# NEET : CHAPTER WISE TEST-11

**SUBJECT :- PHYSICS**
**CLASS :- 11th**
**CHAPTER :- Mechanical Properties of Matter & Fluid**

**DATE........................................................**
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**SECTION...................................................**

## (SECTION-A)

**1.** On increasing the length by 0.5 *mm* in a steel wire of length 2 *m* and area of cross-section $2\,mm^2$, the force required is [*Y* for steel $= 2.2\times10^{11}\ N/m^2$]]

(A) $1.1\times10^5\ N$ (B) $1.1\times10^4\ N$
(C) $1.1\times10^3\ N$ (D) $1.1\times10^2\ N$

**2.** If the temperature increases, the modulus of elasticity

(A) Decreases (B) Increases
(C) Remains constant (D) Becomes zero

**3.** A tensile force F is applied on all six surfaces of a cube of side unity then increase in length of each side will be (Y = young measurement] σ = Pieson ratio½

(A) $\frac{F}{Y(1-\sigma)}$ (B) $\frac{F}{Y(1+\sigma)}$
(C) $\frac{F(1-2\sigma)}{Y}$ (D) $\frac{F}{Y(1+2\sigma)}$

**4.** The temperature of a wire of length 1 *metre* and area of cross-section $1\,cm^2$ is increased from 0°*C* to 100°*C*. If the rod is not allowed to increase in length, the force required will be $(\alpha = 10^{-5}/°C$ and $Y = 10^{11}\ N/m^2)$

(A) $10^3 N$ (B) $10^4 N$
(C) $10^5 N$ (D) $10^9 N$

**5.** An aluminum rod (Young's modulus $= 7\times10^9\ N/m^2)$ has a breaking strain of 0.2%. The minimum cross-sectional area of the rod in order to support a load of $10^4$ Newton's is

(A) $1\times10^{-2}\ m^2$ (B) $1.4\times10^{-3}\ m^2$
(C) $3.5\times10^{-3}\ m^2$ (D) $7.1\times10^{-4}\ m^2$

**6.** In steel, the Young's modulus and the strain at the breaking point are $2\times10^{11}\ Nm^{-2}$ and 0.15 respectively. The stress at the breaking point for steel is therefore

(A) $1.33\times10^{11}\ Nm^{-2}$
(B) $1.33\times10^{12}\ Nm^{-2}$
(C) $7.5\times10^{-13}\ Nm^{-2}$
(D) $3\times10^{10}\ Nm^{-2}$

**7.** A copper wire and a steel wire 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) Different stresses and strains
(B) The same stress and strain
(C) The same strain but different stresses
(D) The same stress but different strains

**8.** *A* and *B* are two wires. The radius of *A* is twice that of *B*. They are stretched by the some load. Then the stress on *B* is

(A) Equal to that on *A*
(B) Four times that on *A*
(C) Two times that on *A*
(D) Half that on *A*

**9.** A force *F* is applied on the wire of radius *r* and length *L* and change in the length of wire is *l*. If the same force *F* is applied on the wire of the same material and radius 2*r* and length 2*L*, Then the change in length of the other wire is

(A) *l* (B) 2*l* (C) *l*/2 (D) 4*l*

**10.** A steel wire is suspended vertically from a rigid support. When loaded with a weight in air, it expands by $L_a$ and when the weight is immersed completely in water, the extension is reduced to $L_W$. Then relative density of the material of the weight is

(A) $\frac{L_a}{L_a - L_w}$ (B) $\frac{L_w}{L_a}$
(C) $\frac{L_a}{L_w}$ (D) $\frac{L_w}{L_a - L_w}$

**11.** The specific heat at constant pressure and at constant volume for an ideal gas are $C_p$ and $C_v$ and its adiabatic and isothermal elasticities are $E_\phi$ and $E_\theta$ respectively. The ratio of $E_\phi$ to $E_\theta$ is
(A) $C_v / C_p$ (B) $C_p / C_v$
(C) $C_p C_v$ (D) $1 / C_p C_v$

**12.** If a rubber ball is taken at the depth of 200 *m* in a pool, its volume decreases by 0.1%. If the density of the water is $1 \times 10^3\, kg/m^3$ and $g = 10\, m/s^2$, then the volume elasticity in $N/m^2$ will be
(A) $10^8$ (B) $2 \times 10^8$
(C) $10^9$ (D) $2 \times 10^9$

**13.** Which of the following relations is true
(A) $3Y = K(1-\sigma)$ (B) $K = \frac{9\eta Y}{Y + \eta}$
(C) $\sigma = (6K + \eta)Y$ (D) $\sigma = \frac{0.5Y - \eta}{\eta}$

**14.** If the potential energy of a spring is *V* on stretching it by 2 *cm*, then its potential energy when it is stretched by 10 *cm* will be
(A) *V*/25 (B) 5*V*
(C) *V*/5 (D) 25*V*

**15.** If a spring is extended to length *l*, then according to Hook's law
(A) $F = kl$ (B) $F = \frac{k}{l}$
(C) $F = k^2 l$ (D) $F = \frac{k^2}{l}$

**16.** A force F is needed to break a copper wire having radius R. Then the force needed to break a copper wire of radius 2 R will be :
(A) F/2 (B) 2 F
(C) 4 F (D) F/4

**17.** A square brass plate of side 1.0 m and thickness 0.005 m is subjected to a force F on its smaller opposite edges, causing a displacement of 0.02 cm. If the shear modulus of brass is 0.4 × $10^{11}$ N/$m^2$, the value of the force F is
(A) 4 × $10^3$ N (B) 400 N
(C) 4 × $10^4$ N (D) 1000 N

**18.** The spherical shape of rain-drop is due to
(A) Density of the liquid
(B) Surface tension
(C) Atmospheric pressure
(D) Gravity

**19.** A 2 *m* long rod of radius 1 *cm* which is fixed from one end is given a twist of 0.8 radians. The shear strain developed will be
(A) 0.002 (B) 0.004
(C) 0.008 (D) 0.016

**20.** A square frame of side L is dipped in a liquid. On taking out, a membrane is formed. If the surface tension of the liquid is *T*, the force acting on the frame will be
(A) 2 *TL* (B) 4 *TL*
(C) 8 *TL* (D) 10 *TL*

**21.** Match the column A with column B

| **Column A** | **Column B** |
|---|---|
| (a) Torricelli's law | (p) $F = 6\pi\eta Av$ |
| (b) Atmospheric pressure | (q) $\eta = \frac{F}{6\pi rv}$ |
| (c) Stokes law | (r) $v_1 = \sqrt{2gh}$ |
| (d) coefficient of viscosity | (s) $P = P_a + \rho gh$ |

(A) d→q, c→p, b→s, 1→r
(B) d→p, c→q, b→r, 1→s
(C) d→s, c→q, b→p, 1→r
(D) d→s, c→r, b→q, 1→p

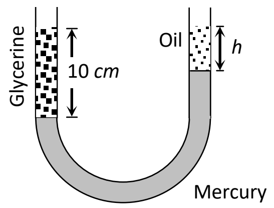
**22.** The surface tension of a liquid is 5 *N/m*. If a thin film of the area 0.02 $m^2$ is formed on a loop, then its surface energy will be
(A) $5 \times 10^2\, J$ (B) $2.5 \times 10^{-2}\, J$

(C) $2\times10^{-1}\ J$ (D) $5\times10^{-1}\ J$

**23.** The work done in blowing a soap bubble of radius *r* of the solution of surface tension *T* will be
(A) $8\pi r^2 T$ (B) $2\pi r^2 T$
(C) $4\pi r^2 T$ (D) $\frac{4}{3}\pi r^2 T$

**24.** Two wires of the same material and length but diameter in the ratio 1 : 2 are stretched by the same force. The ratio of potential energy per unit volume for the two wires when stretched will be :
(A) 1 : 1 (B) 2 : 1
(C) 4 : 1 (D) 16 : 1

**25.** A vertical U-tube of uniform inner cross section contains mercury in both sides of its arms. A glycerin (density = 1.3 $g/cm^3$) column of length 10 *cm* is introduced into one of its arms. Oil of density 0.8 $gm/cm^3$ is poured into the other arm until the upper surfaces of the oil and glycerin are in the same horizontal level. Find the length of the oil column, Density of mercury = 13.6 $g/cm^3$




(A) 10.4 cm (B) 8.2 cm
(C) 7.2 cm (D) 9.6 cm

**26.** A liquid does not wet the solid surface, if the angle of contact is
(A) Zero
(B) Obtuse (More than 90°)
(C) Acute (Less than 90°)
(D) 90°

**27.** If two soap bubbles of different radii are in communication with each other
(A) Air flows from larger bubble into the smaller one
(B) The size of the bubbles remains the same
(C) Air flows from the smaller bubble into the large one and the larger bubble grows at the expense of the smaller one
(D) The air flows from the larger

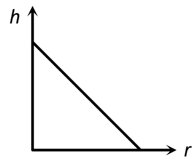
**28.** Two solids *A* and *B* float in water. It is observed that *A* floats with half its volume immersed and *B* floats with 2/3 of its volume immersed. Compare the densities of *A* and *B*
(A) 4 : 3 (B) 2 : 3
(C) 3 : 4 (D) 1 : 3

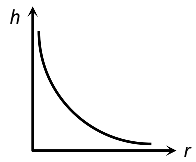
**29.** The upper end of a wire of radius 4 mm and length 100 cm is clamped and its other end is twisted through an angle of 30º. The angle of shear is
(A) 12º (B) 0.12º
(C) 1.2º (D) 0.012º

**30.** If work done in stretching a wire by 1mm is 2J, the work necessary for stretching another wire of same material, but of double the radius and half the length by 1mm in joule will be -
(A) 1/4 (B) 4 (C) 8 (D) 16

**31.** If the diameter of a capillary tube is doubled, then the height of the liquid that will rise is
(A) Twice
(B) Half
(C) Same as earlier
(D) None of these

**32.** The correct curve between the height or depression *h* of liquid in a capillary tube and its radius is

(A)



(B)
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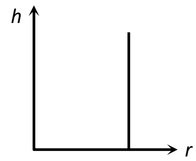
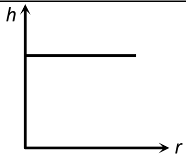


(D) 


**33.** **Assertion :** A needle placed carefully on the surface of water may float, whereas a ball of the same material will always sink.

**Reason :** The buoyancy of an object depends both on the material and shape of the object.

(A) If both assertion and reason are true and the reason is the correct explanation of the assertion.

(B) If both assertion and reason are true but reason is not the correct explanation of the assertion.

(C) If assertion is true but reason is false.

(D) If the assertion and reason both are false.

**34.** Two water pipes of diameters 2 *cm* and 4 *cm* are connected with the main supply line. The velocity of flow of water in the pipe of 2 *cm* diameter is

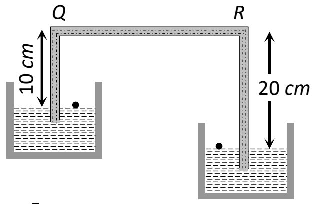
(A) 4 times that in the other pipe

(B) $\frac{1}{4}$ times that in the other pipe

(C) 2 times that in the other pipe

(D) $\frac{1}{2}$ times that in the other pipe

**35.** A siphon in use is demonstrated in the following figure. The density of the liquid flowing in siphon is 1.5 *gm/cc*. The pressure difference between the point *P* and *S* will be




(A) $10^5$ *N/m* (B) $2 \times 10^5$ *N/m*

(C) Zero (D) Infinity

## (SECTION-B)

**36.** If two liquids of same volume but different densities $\rho_1$ and $\rho_2$ are mixed, then density of mixture is given by

(A) $\rho = \frac{\rho_1 + \rho_2}{2}$ (B) $\rho = \frac{\rho_1 + \rho_2}{2\rho_1\rho_2}$

(C) $\rho = \frac{2\rho_1\rho_2}{\rho_1 + \rho_2}$ (D) $\rho = \frac{\rho_1\rho_2}{\rho_1 + \rho_2}$

**37.** A body is just floating on the surface of a liquid. The density of the body is same as that of the liquid. The body is slightly pushed down. What will happen to the body

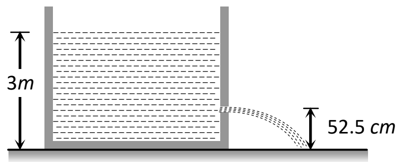
(A) It will slowly come back to its earlier position

(B) It will remain submerged, where it is left

(C) It will sink

(D) It will come out vigoursly

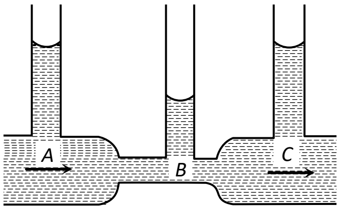
**38.** Water is filled in a cylindrical container to a height of 3*m*. The ratio of the cross-sectional area of the orifice and the beaker is 0.1. The square of the speed of the liquid coming out from the orifice is ($g$ = 10 $m/s^2$)




(A) 50 $m^2/s^2$ (B) 50.5 $m^2/s^2$

(C) 51 $m^2/s^2$ (D) 52 $m^2/s^2$

**39.** In the following fig. is shown the flow of liquid through a horizontal pipe. Three tubes *A*, *B* and *C* are connected to the pipe. The radii of the tubes *A*, *B* and *C* at the junction are respectively 2 *cm*, 1 *cm* and 2 *cm*. It can be said that the

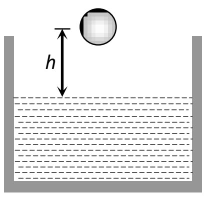



(A) Height of the liquid in the tube *A* is maximum
(B) Height of the liquid in the tubes *A* and *B* is the same
(C) Height of the liquid in all the three tubes is the same
(D) Height of the liquid in the tubes *A* and *C* is the same

**40.** There is a hole in the bottom of tank having water. If total pressure at bottom is 3 *atm* (1 *atm* = $10^5 N/m^2$) then the velocity of water flowing from hole is

(A) $\sqrt{400}\ m/s$ (B) $\sqrt{600}\ m/s$
(C) $\sqrt{60}\ m/s$ (D) None of these

**41.** A ball of radius *r* and density $\rho$ falls freely under gravity through a distance *h* before entering water. Velocity of ball does not change even on entering water. If viscosity of water is $\eta$, the value of *h* is given by




(A) $\frac{2}{9}r^2\left(\frac{1-\rho}{\eta}\right)g$ (B) $\frac{2}{81}r^2\left(\frac{\rho-1}{\eta}\right)g$
(C) $\frac{2}{81}r^4\left(\frac{\rho-1}{\eta}\right)^2 g$ (D) $\frac{2}{9}r^4\left(\frac{\rho-1}{\eta}\right)^2 g$

**42.** Water is flowing through a tube of non-uniform cross-section ratio of the radius at entry and exit end of the pipe is 3 : 2. Then the ratio of velocities at entry and exit of liquid is

(A) 4 : 9 (B) 9 : 4
(C) 8 : 27 (D) 1 : 1

**43.** The heart of man pumps 5 litres of through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be 13.6 $\times 10^3$ kg/m$^3$ and g = 10m/s$^2$ then the power of heart in watt is :

(A) 2.35 (B) 3.0
(C) 1.50 (D) 1.70

**44.** A drop of oil is placed on the surface of water. Which of the following statement is correct

(A) It will remain on it as a sphere
(B) It will spread as a thin layer
(C) It will be partly as spherical droplets and partly as thin film
(D) It will float as a distorted drop on the water surface

**45.** Water falls from a tap, down the streamline

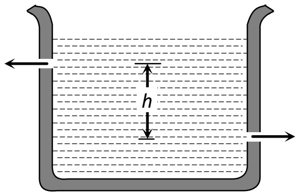
(A) Area decreases
(B) Area increases
(C) Velocity remains same
(D) Area remains same

**46.** A small hole of area of cross-section 2 mm$^2$ present near the bottom of a fully filled open tank of height 2 m. Taking g = 10 m/s$^2$, the rate of flow of water through the open hole would be nearly

(A) 6.4 × $10^{-6}$ m$^3$/s
(B) 12.6 × $10^{-6}$ m$^3$/s
(C) 8.9 × $10^{-6}$ m$^3$/s
(D) 2.23 × $10^{-6}$ m$^3$/s

**47.** There are two identical small holes of area of cross-section *a* on the opposite sides of a tank containing a liquid of density $\rho$.

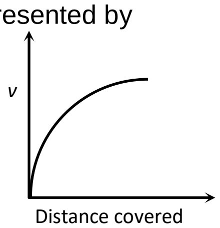
The difference in height between the holes is *h*. Tank is resting on a smooth horizontal surface. Horizontal force which will has to be applied on the tank to keep it in equilibrium is

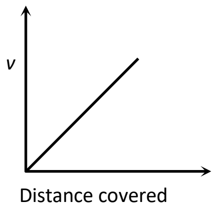


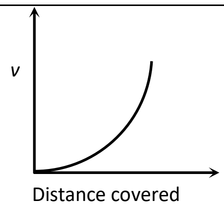

(A) $gh\rho a$ (B) $\frac{2gh}{\rho a}$

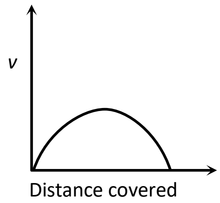
(C) $2\rho agh$ (D) $\frac{\rho gh}{a}$

**48.** A lead shot of 1*mm* diameter falls through a long column of glycerine. The variation of its velocity *v*. with distance covered is represented by

(A)



(B)



(C)



(D)



**49.** Due to which property of water, tiny particles of camphor dance on the surface of water
(A) Viscosity
(B) Surface tension
(C) Weight
(D) Floating force

**50.** What is ratio of surface energy of 1 small drop and 1 large drop, if 1000 small drops combined to form 1 large drop
(A) 100 : 1 (B) 1000 : 1
(C) 10 : 1 (D) 1 : 100