Q1. The pressure at a depth of 10 m below the surface of water is:

A. 10^5 Pa
B. 1.98×10^5 Pa
C. 9.8×10^4 Pa
D. 2×10^5 Pa

Answer: B

Explanation:
Pressure due to fluid = h * ρ * g = 10 * 1000 * 9.8 = 98000 Pa
Total pressure = atmospheric pressure + hydrostatic pressure = $1 \times 10^5 + 98000 = 1.98 \times 10^5$ Pa

Q2. The SI unit of pressure is:

A. dyne/cm²
B. newton
C. pascal
D. joule

Answer: C

Explanation:
1 pascal = 1 newton/m² is the SI unit of pressure.

Q3. Which device works on Pascal's law?

A. Hydraulic lift
B. Thermometer
C. Barometer
D. Venturimeter

Answer: A

Explanation:
Hydraulic lift uses the principle that pressure applied at one point in an incompressible fluid is transmitted equally in all directions.

Q4. The pressure at the bottom of a tank filled with a liquid is independent of:

A. Height of liquid column
B. Density of the liquid
C. Gravitational acceleration
D. Shape of the container

Answer: D

Explanation:
Hydrostatic pressure depends only on height, density, and gravity. It is not affected by the container's shape.

Q5. An object floats in water with 1/10th of its volume above the surface. The density of the object is:

A. Equal to 1000 kg/m³
B. 1100 kg/m³
C. 900 kg/m³
D. 100 kg/m³

Answer: C

Explanation:
Fraction submerged = ρ_object / ρ_water
If 9/10 submerged, then ρ_object = 900 kg/m³

Q6. A body weighs 500 N in air and 300 N in water. The buoyant force acting on the body is:

A. 800 N
B. 200 N
C. 300 N
D. 500 N

Answer: B

Explanation:
Buoyant force = weight in air – weight in fluid = 500 – 300 = 200 N

Q7. Which one of the following is correct about streamlined flow?

A. Irregular fluid motion
B. Associated with eddies
C. Fluid particles move in parallel layers
D. Occurs only at high velocity

Answer: C

Explanation:
In streamlined (laminar) flow, the particles follow smooth paths that don't cross each other.

Q8. The viscosity of a fluid is a measure of:

A. Its density
B. Its resistance to flow
C. Its compressibility
D. Its surface tension

Answer: B

Explanation:
Viscosity is the internal friction between adjacent fluid layers that resists flow.

Q9. SI unit of coefficient of viscosity is:

A. Pa·s
B. N·s/m
C. m^2/s
D. N/m^2

Answer: A

Explanation:
Viscosity (η) = shear stress / velocity gradient = $N \cdot s/m^2$ = Pa·s

Q10. Which of the following statements is true about an ideal fluid?

A. It is compressible

B. It has viscosity
C. It is incompressible and non-viscous
D. It has high surface tension

Answer: C

Explanation:
An ideal fluid is hypothetical: it has no viscosity and is incompressible.

Q11. According to Bernoulli's theorem, where the velocity of fluid is high:

A. Pressure is also high
B. Pressure is low
C. Pressure is zero
D. Density is high

Answer: B

Explanation:
Bernoulli's principle: As fluid speed increases, pressure decreases.

Q12. A fluid is moving in a horizontal pipe. At a narrow point, the pressure:

A. Increases
B. Remains same
C. Decreases
D. Becomes zero

Answer: C

Explanation:
At narrower cross-section, velocity increases and pressure decreases.

Q13. Terminal velocity of a falling sphere in a fluid depends on:

A. Viscosity
B. Radius of sphere
C. Density difference

D. All of these

Answer: D

Explanation:
$v = (2 * r^2 * (\rho - \sigma) * g) / (9 * \eta)$, where all listed parameters influence terminal velocity.

Q14. Capillary rise depends on:

A. Surface tension
B. Density of liquid
C. Radius of capillary
D. All of these

Answer: D

Explanation:
$h = (2T \cos\theta) / (r\rho g)$, depends on all above factors.

Q15. Which of the following will have the maximum capillary rise?

A. Water in a narrow glass tube
B. Mercury in a narrow tube
C. Water in a broad tube
D. Kerosene in a narrow tube

Answer: A

Explanation:
Water has high surface tension and wetting tendency, leading to maximum rise in narrow tubes.

Q16. A fluid is flowing through a horizontal pipe. At a point where the velocity is 2 m/s, the pressure is 3×10^5 Pa. What will be the pressure at a point where the velocity is 5 m/s? (Density = 1000 kg/m³)

A. 2.625×10^5 Pa
B. 2.5×10^5 Pa
C. 2.0×10^5 Pa
D. 1.875×10^5 Pa

Answer: A

Explanation:
Use Bernoulli's equation:
$P_1 + 0.5 \times \rho \times v_1^2 = P_2 + 0.5 \times \rho \times v_2^2$
$\Rightarrow P_2 = P_1 + 0.5 \times \rho \times (v_1^2 - v_2^2)$
$= 3 \times 10^5 + 0.5 \times 1000 \times (4 - 25)$
$= 3 \times 10^5 - 10{,}500 = 2.625 \times 10^5$ Pa

Q17. Water flows through a pipe of radius 1 cm with a velocity of 2 m/s. What is the volume flow rate?

A. 6.28×10^{-4} m³/s
B. 3.14×10^{-4} m³/s
C. 2.0×10^{-4} m³/s
D. 1.57×10^{-4} m³/s

Answer: A

Explanation:
Flow rate $Q = A \times v = \pi \times r^2 \times v$
$= 3.14 \times (0.01)^2 \times 2 = 6.28 \times 10^{-4}$ m³/s

Q18. A steel ball of radius 0.01 m falls through glycerin with terminal velocity. If the density of steel is 8000 kg/m³, glycerin is 1200 kg/m³, and viscosity is 0.83 Pa·s, find terminal velocity. ($g = 10$ m/s²)

A. 0.5 m/s
B. 0.3 m/s
C. 0.1 m/s
D. 0.05 m/s

Answer: C

Explanation:
$v = (2 \times r^2 \times (\rho - \sigma) \times g) / (9 \times \eta)$
$= (2 \times 0.0001 \times 6800 \times 10) / (9 \times 0.83)$
≈ 0.1 m/s

Q19. A capillary tube of radius r is dipped in a liquid. If surface tension is T and angle of contact is 0, then height of rise is:

A. $T / (r \times \rho \times g)$
B. $2T / (r \times \rho \times g)$
C. $T / (2 \times r \times \rho \times g)$
D. $4T / (r \times \rho \times g)$

Answer: B

Explanation:
$h = (2 \times T \times \cos\theta) / (r \times \rho \times g)$, and $\cos 0 = 1$
So, $h = 2T / (r \times \rho \times g)$

Q20. Two capillaries of radii r and 2r are dipped in water. The ratio of heights of water columns in the two tubes is:

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

Answer: C

Explanation:
$h \propto 1 / r \Rightarrow h_1/h_2 = r_2/r_1 = 2r/r = 2 \Rightarrow h_1:h_2 = 1:2$

Q21. The Reynolds number for a flow is 1800. The nature of flow is:

A. Turbulent
B. Highly turbulent
C. Laminar
D. Unsteady

Answer: C

Explanation:
Reynolds number < 2000 ⇒ Laminar flow

Q22. The rise of liquid in a capillary tube will be more if:

A. Radius is large
B. Surface tension is less
C. Radius is small
D. Density is more

Answer: C

Explanation:
$h \propto 1/r \Rightarrow$ Smaller radius, greater capillary rise

Q23. Bernoulli's principle is based on:

A. Law of conservation of mass
B. Law of conservation of angular momentum
C. Law of conservation of energy
D. Law of conservation of charge

Answer: C

Explanation:
Bernoulli's principle is an application of energy conservation for fluids.

Q24. An ideal fluid is:

A. Incompressible and non-viscous
B. Compressible and viscous
C. Incompressible and viscous
D. Compressible and non-viscous

Answer: A

Explanation:
Ideal fluid has no viscosity and is incompressible.

Q25. Terminal velocity increases with:

A. Increase in viscosity
B. Increase in radius
C. Decrease in density difference
D. Decrease in g

Answer: B

Explanation:
$v \propto r^2 \Rightarrow$ Larger radius means higher terminal velocity

Q26. Water flows through two pipes of radii 1 cm and 2 cm at same pressure difference. Which will have greater volume flow rate?

A. Both same
B. Pipe with 1 cm radius
C. Pipe with 2 cm radius
D. Cannot be determined

Answer: C

Explanation:
Poiseuille's law: $Q \propto r^4 \Rightarrow$ 2 cm pipe will have 16 times more flow

Q27. Which one of the following is a correct unit of surface tension?

A. N/m
B. N·m
C. J/m^2
D. m^2/s

Answer: A

Explanation:
Surface tension = force/length ⇒ N/m

Q28. What causes a liquid drop to be spherical in the absence of gravity?

A. Viscosity
B. Surface tension
C. Adhesion
D. Buoyancy

Answer: B

Explanation:
Surface tension minimizes surface area, forming a sphere

Q29. When a soap bubble is formed, its internal pressure is:

A. Less than atmospheric pressure
B. Equal to atmospheric pressure
C. Greater than atmospheric pressure
D. Zero

Answer: C

Explanation:
Excess pressure inside bubble = $4T / r$
So, internal pressure is more than atmospheric

Q30. A drop of liquid of radius R breaks into 8 equal drops. The total surface energy:

A. Doubles
B. Becomes 4 times
C. Becomes 2 times
D. Remains same

Answer: B

Explanation:
Surface area $\propto r^2$, and total surface area increases after breaking
New radius = $R / 2$
New total surface area = $8 \times 4\pi(R^2/4) = 8\pi R^2 \Rightarrow$ 4 times more than original (πR^2)

Q31. A U-tube contains water and oil. The height of water column is 15 cm. If the height of oil column is 20 cm, what is the density of oil? (Density of water = 1000 kg/m³)

A. 750 kg/m³
B. 800 kg/m³
C. 850 kg/m³
D. 900 kg/m³

Answer: A

Explanation:
Pressure due to both columns must be equal at the same level.
$\rho_1 g\, h_1 = \rho_2 g\, h_2 \Rightarrow 1000 \times 15 = \rho \times 20 \Rightarrow \rho = 750$ kg/m³

Q32. An object weighs 5 N in air and 3 N in water. What is the buoyant force?

A. 1 N
B. 2 N
C. 3 N
D. 5 N

Answer: B

Explanation:
Buoyant force = weight in air – weight in water = 5 – 3 = 2 N

Q33. A tank is filled with water up to a height of 4 m. Find the pressure at the bottom. ($g = 10$ m/s², $\rho = 1000$ kg/m³)

A. 4×10^4 Pa
B. 2×10^4 Pa
C. 5×10^4 Pa
D. 3×10^4 Pa

Answer: A

Explanation:
$P = h\rho g = 4 \times 1000 \times 10 = 40000$ Pa

Q34. A fluid is moving through a pipe. At one point, its speed is 3 m/s and pressure is 2.5×10^5 Pa. At another point where the speed is 5 m/s, find the pressure. ($\rho = 1000$ kg/m³)

A. 2.2×10^5 Pa
B. 2.0×10^5 Pa
C. 2.35×10^5 Pa
D. 2.1×10^5 Pa

Answer: C

Explanation:
Apply Bernoulli's theorem:
$P_1 + \frac{1}{2}\rho v_1^2 = P_2 + \frac{1}{2}\rho v_2^2$
$P_2 = P_1 + \frac{1}{2}\rho(v_1^2 - v_2^2)$
$= 2.5 \times 10^5 + 0.5 \times 1000 \times (9 - 25) = 2.5 \times 10^5 - 8000 = 2.42 \times 10^5$ Pa

Q35. A ball of radius 0.01 m falls in a viscous fluid with terminal velocity of 0.2 m/s. The density of the ball is 7800 kg/m³, and the fluid is 1200 kg/m³. Find viscosity. ($g = 10$ m/s²)

A. 0.3 Pa·s
B. 0.6 Pa·s
C. 0.9 Pa·s
D. 1.2 Pa·s

Answer: A

Explanation:
Use Stokes' law:
$v = (2r^2(\rho - \sigma)g) / (9\eta) \Rightarrow$
$\eta = (2 \times r^2 \times (\rho - \sigma) \times g) / (9v)$
$= (2 \times 10^{-4} \times 6600 \times 10) / (9 \times 0.2) = 0.3$ Pa·s

Q36. Reynolds number for a fluid flow is 2500. The flow is:

A. Laminar
B. Turbulent
C. Critical
D. Steady

Answer: B

Explanation:
Reynolds number > 2000 ⇒ Turbulent flow

Q37. Water rises to a height of 6 cm in a capillary tube of radius 0.2 mm. Find surface tension. ($g = 10\ m/s^2$, $\rho = 1000\ kg/m^3$)

A. 6×10^{-2} N/m
B. 1.2×10^{-2} N/m
C. 0.6×10^{-2} N/m
D. 3×10^{-2} N/m

Answer: B

Explanation:
$h = 2T / (r\rho g) \Rightarrow$
$T = h \times r \times \rho \times g / 2$
$= (0.06 \times 0.0002 \times 1000 \times 10) / 2 = 0.012 = 1.2 \times 10^{-2}$ N/m

Q38. A soap bubble of radius 2 cm has excess pressure of 50 N/m^2. What is the surface tension?

A. 0.5 N/m
B. 0.25 N/m
C. 0.1 N/m
D. 0.05 N/m

Answer: D

Explanation:
$\Delta P = 4T / r \Rightarrow T = \Delta P \times r / 4$
$= 50 \times 0.02 / 4 = 0.05$ N/m

Q39. The volume flow rate of a fluid through a capillary is $4.9 \times 10^{-8}\ m^3/s$. The pressure difference is 100 Pa. Viscosity is 1 Pa·s, and length is 0.5 m. Find the radius.

A. 0.5 mm

B. 1.0 mm
C. 0.8 mm
D. 1.5 mm

Answer: C

Explanation:
Poiseuille's law:
$Q = (\pi r^4 \Delta P) / (8\eta L)$
$r^4 = (Q \times 8\eta L) / (\pi \Delta P)$
$= (4.9 \times 10^{-8} \times 8 \times 1 \times 0.5) / (3.14 \times 100) \approx 6.25 \times 10^{-12}$
$r \approx (6.25 \times 10^{-12})^{(¼)} = 0.0008$ m = 0.8 mm

Q40. A small spherical object experiences a viscous drag force of 3×10^{-3} N when moving at 0.02 m/s through a fluid. The radius is 1 mm. Find the viscosity of the fluid.

A. 0.079 Pa·s
B. 0.095 Pa·s
C. 0.119 Pa·s
D. 0.145 Pa·s

Answer: C

Explanation:
$F = 6\pi\eta rv \Rightarrow \eta = F / (6\pi rv)$
$= (3 \times 10^{-3}) / (6 \times 3.14 \times 0.001 \times 0.02)$
≈ 0.119 Pa·s

Q41. An air bubble of radius 1 mm is in water. What is the excess pressure inside it? (Surface tension of water = 0.072 N/m)

A. 72 Pa
B. 144 Pa
C. 288 Pa
D. 36 Pa

Answer: B

Explanation:

Excess pressure = 2T / r = 2 × 0.072 / 0.001 = 144 Pa

Q42. A metal block weighs 50 N in air and 40 N when submerged in a liquid. What is the relative density of the block?

A. 2.5
B. 4
C. 5
D. 6

Answer: C

Explanation:
Loss in weight = 10 N = Buoyant force = weight of fluid displaced
Relative density = weight in air / loss of weight = 50 / 10 = 5

Q43. A tank has a hole at depth 1.25 m from the water surface. Find the speed of water leaving the hole. (g = 10 m/s^2)

A. 4.5 m/s
B. 5.0 m/s
C. 6.0 m/s
D. 5.5 m/s

Answer: B

Explanation:
Use Torricelli's law: v = √(2gh) = √(2 × 10 × 1.25) = √25 = 5 m/s

Q44. The terminal velocity of a ball is doubled. What is the change in radius?

A. Doubles
B. Quadruples
C. Increases √2 times
D. Increases 1.41 times

Answer: C

Explanation:
$v \propto r^2 \Rightarrow$ if v becomes 2v, then r^2 becomes $2r^2 \Rightarrow$ r increases by $\sqrt{2}$ times

Q45. The height of water column in a capillary is 6 cm. If the radius is halved, what will be the new height?

A. 3 cm
B. 12 cm
C. 24 cm
D. 1.5 cm

Answer: B

Explanation:
$h \propto 1/r \Rightarrow$ if $r \rightarrow r/2$, then $h \rightarrow 2h = 12$ cm