 180º$

Questions based on Capillarity

Q.74 When a capillary is dipped into a beaker full of water then water rises in it because the pressure just below the meniscus is-
(A) less than the atmospheric pressure
(B) more than the atmospheric pressure
(C) equal to the atmospheric pressure
(D) 13.6 N/m

Q.75 When liquid rises in a capillary tube, the upward pull due to surface tension is equal to -
(A) weight of the liquid column
(B) cohesive forces
(C) surface energy per unit area
(D) adhesive forces

Q.76 If the thickness of glass of a capillary is doubled then the height of liquid risen in it will be-
(A) doubled (B) four times
(C) eight times (D) unchanged

Q.77 If the diameter of capillary be doubled, the rise of water in capillary will be-

(A) double (B) half

(C) remain the same (D) four times

Q.78 A liquid rises upto a height greater than that for water. Its reason is that -

(A) liquid is more viscous than water

(B) the temperature of liquid is higher than that of water

(C) the surface tension of water is less than that of liquid

(D) the surface tension of water is more than that of liquid

Q.79 If a capillary is dipped partially in water contained in a beaker which is placed inside a lift falling freely then the water-

(A) will rise upto the upper end of the capillary

(B) will rise upto a certain height only

(C) will not rise at all

(D) will osciliate in the capillary

Q.80 In gravity free space, the liquid in a capillary tube will rise to-

(A) same height as on earth

(B) less height as on earth

(C) slightly more height than that on earth

(D) infinite height

Q.81 On performing the experiment of capillary rise on the moon the height of liquid column inside the capillary is found h'. If the same experiment is repeated on the earth. then the liquid is found to rise up to height h, then-

(A) $h' > h$ (B) $h' < h$

(C) $h' \neq h$ (D) $h' = 0$

Q.82 Water rises in a capillary tube of diameter 0.2×10^{-2} m upto a height of 1.5 cm. The surface tension of water is -

(A) 73.5×10^{-3} N/m

(B) 73.5×10^{-3} dyne/cm

(C) 35.7×10^{-3} N/m

(D) 43.5×10^{-3} N/m

Q.83 Water rises to a height of 30 mm in a capillary tube. If the radius of the capillary tube is made $(3/4)^{th}$ of its previous value, the height to which the water will rise in the tube is-

(A) 30 mm (B) 20 mm

(C) 40 mm (D) 10 mm

Q.84 Water rises to a height of 5 cm in a glass capillary tube. If the area of cross section of the tube is reduced to $(1/16)^{th}$ of the former value, the water rises to a height of-

(A) 10 cm (B) 20 cm

(C) 30 cm (D) 40 cm

Q.85 Water rises in a capillary upto a height of 4 cm. If it is tilted to 30º from the vertical, then the length of water column in it will be-

(A) $\frac{8}{\sqrt{3}}$ cm (B) $8\sqrt{3}$ cm

(C) 4 cm (D) 2 cm

Q.86 If a capillary tube is tilted to 45º and 60º from the vertical then the ratio of length l_1 and l_2 of liquid columns in it will be-

(A) $1 : \sqrt{2}$ (B) $\sqrt{2} : 1$

(C) 2 : 1 (D) 1 : 2

ANSWER KEY

LEVEL # 1

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	A	D	C	A	A	B	C	C	D	C	B	C	A	B	C	C	C	C	B
Q.No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	B	A	D	D	B	C	A	A	B	D	C	C	D	D	D	A	C	D	A	C
Q.No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	C	A	A	D	C	A	A	D	B	A	C	D	B	A	A	D	A	B	A	D
Q.No.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	C	D	A	C	D	A	D	D	D	A	B	C	B	A	A	D	B	C	A	D
Q.No.	81	82	83	84	85	86														
Ans.	D	A	C	B	A	A														

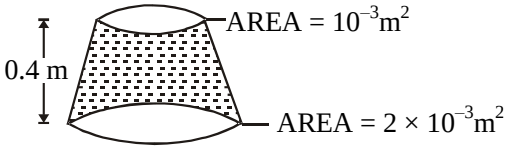
FLIUD MECHNICS

SECTION-B

FLUID STATICS

Q.1 Which one of the following would hydrogen balloon find easiest to lift ?
(A) 1 kg of steel
(B) 1 kg of water
(C) 1 kg of lightly packed feathers
(D) all the same

Q.2 A uniformaly tapering vessel shown in Fig. is filled with liquid of density 900 kg/m^3. The force that acts on the base of the vessel due to liquid is (take g = 10 m/s^2) -



(A) 3.6 N (B) 7.2 N
(C) 9.0 N (D) 12.6 N

Q.3 What is the pressure on a swimmer 10 m below the surface of a late ?
(A) 2 atm (B) 4 atm (C) 6 atm (D) None

Q.4 A body is just floating in a liquid (their densities are equal) If the body is slightly pressed down and released it will -
(A) start oscillating
(B) sink to the bottom
(C) come back to the same position immediately
(D) come back to the same position slowly

Q.5 Two stretched membranes of areas 2 and 3 m^2 are placed in a liquid at the same depth. The ratio of the pressure on them is -

(A) 1 : 1 (B) 2 : 3

(C) $\sqrt{2} : \sqrt{3}$ (D) $2^2 : 3^2$

Q.6 1 kg of cotton and iron are weighed in vacuum, then -

(A) cotton and iron will weight same

(B) iron will weight more than cotton

(C) cotton will weight more than iron

(D) both have zero weight

Q.7 An ice block floats in a liquid whose density is less than water. A part of block is outside the liquid. When whole of ice has melted, the liquid level will -

(A) rise

(B) go down

(C) remain same

(D) first rise then go down

Q.8 A body partly immersed, floats in a liquid contained in a beaker. The beaker is kept inside a lift falling freely under gravity. The upthrust on the body due to liquid is -

(A) zero

(B) equal to weight of body in air

(C) equal to weight of liquid displaced

(D) equal to weight of immersed part of body

Q.9 The height of a barometer filled with a liquid of density 3.4 g/cc under normal condition is approximately -

(A) 8 m (B) 5 m (C) 3 m (D) 1 m

Q.10 A weightless base is filled with 5 kg of water and then weighed in water. The reading of spring balance is -

(A) 5 kg f (B) 2.5 kg f

(C) 1.25 kg f (D) zero

Q.11 A cube of iron whose sides are of length L, is put into mercury. The weight of iron cube is W. The density of iron is ρ_I, that of mercury is ρ_M. The depth to which the cube sinks is given by the expression -

(A) $WL^2\rho_I$ (B) $WL^2\rho_M$

(C) $\frac{W}{L^2\rho_I}$ (D) $\frac{W}{L^2\rho_M g}$

FLUID DYNAMICS

Q.12 An incompressible fluid flows steabily through a cylindrical pipe which has radius 2R at point A and radius R at point B further along the flow direction. If the velocity at point A is ν, its velocity at point B will be –

(A) 2ν (B) ν (C) $\nu/2$ (D) 4ν

Q.13 Water is flowing in a horizontal pipe of non-uniform cross - section. At the most contracted place of the pipe –

(A) Velocity of water will be maximum and pressure minimum

(B) Pressure of water will be maximum and velocity minimum

(C) Both pressure and velocity of water will be maximum

(D) Both pressure and velocity of water will be minimum

Q.14 Water is flowing in a tube of non-uniform radius. The ratio of the radii at entrance and exit ends of tube is 3 : 2. The ratio of the velocities of water entering in and exiting from the tube will be –

(A) 8 : 27 (B) 4 : 9

(C) 1 : 1 (D) 9 : 4

Q.15 Water from a tap emerges vertically downward with an initial speed of 1.0 ms^{-1}. The cross-section area of the tap is $10^{-4}m^2$. Assumed at the pressure is constant throughout the stream of water and that the flow is steady. The cross-sectional areal of the stream 0.15 m below the tap is (g = 10 m/s^2)

(A) 5.0×10^{-4} m^2 (B) 1.0×10^{-5} m^2

(C) 5.0×10^{-5} m^2 (D) 2.0×10^{-5} m^2

Q.16 The velocity of a small ball of mass M and density d_1, when dropped in a container filled with glycerine becomes constant after some time. If the density of glycerine is d_2, the viscous force acting on the ball will be –

(A) $\frac{Md_1g}{d_2}$ (B) $\frac{M(d_1+d_2)}{g}$

(C) $Mg\left(1-\frac{d_2}{d_1}\right)$ (D) $M\,d_1\,d_2$

Q.17 Bernoulli's theorem based upon –

(A) Conservation of momentum

(B) Conservation of energy

(C) Conservation mass

(D) None of these

(E) Faraday's law

Q.18 There is a gale over a house. The force on the roof of the house due to the gale is –

(A) Directed downward

(B) Directed upward

(C) Zero

(D) None of these

Q.19 A tank has an orifice near its bottom. The volume of the liquid flowing per second out of the orifice does not depend upon –
(A) Area of the orifice
(B) Height of the liquid level above the orifice
(C) Density of liquid
(D) Acceleration due to gravity

Q.20 The rate of flowing of water from the orifice in a wall of a tank will be more if the orific is –
(A) Near the bottom
(B) Near the upper end
(C) Exactly in the middle
(D) Does not depend upon the position of orific

Q.21 A tank is filled with water to a height H. A hole is made in one of the walls at a depth D below the water surface. The distance x from the foot of the wall at which the stream of water coming out of the tank strikes the ground is given by –
(A) $x = 2\,[D(H - D)]^{1/2}$
(B) $x = 2\,(gD)^{1/2}$
(C) $x = 2\,[D(H + D)]^{1/2}$
(D) None of these

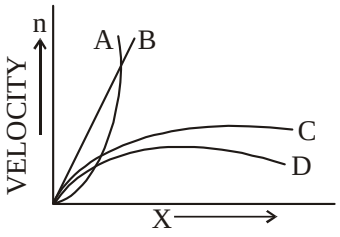
Viscosity

Q.22 A small lead ball is falling freely in a viscous liquid. The velocity of the ball –
(A) goes on increasing
(B) goes on decreasing
(C) remains constant
(D) first increases and then becomes constant

Q.23 The terminal velocity of a spherical ball of radius r falling through a viscous liquid is proportional to –
(A) r (B) r^2
(C) r^3 (D) r^{-1}

Q.24 The viscous force acting on a solid ball moving in air with terminal velocity ν is directly proportional to–
(A) $\sqrt{\nu}$ (B) ν
(C) $\frac{1}{\sqrt{\nu}}$ (D) ν^2

Q.25 A small spherical solid ball is dropped in a viscous liquid. Its journey in the liquid is best described in the figure by –



(A) Curve A (B) Curve B
(C) Curve C (D) Curve D