Ravi Maths Tuition Centre

Time : 1 Mins **PROPERTIES OF BULK MATTER 1** **Marks : 1423**

1. Water is flowing through two horizontal pipes of different diameters which are connected together. The diameters of the two pipes are 3 cm and 6 cm respectively. If the speed of water in narrower pipe is 4 m/sec and the pressure is 2.0 x 10^4 pascal, then the speed of water in the wider pipe is:
   a) 4 m/sec b) 2 m/sec c) 1 m/sec d) 16 m/sec
2. 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
3. A vessel of water is placed on the floor of an elevator. How does the pressure at the bottom of the vessel change if the elevator moves up with uniform acceleration a?
   a) Increases by hpa b) Decreases by hpa c) No change in pressure
   d) None of these
4. A liquid is flowing through a tube of varying diameter. The rate (R) of flow ofliquid in any portion and the diameter (d) of the tube in that portion are related as:
   a) R $\propto$ d b) R $\propto \frac{1}{d}$ c) R $\propto \frac{1}{d^2}$ d) none of these
5. The adiabatic elasticity of a gas is equal to :
   a) γ X density b) γ X Volume c) γ X Pressure d) γX Specific heat
6. If a spring is extended to length 1, then according to Hook's law:
   a) F = kl b) F = k/l c) F = k2/l d) F = k^2/l
7. (A) The velocity increases, when water flowing in broader pipe enter a narrow pipe.
   (R) According to equation of continuity, product of area and velocity is constant.
   a)
   If both assertion and reason are true and reason is the correct explanation of assertion
   b)
   If both assertion and reason are true but reason is not the correct explanation of assertion
   c) If assertion is true but reason is false d) If both assertion and reason are false
   e) If assertion is false but reason is true
8. A tank is filled with water of density 1 g per cm^3 and oil of density 0.9 g per cm^3. The height of water layer is 100 em and of the oil layer is 400 cm. If g =980 cm/sec^2, then the velocity of efflux from an opening in the bottom of the tank is:

a) $\sqrt{900 \times 980}$ cm/sec b) $\sqrt{1000 \times 980}$ cm/sec c) $\sqrt{920 \times 980}$ cm/sec d) $\sqrt{950 \times 980}$ cm/sec

9. If there were no gravity, which of the following will not be there for a fluid?
   a) Viscosity b) Surface tension c) Pressure d) Archimedes' upward thrust

10. A metallic sphere floats in an immiscible mixture of water (pw = 10^3 kg/m^3) and a liquid (p_L = 13.5 x 10^3 kg/m^3 such that its (4/5)th portion is in water and (1/5)th portion in the liquid. The density of metal is:
    a) 1.9 x 10^3 kg/m^3 b) 4.5 x 10^3 kg/m^3 c) 4.0 x 10^3 kg/m^3 d) 3.5 x 10^3 kg/m^3

11. A vertical off shore structure is built to withstand a maximum stress of 10^9 Pa. What is the suitable pressure exerted by water column?
    [Take the depth of the ocean to be roughly 3 km and ignore ocean currents.]
    a) 4 x 10^4 Pa b) 2.94 x 10^7 Pa c) 2.0 x 10^6 Pa d) 3 x 10^5 Pa

12. Copper of fixed volume V is drawn into wire of length 1. When this wire is subjected to a constant force F, the extension produced in the wire is 111. Which of the following graphs is a straight line?
    a) Δl versus 1/l b) Δl versus l^2 c) Δl versus $1/l^2$ d) Δl versus l

13. When a large bubble rises from the bottom of a lake to the surface, its radius doubles. The atmospheric pressure is equal to that of a column of water of height H. The depth of the lake is:
    a) H b) 2H c) 7H d) 8H

14. In order that a floating object be in a stable equilibrium, its centre of buoyancy should be:
    a) vertically above its centre of gravity b) vertically below its centre of gravity
    c) horizontally in line with its centre of gravity d) may be anywhere

15. (A) Cars and aeroplanes are streamlined.
    (R) Bernoulli's theorem hold for incompressible, non-viscous fluids.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false
    e) If assertion is false but reason is true

16. A bird resting on the floor of an airtight box which is being carried by a boy, starts flying. The boy will feel that the box is now:
    a) heavier b) lighter c) same in weight d) lighter in the beginning and heavier later

17. Two small spheres of radii rand 4r fall through a viscous liquid with the same terminal velocity. The ratio between the viscous forces acting on them is:
    a) 1:2 b) 4:1 c) 1:16 d) 1:4

18. The neck and bottom of a bottle are 3 em and 15 cm in radius respectively. If the cork is pressed with a force 12N in the neck of the bottle, then force exerted on the bottom of the bottle is:
    a) 30 N b) 150 N c) 300 N d) 600 N

19. We have three beakers A, B and C containing glycerine, water and kerosene respectively. They are stirred vigorously and placed on a table. The liquid which comes to rest at the earliest is:
    a) glycerine b) water c) kerosene d) all of them at the same time

20. A satellite revolves around the earth. Air pressure inside the satellite is maintained at 76 cm of mercury column. The height of the mercury column in the barometer tube of one metre length in the satellite is:
    a) 76 cm b) 100 cm c) zero d) none of these

21. The product of the coefficient of viscosity and volume of liquid flowing through a tube of area of cross-section A and length I in time t is x. Then, the pressure difference P between the two ends of the tube is given by:
    a) $\frac{8\pi xL}{A^2}$ b) $\frac{8\pi xL}{tA^2}$ c) $\frac{8\pi^2 xL}{tA^2}$ d) $\frac{8xL}{tA^2}$

22. Two helium filled balloons are floating next to each other at the ends of strings tied to a table. The facing surfaces of the balloons are separated by 1 to 2 cm. If you blow through the opening between the balloons, then:
    a) they move away from each other b) they move towards each other
    c) they are unaffected d) nothing can be said about their separation

23. A body of mass 120 kg and density 600 kg/m^3 floats in water. What additional mass could be added to the body, so that the body will just sink?
    a) 20 kg b) 80 kg c) 100 kg d) 120 kg

24. A piece of ice having a stone frozen in it melts in a glass vessel filled with water. How will the level of water in vessel change when the ice melts?
    a) The level will rise b) The level will not change c) The level will drop
    d) Some water will flow out e) The vessel will break

25. The cylindrical tube of a spray pump has a cross-section of 6 cm^2, one of which has 50 holes each of diameter Imm. If the liquid flow inside the tube is 1.2 m per minute, then the speed of ejection of the liquid through the holes is :
    a) 2.1 ms^{-1} b) 0.31 ms^{-1} c) 0.96 ms^{-1} d) 3.4 ms^{-1}

26. Ice pieces are floating in a beaker A containing water and also in a beaker B containing miscible liquid of specific gravity 1.2. When ice melts, the level of:
    a) water increases in A b) water decreases in A c) liquid in B decreases
    d) liquid in B increases e) water in A and liquid in B remains unaltered

27. A wide vessel with a small hole in the bottom is filled with water and kerosene. Neglecting viscosity, the velocity of water flow v if the thickness of water layer is h_1 and that of kerosene layer is h_2 is (density of water is ρ_1 g/cc and that of kerosene is ρ_2 gm/cc):

a) $\sqrt{2g(h_1+h_2)}$ b) $\sqrt{2g\left(h_1+h_2\frac{\rho_1}{\rho_2}\right)}$ c) $\sqrt{2g(h_1\rho_1+h_2\rho_2)}$ d) $\sqrt{2g\left(h_1\frac{\rho_1}{\rho_2}+h_2\right)}$

28. A square plate of 0.1 meter side moves parallel to a second plate with a velocity of 0.1 m/s, both plates being immersed in water. If the viscous force is 0.002 N and the coefficient of viscosity is 0.01 poise, distance between the plates (in metres) is
a) 0.1 b) 0.05 c) 0.005 d) 0.0005

29. A hemispherical bowl just floats without sinking in a liquid of density 1.2 x 10^3 kg/m^3. If outer diameter and the density of the bowl are 1 m and 2 x 10^4 kg/m^3 respectively, then the inner diameter of the bowl will be:
a) 0.94 m b) 0.97 m c) 0.98 m d) 0.99 m

30. A cube with an edge of 10 cm is immersed in a vessel containing water. A layer of liquid immiscible with water and having a density of 0.8 x 10^3 kg/m^3 is poured above water. The interface between the liquid is at the middle of the cube height. The mass of the cube is:
a) 0.060 kg b) 0.75 kg c) 0.90 kg d) 0.81 kg

31. A cylinder of height 20 m is completely filled with water. The velocity of efflux of water (in ms^{-1}) through a hole on the side wall of the cylinder near its bottom is:
a) 10 b) 20 c) 25.5 d) 5

32. Coefficient of linear expansion of brass and steel rods are α_1 and α_2 Lengths of brass and steel rods are l_1 and l_2 respectively. If (l_2- l_1) is maintained same at all temperatures, which one of the following relations holds good?
a) $\alpha_1 l_2$ b) $\alpha_1 l_2 = a_2 l_2$ c) $a_2 l_2 = a_1 l_1$ d) $a_1 l_1 = a_2 l_2$

33. 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:
a) zero b) hdg c) $\frac{h}{2}$dg d) 2hdg

34. A black body at 200 K is found to emit maximum energy at a wavelength 14 urn, When its temperature is raised to 1000 K, then wavelength at which maximum energy emitted is :
a) 14 mm b) 7 μm c) 2.8 μm d) 28 mm

35. (A) The blood pressure in humans is greater at the feet that at the brain.
(R) Pressure of liquid at any point is proportional to height, density of liquid and acceleration due to gravity.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

36. Suppose the gas in the explosion chamber of a rocket ship is kept at density ρ and a pressure P_1 and that it exudes from the chamber into empty space through an opening of area at one end ofthe rocket, fmd the thrust produced on the rocket ship:
    a) $2P_1a$ b) P_1a c) $\sqrt{2}P_1a$ d) $\sqrt{2P_1a}$

37. Two capillary tubes of same radius r but of lengths l_1 and l_2 are fitted in parallel to the bottom of a vessel. The pressure head is P. What should be the length of a single tube that can replace the two tubes so that the rate of flow is same as before?
    a) l_1+l_2 b) $\frac{1}{l_1}+\frac{1}{l_2}$ c) $\frac{l_1 l_2}{l_1+l_2}$ d) $\frac{1}{l_1+l_2}$

38. (A) With increase of temperature, the viscosity of gases increases.
    (R) With increase of temperature, the transport of momentum between adjacent layers increases.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false
    e) If assertion is false but reason is true

39. A water barrel stands on a table of height h. If a small hole is punched in the side of the barrel at its base, it is found that the resultant stream of water strikes the ground at a horizontal distance R from the table. What is the depth of water in the barrel?
    a) $\frac{R^2}{h}$ b) $\frac{R^2}{2h}$ c) $\frac{R^2}{4h}$ d) $\frac{4R^2}{h}$

40. When a steel ball is dropped in oil:
    a) the ball attains constant velocity after some time b) the ball stops
    c) the speed of ball will keep on increasing d) none of the above

41. Tanks A and B open at the top contain two different liquids upto a certain height in them. A hole is made in the wall of each tank at a depth h from the surface of the liquid. The area of the hole in A is twice that of in B. If the liquid mass flux through each hole is equal, then the ratio of densities of the liquids respectively is:
    a) 2/1 b) 3/2 c) 2/3 d) 1/2

42. Suppose the Sun expands so that its radius becomes 100 times its present radius and its surface temperature becomes half of its present value. The total energy emitted by it, then will increase by a factor of:
    a) 10^4 b) 625 c) 256 d) 16

43. (A) A gas filled balloon stops rising after it has attained a certain height in the sky.
    (R) At the highest point in the sky, the density of air is such that the buoyant force on the balloon just equal its weight.

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

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

44. The mass of a balloon with its contents is 1.5 kg. It is descending with an acceleration equal to half that of acceleration due to gravity. If it is to go up with the same acceleration keeping the volume same, its mass should be decreased by:
a) 1.2 kg b) 1 kg c) 0.75 kg d) 0.5 kg

45. In areas far removed from the tanks, the water does not rise to desired heights. This is because the pressure falls due to:
a) gravity b) density c) surface tension d) viscosity

46. A hole is made at the bottom of a tank filled with water (density = 10^3 kg/m^3). If the total pressure at the bottom of the tank is three atmosphere (1 atmosphere = 10^5 N/m^2), then the velocity of efflux is:
a) $\sqrt{400}$ m/s b) $\sqrt{200}$ m/s c) $\sqrt{600}$ m/s d) $\sqrt{500}$ m/s

47. A cylinder containing water stands on a table of height H. A small hole is punched in the side of cylinder at its base. The stream of water strikes the ground at a horizontal distance R from the table. Then, the depth of water in the cylinder is:
a) H b) R c) $\sqrt{(RH)}$ d) $R^2/4H$

48. Air is blown through a hole on a closed pipe containing liquid. Then, the pressure will:
a) increase on sides b) increase downwards c) increase in all directions

d) never increase

49. A ball floats on the surface of water in a container exposed to the atmosphere. Will the ball remain immersed at its former depth or will it sink or rise if the container is covered and the air is removed?
a) The ball sinks b) The ball rises c) The ball remains immersed at its former depth
d) It oscillates

50. A vessel of area of cross-section A has liquid to a height H. There is a hole at the bottom of vessel having area of cross-section a. The time taken to decrease the level from H_1 to H_2 will be:
a) $\frac{A}{2}\sqrt{\frac{2}{g}}[\sqrt{H_2}-\sqrt{H_2}]$ b) $\sqrt{2gh}$ c) $\sqrt{2gh(H_1-H_2)}$ d) $\frac{A}{a}\sqrt{\frac{2}{g}}[\sqrt{H_1}-\sqrt{H_2}]$

51. The isothermal elasticity of a gas is equal to :
a) Density b) Volume c) Pressure d) Specific heat

52. A wire is stretched by 0.01 m by a certain force F. Another wire of same material whose diameter and length are double to the original wire is stretched by the same force. Then its elongation will be:
    a) 0.005 m b) 0.01 m c) 0.02 m d) 0.002 m

53. Of the following thermometers, the one which can be used for measuring a rapidly changing temperature is a
    a) Thermocouple thermometer b) Gas thermometer
    c) Maximum resistance thermometer d) Vapour pressure thermometer

54. A wind with speed 40 m/s blows parallel to the roof of a house. The area of the roof is 250 m^2. Assuming that the pressure inside the house is atmospheric pressure, the force exerted by the wind on the roof and the direction of the force will be : (ρ_{air} = 1.2kg/m^3)
    a) 2.4 x 10^5N, upwards b) 2.4 x 105^N, downwards c) 4.8 x 10^5N, downwards
    d) 4.8 x 10^5N, upwards

55. The centre of pressure on a vertical wall of height h immersed in a liquid is at a depth of_____ from the free surface of liquid.
    a) $\frac{h}{2}$ b) $\frac{h}{3}$ c) $\frac{2h}{3}$ d) zero

56. An air bubble of radius 10^{-2} m is rising up at a steady rate of 2 x 10^{-3} mls through a liquid of density 1.5 x 10^3 kg/m^3, the coefficient of viscosity neglecting the density of air, will be: (Takeg= 10 m/s^2)
    a) 23.2 units b) 83.5 units c) 334 units d) 167 units

57. (A) An ice cube is floating in water in a vessel at 0°c. When ice cube melts, level of water in the vessel remain same.
    (R) Volume of melted ice is same as volume of water displaced by ice.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.
    c) If assertion is true but reason is false. d) If both assertion and reason are false.
    e) If assertion is false but reason is true.

58. Radius of one arm of hydraulic lift is four times of radius of other arm. What force should be applied on the narrow arm to lift 100 kg?
    a) 26.5 N b) 62.5 N c) 6.25 N d) 8.3 N

59. Mercury is poured in a U-tube. Temperature of one side is 50°C and the level of mercury on this side is h_1. Temperature of the other side is 100 °C and the level of mercury on this side is h_2. Then:
    a) $h_1 = h_2$ b) $h_1 < h_2$ c) $h_2 > h_1$ d) $h_2 = 2h_1$

60. (A) For a floating body to be in stable equilibrium, its centre of buoyancy must be located above the centre of gravity.
(R) The torque required by the weight of the body and the upthrust will restore body back to its normal position, after the body is disturbed.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

61. Water enters a house through a pipe with 2.0 cm inside diameter at an absolute pressure of 4×10^5 Pa. The pipe leading to the second floor bathroom 5m above is 1.0 em in diameter. When the flow velocity at the inlet pipe is 4 ms^{-1}, find the flow velocity and pressure in the bathroom in ms $^{-1}$ and Pa respectively.
a) 16, 2.3×10^5 b) 16, 3.2×10^5 c) 132, 2.3×10^5 d) 32, 3.2×10^5

62. (A) Fluids take the shape of container in which they poured.
(R) A fluid cannot sustain a force that is tangential to its surface
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

63. (A) The velocity off all of a man jumping with a parachute first increases and then becomes constant.
(R) The constant velocity off all of a man is called terminal velocity.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

64. If the temperature of the Sun (black body) is doubled, the rate of energy received on earth will be increased by a factor of :
a) 2 b) 4 c) 8 d) 16

65. If x longitudinal strain is produced in a wire of Young's modulus y, then energy stored in the material of the wire per unit volume is :

a) yx^2 b) $2yx^2$ c) $\frac{1}{2}y^2x$ d) $\frac{1}{2}yx^2$

66. An iceberg is floating partly immersed in sea water, density of sea water is 1.03 g/cm^3 and that of ice is 0.92 g/cm^3. The fraction of the total volume of the iceberg above the level of sea water is:

a) 8.1% b) 11% c) 34% d) 0.8%

67. A body floats in water with one-third of its volume above the surface of water. If it is placed in oil, it floats with half of its volume above the surface of the oil. The specific gravity of the oil is:

a) $\frac{5}{3}$ b) $\frac{4}{3}$ c) $\frac{3}{2}$ d) 1 e) $\frac{3}{4}$

68. Three capillaries of length L, L/2 and L/3 are connected in series. Their radii are r, r/2 and r/3 respectively. Then, if stream-line flow is to be maintained and the pressure across the first capillary is P, then:

a) the pressure difference across the ends of second capillary is 8P

b) the pressure difference across the third capillary is 43P

c) the pressure difference across the ends of the second capillary is 16P

d) the pressure difference across the third capillary is 59P

69. A cylindrical, tank is filled with water to a level of 3 m. A hole is opened at a height of 52.5 cm from bottom. The ratio of the area of the hole to that of cross-sectional area of the cylinder is 0.1. Find the square of the velocity with which water is coming out: (g = 10m/sec^2)

a) 50 m^2/sec^2 b) 40 m^2/sec^2 c) 51.5 m^2/sec^2 d) 50.5 m^2/sec^2

70. The fraction of a floating object of volume V_o and density d_o above the surface of a liquid of density d will be:

a) $\frac{d_o}{d}$ b) $\frac{dd_o}{d+d_o}$ c) $\frac{d-d_o}{d}$ d) $\frac{dd_o}{d-d_o}$

71. A body weighs 50 g in air and 40 g in water. How much would it weigh in a liquid of specific gravity 1.5?

a) 30g b) 35g c) 65g d) 45g

72. With rise in temperature, density of a given body changes according to one of the following relations:

a) $p = p_0[1 + \gamma\, d\theta]$ b) $p = p_0[1 - \gamma\, d\theta]$ c) $p = p_0\gamma\, d\theta$ d) $p = p_0/\gamma\, d\theta$

73. A body radiates energy 5W at a temperature of 127°C. If the temperature is increased to 927 °C, then it radiates energy at the rate of:

a) 410 W b) 81 W c) 405 W d) 200 W

74. Water is flowing through a horizontal pipe of varying cross-section. If the pressure of water equals 2 cm of mercury, where the velocity of the flow is 32 cm s^{-1}. what is the pressure at another point, where the velocity of flow is 65 cm s^{-1}?

a) 1.02 cm of Hg b) 1.88 cm of Hg c) 2.42 cm of Hg d) 1.45 cm of Hg

75. (A) The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
(R) The resistance offered by the fluid is maximum.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

76. Two identical bodies are made of a material for which the heat capacity increases with temperature. One of these is at 100°C, while the other one is at O°C. If the two bodies are brought into contact, then, assuming no heat loss, the final common temperature is:
a) less than 50°C but greater than 0 °C b) O°C c) 50°C d) more than 50°C

77. When a venturimeter is used in an inclined position, it will show:
a) same reading b) more reading c) less reading d) depends on viscosity of liquid

78. A body floats with one third of its volume outside the water and $\frac{1}{4}$th of its volume outside another liquid. The density of the other liquid is :
a) 9.4 g cm^{-3} b) 4 g cm^{-3} c) $\frac{8}{3}$g cm^{-3} d) $\frac{3}{8}$g cm^{-3}

79. When a crown of mass 14.7 kg is submerged in water an accurate scale reads only 13.4 kg. The specific gravity of the material of the crown is :
a) 5.8 b) 8.6 c) 9.8 d) 11.3

80. (A) The buoyant force acts at the centre of buoyancy of the body. i.e., at the centre of mass of the fluid displaced.
(R) The buoyant force on a submerged rigid object can be considered to be acting at the centre of mass of the object.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

81. A body of uniform cross-sectional area floats in a liquid of density thrice its value. The portion of exposed height will be:
a) 2/3 b) 5/6 c) 1/6 d) 1/3

82. A cylindrical vessel is filled with a liquid of density ρ to a height h such that the force exerted by the liquid on the bottom is equal to the force exerted on the walls of the vessel. Then h should be:
    a) equal to the radius b) more than the radius c) less than the radius
    d) two times the radius

83. If the velocity of the fluid is the same at a given point at all times, then the flow is:
    a) turbulent b) rapid c) viscous d) stream-lined

84. A body of volume 100 cc floats immersed completely in water contained in a jar. The mass of water and jar before immersion of the body was 700 g. After immersion mass of water and jar will be:
    a) 500 g b) 700 g c) 100 g d) 800 g

85. A solid of relative density D is floating in a liquid of relative density d. If v be the volume of the solid submerged in the liquid and V be the total volume of the solid, then:
    a) $vV = dD$ b) $\frac{V}{v} = \frac{D}{d}$ c) $\frac{v}{V} = \frac{D}{d}$ d) $DV = (1 + d)v$

86. Two solid spheres A and B made of the same material have radii r_A and r_B respectively. Both the sphere are cooled from the same temperature under the conditions valid for Newton's law of cooling. The ratio of the rate of change of temperature of A and B is:
    a) r_A/r_B b) r_B/r_A c) r_{2A} / r_{2B} d) r_{2B}/r_{2A}

87. Which of the following statements is incorrect?
    a) Blood is more viscous than water
    b) The blood pressure in humans is greater at the feet than at the brain
    c)
    The angle of contact of mercury with glass is obtuse while that of water with glass is acute
    d) A spinning cricket ball in air follows a parabolic trajectory

88. A tank containing water has an orifice in one vertical side. If the centre of orifice is 4.9 m below the surface level in the tank, the velocity of discharge is:
    a) 4.9 metre/second b) 9.8 metre/second c) 2.45 metre/second d) zero

89. What is the velocity v of a metallic ball of radius r falling in a tank of liquid at the instant when its acceleration is one-half that of a freely falling body? (The densities of metal and of liquid are ρ and orespectively and the viscosity of the liquid is η)
    a) $\frac{r^2g}{9\eta}(\rho - 2\sigma)$ b) $\frac{r^2g}{9\eta}(2\rho - \sigma)$ c) $\frac{r^2g}{9\eta}(\rho - \sigma)$ d) $\frac{2r^2g}{9\eta}(\rho - \sigma)$

90. A block of volume V and of density ab is placed in liquid of density $\sigma_l(\sigma_l > \sigma_b)$, then block is moved upward due to buoyant force upto a height h. The increase in potential energy is:
    a) $\sigma_b = Vgh$ b) $(\sigma_b + \sigma_l)Vgh$ c) $(\sigma_b - \sigma_l)Vgh$ d) none of these

91. A large ship can float but a steel needle sinks because of:
    a) viscosity b) surface tension c) density d) none of these

92. A piece of ice is floating in a jar containing water. When the ice melts, then the level of water:
    a) rises b) falls c) remains unchanged
    d) rises or falls depending upon the mass of ice

93. A solid sphere falls with a terminal velocity of 10 cm/sec in the earth's gravitational field. If it is allowed to fall in a region outside the gravitational field of the earth, the terminal velocity will be:
    a) equal to 10 cm/sec b) more than 10 cm/sec c) less than 10 cm/sec d) zero

94. A cylindrical tank has a hole of $1cm^2$ in its bottom. If the water is allowed to flow into the tank from a tube above it at the rate of 70 cm^3 /sec then the maximum height upto which water can rise in the tank is:
    a) 2.5 cm b) 5 cm c) 10 cm d) 0.25 cm

95. A horizontal pipe line carries water in a stream-line flow. At a point along the pipe where cross-sectional area is 10 cm 2, the velocity of water is 1 m/s and pressure is 2000 Pa. The pressure of water at another point where cross-sectional area is 5 cm^2, is: (Density of water = 1000 kg/m^3)
    a) 250 Pa b) 500 Pa c) 1000 Pa d) 2000 Pa

96. If a small sphere is let fall vertically in a large quantity of still liquid of density smaller than that of the material of the sphere:
    a) at first its velocity increases, but soon approaches a constant value
    b) it falls with a constant velocity all along from the very beginning
    c) at first it falls with a constant velocity which after some time goes on decreasing
    d) nothing can be said about its motion

97. (A) Roofs of buildings are blown off during a strong storm.
    (R) Roofs of buildings becomes lighter during storm.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion
    c) If assertion is true but reason is false d) If both assertion and reason are false
    e) If assertion is false but reason is true

98. (A) A dam for water reservoir is built thicker at bottom than at the top.
    (R) Pressure of water is very large at the bottom.
    a)
    If both assertion and reason are true and reason is the correct explanation of assertion.
    b)
    If both assertion and reason are true but reason is not the correct explanation of assertion.

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

99. The pressure on a swimmer 20 m below the surface of water at sea level is : (Take atmospheric pressure =1x 10^5 Pa)
    a) 1.0 atm b) 2.0 atm c) 2.5 atm d) 3.0 atm
100. Two wires are made of the same material and have the same volume. The first wire has cross-sectional area A and the second wire has cross-sectional area 3A. If the length of the first wire is increased by Δlon applying a force F, how much force is needed to stretch the second wire by the same amount?
    a) 9 F b) 6 F c) 4 F d) F
101. The fraction of a floating object of volume Vo and density ρo above the surface of liquid of density ρ will be :
    a) $\frac{\rho_o}{\rho-\rho_o}$ b) $\frac{\rho-\rho_o}{\rho}$ c) $\frac{\rho_o}{\rho}$ d) $\frac{\rho_o\rho}{\rho+\rho_o}$
102. Two similar wires under the same load yield elongation of 0.1 nun and 0.05 nun respectively. If the area of cross-section of the first wire is 4 mm^2, then the area of cross-section of the second wire is:
    a) 6 mm^2 b) 8 mm^2 c) 10 mm^2 d) 12 mm^2
103. A body of mass 2 kg is floating in water with half its volume submerged. What would be the force required to wholly submerge it into water?
    a) 2 N b) 9.8 N c) 19.6 N d) 4.9 N
104. Water from a tap (at the end ofa horizontal pipe) emerges vertically downwards with an initial speed of 1.0 m s^{-1}. The cross-sectional area of the tap is 10^{-4} m^2. Assume that the pressure is constant throughout the stream of water and the flow is steady. The cross-sectional area ofthe stream 0.15 m below the tap is:
    a) 5.0 x 10^{-4} m^2 b) 1.0 x 10^{-5} m^2 c) 5.0 x 10^{-5} m^2 d) 2.0 x 10^{-5} m^2
105. Construction of submarines is based on:
    a) Archimedes' principle b) Bernoulli's theorem c) Pascal's law d) Newton's laws
106. A motor ship sails from the sea water to a river. To keep the same draught, a 90 tonne load is removed from the ship. Find the mass of the loaded ship before it has been unloaded: (The density of sea water is 1.03 x 10^3 kg/m^3)
    a) 3090 tonne b) 4545 tonne c) 2222 tonne d) 1317 tonne
107. (A) Two identical spheres, one solid and the other hollow are immersed completely in water. The solid sphere will experience greater upthurst.
    (R) The upthurst is directly proportional to mass of the body.

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

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

108. A force of 6×10^6 Nm^{-2} is required for breaking a material. The density p of the material is 3×10^3 kg $m^{-3.}$ If the wire is to break under its own weight, the length of the wire made of that material should be (Taking g = 10 ms^{-2})
a) 20 m b) 200 m c) 100 m d) 2000 m

109. When a weight of 10 kg is suspended from a copper wire of length 3 m and diameter 0.4 mm, its length increases by 2.4 em. If the diameter of the wire is doubled, then the extension in its length will be :
a) 7.6 cm b) 7.6 cm c) 1.2 cm d) 0.6 cm

110. (A) Machine parts are jammed in winter.
(R) The viscosity of lubricant used in machine parts increases at low temperature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

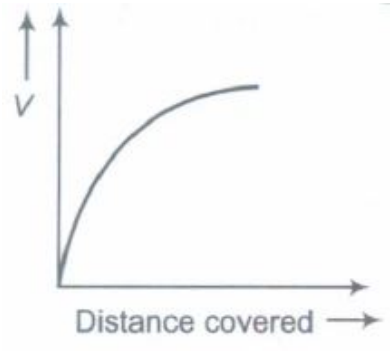
c) If assertion is true but reason is false d) If both assertion and reason are false

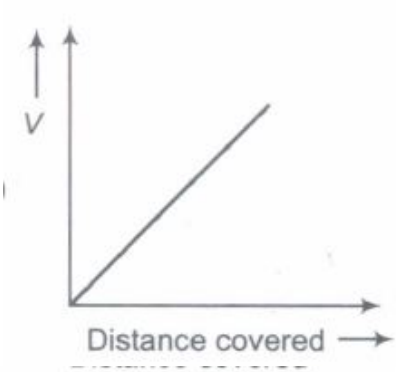
e) If assertion is false but reason is true

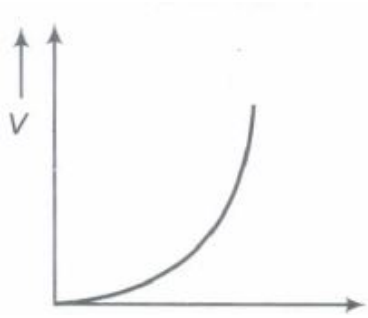
111. The heart of a man pumps 5 litres of blood through the arteries per minute at a pressure of 150 mm of mercury. If the density of mercury be 13.6 x 103 kg/m^3 and g = 10 m/sz then the power of heart in watt is:
a) 1.50 b) 1.70 c) 2.35 d) 3.0

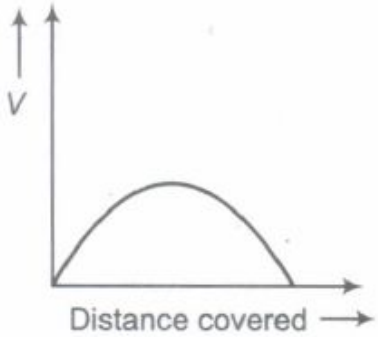
112. The pans of a physical balance are in equilibrium. Air is blown under the right hand pan; then the right hand pan will:
a) move up b) move down c) move erratically d) remain at the same level

113. 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) 

114. (A) Upthurst on a solid block of iron when immersed in a lake will be less on the surface than on the bed of the lake.
(B) On the surface of the lake density of water will be less than that at the bed.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

115. Two solid spheres of same metal but of mass M and 8M fall simultaneously on a viscous liquid and their terminal velocities are v and nv, then value of n is:
a) 16 b) 8 c) 4 d) 2

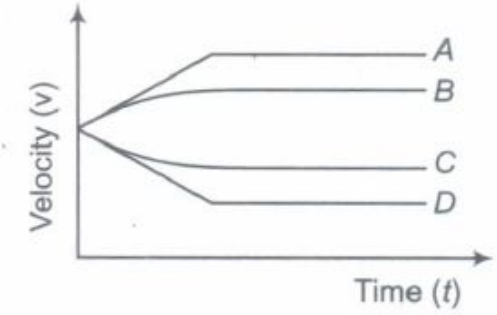
116. Two equal drops are falling through air with a steady velocity of 5 cm/sec. If the drops coalesce, the new terminal velocity will be:
a) 5 x 2 cm/sec b) 5 x $\sqrt{2}$ cm/sec c) 5 x $(4)^{1/3}$ cm/sec d) $\frac{5}{\sqrt{2}}$ cm/sec

117. A boat carrying a number of large stones is floating in a water tank. What will happen to the water level if the stones are unloaded into water?
a) Rise b) Fall c) Remain unchanged
d) Rise tiIl half the number of stones are unloaded and then begin to fall

118. A tank full of water has a small hole at its bottom. If one-fourth of the tank is emptied in t_1 second and the remaining three-fourth of the tank is emptied in t_2 second. Then, the ratio t_1/t_2 is:
a) $\sqrt{3}$ b) $\sqrt{2}$ c) $1/\sqrt{2}$ d) $1/\sqrt{3}$

119. (A) In the steady flow of an ideal fluid, the velocity at any point is same for different fluid particles.
(R) Steady fluid flow is an unaccelerated fluid flow.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

120. A small spherical solid ball is dropped from a great height in a viscous liquid. Its journey in the liquid is best described in the diagram given below by the:



a) Curve A b) Curve B c) Curve C d) Curve

121. A steel ball is floating in a trough of mercury. If we fill the empty part of the trough with water, what will happen to the steel ball?
a) It will continue in its position b) It will move up c) It will move down
d) It will execute vertical oscillations

122. A solid body floating on water has one-fifth of its volume above the surface. It is allowed to float in a liquid of specific gravity 1.25; the fraction of the volume that will project will be:
a) $\frac{16}{25}$ b) $\frac{9}{25}$ c) $\frac{4}{5}$ d) $\frac{5}{4}$

123. The volume of the hollow portion of a sphere is $\frac{3}{4}$ of the external volume of the sphere. If it floats in a liquid of relative density $\frac{3}{2}$,half of its external volume immersed, the relative density of the material of the solid is:
a) 2 b) 3 c) 2.4 d) 1.8

124. The rate of steady volume of water through a capillary tube of length l and radius runder a pressure difference of P is V. This tube is connected with another tube of same length but half the radius in series. Then, the rate of steady volume flow through them is: (pressure difference across the combination is P)
a) V/16 b) V/17 c) 16V/17 d) 17V/16

125. A flat plate of area 10 cm^2 is separated from a large plate by a layer of glycerine I mm thick. If the coefficient of viscosity of glycerine is 20 poise, the force required to keep the plate moving with a velocity of I cm/sec is
a) 80 dyne b) 200 dyne c) 800 dyne d) 2000 dyne

126. (A) Specific gravity of a fluid is a dimensionless quantity.
(R) It is the ratio of density of fluid to the density of water.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

127. A thin square steel plate with each side equal to 10 cm is heated by a blacksmith. The rate radiated energy by the heated plate is 1134 W. The temperature of the hot steel plate is (Stefan's constant (σ = 5.67 x 10-8 W/m^2K^4, emissivity of the plate = 1)
a) 1000K b) 1189K c) 20000K d) 2378K

128. Stream-line flow is more likely for liquids with:
a) low density and low viscosity b) high viscosity and high density
c) high viscosity and low density d) low viscosity and high density

129. Air is streaming past a horizontal airplane wing such that its speed is 120 metre per sec over the upper surface and 90 metre per sec at the lower surface. If the density of air is 1.3 kg per $metre^3$ and the wing is 10 metre long and has an average width of 2 metre, then the difference ofthe pressure on the two sides of the wing is:
a) 4095.0 pascal b) 409.50 pascal c) 40.950 pascal d) 4.0950 pascal

130. The radiant energy from the sun incident normally at the surface of earth is 20 kcal/me min. What would have been the radiant energy incident normally on the earth, if the Sun had a temperature twice of the present one:
a) 160 $kcal/m^2$ min b) 40 $kcal/m^2$ min c) 320 $kcel/m^2$min d) 80 $kcal/m^2$min

131. A rectangular block of mass m and area of cross-section a, floats in a liquid of density σ. If it is given a small vertical displacement from equilibrium, it starts oscillating with frequency f, then:
a) $f \propto \frac{1}{\sigma}$ b) $f \propto \sigma$ c) $f \propto m$ d) $f \propto \sqrt{a}$

132. (A) Sudden fall of pressure at a place indicates storm.
(R) Air flows from higher pressure to lower pressure.

a)
If both assertion and reason are true and reason is the correct explanation of assertion

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

133. At what speed, the velocity head of water is equal to pressure head of 40 cm of Hg?
a) 10.3 m/s b) 2.8 m/s c) 5.6 m/s d) 8.4 m/s

134. A cubical box of wood of side 30 cm weighing 21.6 kg floats on water with two faces horizontal. The depth of immersion of box is:
a) 30 cm b) 12 cm c) 6 cm d) 24 cm

135. Blood is flowing at the rate of 200 cm^3 /sec in a capillary of cross-sectional area 0.5 m^2. The velocity of flow, (in mm/sec) is:
a) 0.1 b) 0.5 c) 0.3 d) 0.4 e) 0.5

136. A solid ball of volume v experiences a viscous force F when falling with a speed v in a liquid. If another ball of volume 8V with the same velocity v is allowed to fall in the same liquid it experiences a force:
a) F b) 16F c) 4F d) 8F e) 2F

137. Two spheres of volume 250 cc each but of relative densities 0.8 and 1.2 are connected by a string and the combination is immersed in a liquid. The tension in the string is: (g = 10 m/s^2)
a) 5.0 N b) 0.5 N c) 1.0 N d) 2.0 N

138. Eight drops of a liquid of density p and each of radius a are falling through air with a constant velocity 3.75 cms^{-1}. When the eight drops coalesce to form a single drop, the terminal velocity of the new drop will be:
a) 1.5 x 10^{-2} ms^{-1} b) 2.4 x 10^{-2} ms^{-1} c) 0.75 x 10^{-2} ms^{-1} d) 25 x 10^{-2} ms^{-1}
e) 15 x 10^{-2} ms^{-1}

139. An incompressible fluid flows steadily 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 v, its velocity at point B will be:
a) 2v b) v c) v/2 d) 4v

140. Bernoulli's principle is not involved in the working or explanation of:
a) movement of spinning ball b) carburetor of automobile
c) blades of a kitchen mixer d) dynamic lift of an aeroplane

141. A spherical ball of radius R is falling in a viscous fluid of viscosity η with a velocity v. The retarding viscous force acting on the spherical ball is:

a) directly proportional to R but inversely proportional to v

b) directly proportional to both radius R and velocity v

c) inversely proportional to both radius R and velocity v

d) inversely proportional to R but directly proportional to velocity v

142. The density P of water of bulk modulus B at a depth y in the ocean is related to the density at surface P_0 by the relation:

a) $p = p_o[1 - \frac{p_0 gy}{B}]$ b) $p = p_o[1 + \frac{p_0 gy}{B}]$ c) $p = p_o[1 + \frac{B}{p_0 gy}]$ d) $p = p_o[1 - \frac{B}{p_0 gy}]$

143. Viscosity of gases is:

a) about hundred times less than those of liquids

b) about twenty times less than those of liquids

c) about five hundred times less than those of liquids

d) about ten hundred times less than those of liquids

144. Two metal spheres are falling through a liquid of density 2 x 10^3 kg/m^3 with the same uniform speed. The material density of sphere 1 and sphere 2 are 8 x 10^3 kg/m^3 and 11 x 10^3 kg/m^3 respectively. The ratio of their radii is:

a) $\frac{11}{8}$ b) $\sqrt{\frac{11}{8}}$ c) $\frac{3}{2}$ d) $\sqrt{\frac{3}{2}}$

145. (A) The rate of flow of a liquid through a capillary becomes non-linear when the pressure across capillary is increased.

(R) With increase of pressure, the bore of capillary increases.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

146. Once a submarine starts sinking, it will always sink to the bottom of the ocean if no other changes arc made. This is because during the descent of the submarine:

a) the buoyant force acting on it decreases

b) the hydrostatic pressure acting on it increases

c) the gravitational force acting on it increases d) the density remains constant

147. Aboat having a length of 5 m and breadth 1m is floating on a lake. If a man gets on to the boat, the boat sinks by 1 cm. The weight of the man is (Take g = 10m s^{-2}):

a) 50 kg b) 9 kg c) 35 kg d) 75 kg

148. Velocity of water in a river is :

a) Same everywhere b) More in the middle and less near its banks
c) Less in the middle and more near its banks
d) Increase from one bank to other bank

149. A hollow sphere of inner and outer diameter of 12 cm and 16 cm respectively floats half submerged in water. The specific gravity of the material of the sphere is :
a) 8.65 b) 6.85 c) 0.865 d) 0.685

150. A piece of ice is floating in a beaker containing water. When ice melts, the temperature falls from 20^{o}C to 4^{o}C and the level of water:
a) remains unchanged b) falls c) rises d) changes erratically

151. The height of a mercury barometer is 75 cm at sea level and 50 cm at the top of a hill. Ratio of density of mercury to that of air is 10^4. The height of the hill is:
a) 250 m b) 2.5 km c) 2.5 km d) 750 m

152. The gate of a canal is 8 m wide. The level of water on one side is 30 m and on the other side is 15 m. The resultant force on the gate is :
a) 270 x 10^5 N b) 270 x 10^6 N c) 540 x 10^5 N d) 540 x 10^6 N

153. A large open tank has two holes in its wall. One is a square hole of side a at a depth of x from the top and the other is a circular hole of radius r at depth 4x from the top. When the tank is completely filled with water, the quantities of water flowing out per second from both holes are the same. Then r is equal to:
a) aπa b) a c) $\frac{a}{2\pi}$ d) $\frac{a}{\pi}$ e) $\frac{a}{\sqrt{2\pi}}$

154. The average depth of Indian ocean is about 3000 m. The fractional compression, $\frac{\triangle V}{V}$ of water at the bottom of the ocean (given that the bulk modulus of the water =2.2x 10^9N m^{-2} and g=10ms^{-2})is:
a) 0.82% b) 0.91% c) 1.36% d) 1.24% e) 1.52%

155. A liquid is allowed to flow into a tube of truncated cone shape. Identify the correct statement from the following:
a) the speed is high at the wider end and low at the narrow end
b) the speed is low at the wider end and high at the narrow end
c) the speed is same at both ends in a stream line flow
d) the liquid flows with uniform velocity in the tube

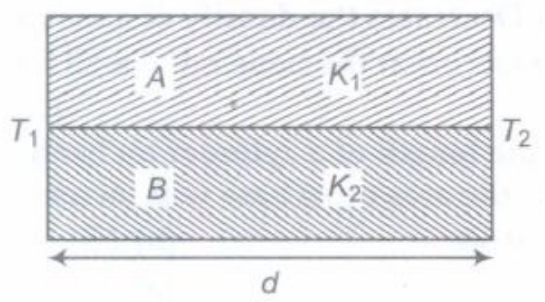
156. A manometer connected to a closed tap reads 4.5 x 10^5 Pa. When the tap is opened the reading of the manometer falls to 4 x 10^5 Pa. Then, the velocity of flow of water is:
a) 7 ms^{-1} b) 8 ms^{-1} c) 9 ms^{-1} d) 10 ms^{-1}

157. When a bimetallic strip is heated, it
a) Does not bend at all b) Gets twisted in the form of an helix
c) Bend in the form of an arc with the more expandable metal outside
d) Bends in the form of an arc with the more expandable metal inside

158. A U-tube containing a liquid is accelerated horizontally with a constant acceleration a. If the separation between the two vertical limbs is I, then the difference in the heights of the liquid in the two arms is:

a) zero b) I c) $\frac{la}{g}$ d) $\frac{lg}{a}$

159. Two rods A and B of different materials are welded together as shown in figure. Their thermal conductivities are Kl and K2• The thermal conductivity of the composite rod will be :



a) $3(K_1 + K_2)/2$ b) $K_I + K_2$ c) $2(K_I + K_2)$ d) $(K_1 + K_2)/2$

160. With increase in temperature the viscosity of:

a) both gases and liquids increases b) both gases and liquids decreases

c) gases increases and liquids decreases d) gases decreases and liquids increases

161. Two friends A and B are waiting for another friend for tea. A took the tea in a cup and mixed the cold milk and then waits. B took the tea in the cup and then mixed the cold milk when the friend comes. Then the tea will be hotter in the cup of :

a) A b) B c) tea will be equally hot in both cups d) friend's cup

162. A body of density D_1 and mass M is moving downward in glycerine of density D_2. What is the viscous force acting on it?

a) $Mg\left(1-\frac{D_2}{D_1}\right)$ b) $Mg\left(1-\frac{D_1}{D_2}\right)$ c) $Mg\left(1-\frac{D_1}{D_2}\right)$ d) $Mg\left(1-\frac{D_1}{D_2}\right)$

163. Two solid pieces, one of gold and the other of silver when immersed completely in water have equal weights. When weighed in air:

a) the gold piece will weigh more b) the silver piece will weigh more

c) they will have the same weight

d) both of them weigh less than they weighed in water

164. A sphere of mass M and radius R is dropped in a liquid, then terminal velocity of sphere is proportional to:

a) R b) 1/R c) R^2 d) $1/R^2$

165. (A) Two identical beakers contains water to the same level. A wooden block is floating in one of the beakers. The total weight of both-beakers is same.

(R) Volume of the displaced water is equal to the volume of block.

a)

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

b)

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

166. A cube made of material having a density of 0.9 x 10^3 kg/m^3 floats between water and a liquid of density 0.7 x 10^3 kg/m^3, which is immiscible with water. What part of the cube is immersed in water?

a) $\frac{1}{3}$ b) $\frac{2}{3}$ c) $\frac{3}{4}$ d) $\frac{3}{7}$

167. (A) Water flows faster than honey.

(R) The coefficient of viscosity of water is less than honey.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

168. 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

169. In rising from the bottom of a lake to the top, the temperature of an air bubble remains unchanged but its diameter gets doubled. If h is the barometric height (expressed in metres of mercury of relative density p) at the surface of the lake, the depth of the lake is:

a) 8phm b) 4phm c) 7phm d) 2phm

170. Consider the following equation of Bemoulli's theorem;

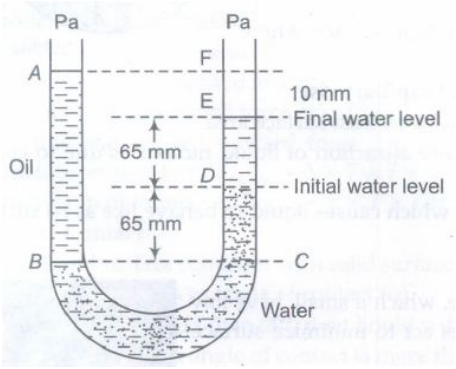
$p+\frac{1}{2}\rho v^2+\rho gh=K$ (constant)

The dimensions of K/p are same as that of which of the following?

a) Thrust b) Pressure c) Angle d) Viscosity

171. The viscosity of liquids is due to:

a) adhesive force b) cohesive force c) gravitational force d) diffusion

172. 

A U tube with both ends open to the atmosphere, is partially filled with water and oil, which is immiscible with water, is poured into one side until it stands at a distance of 10 mm above the water level on the other side. Meanwhile the water rises by 65 mm from its original level (see diagram). The density of the oil is

a) 650kgm-^{3} b) 425kg^{-3} c) 800kgm^{-3} d) 928kgm^{-3}

173. Which one of the following would a 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 of the above are same

174. Planet having average surface temperature To at an average distance d from the sun. Assuming that the planet receives radiant energy from th sun only and it loses radiant energy only from the surface and neglecting all other atmospheric effects we conclude:

a) $T_o \propto d^2$ b) $T_o \propto a^2$ c) $T_o \propto d^{1/2}$ d) $T_o \propto d^{-1/2}$

175. The light machine oil used for lubrication is about:

a) one hundred times more viscous than water b) ten times more viscous than water

c) one thousand times more viscous than water d) ten times less viscous than water

176. A metal ball immersed in alcohol weighs W_1 at 0^oC and W_2 at 50^0 C. The coefficient of cubical expansion of the metal is less than that of alcohol. Assuming that the density of the metal is large compared to that of alcohol, it can be shown that:

a) $w_1 = w_2$ b) $w_1 > w_2$ c) $w_1 < w_2$ d) none of these

177. If the length of a cylinder on heating increases by 2%, the area of its base will increase by:

a) 0.5% b) 2% c) 1% d) 4%

178. A silver ingot weighing 2.1 kg is held by a string so as to be completely immersed in a liquid of relative density 0.8. The relative density of silver is 10.5. The tension in the string (in kg-wt) is:

a) 1.6 b) 1.94 c) 3.1 d) 5.25

179. The working of venturimeter is based on:

a) Torricelli's law b) Pascal's law c) Bernoulli's theorem d) Archimedes' principle

e) Stokes' law

180. The bulk modulus of a spherical object is 'B'. If it is subjected to uniform pressure 'p', the fractional decrease in radius is :

a) B/3p b) 3p/B c) p/3B d) p/B

181. (A) A hydrogen filled balloon stops rising after it has attained a certain height in the sky.
(R) The atmosphere pressure decreases with height and becomes zero when maximum height is attained by hydrogen balloon.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

182. There is a hole of area A at the bottom of cylindrical vessel.Water is filled upto a height h and water flows out in t second. If water is filled to a height 4h, it will flow out in time equal to:

a) t b) 4t c) 2t d) t/4

183. A wooden sphere is taken deep inside a long column of water and released. It will move up with a:

a) uniform acceleration b) uniform retardation c) uniform velocity finally

d) non-uniform velocity finally

184. On which of the following, the terminal velocity of a solid ball in a viscous liquid is independent?

a) Area of cross-section b) Height of liquid c) Density of the ball

d) Density of the liquid

185. A body floats with one-third of its volume outside water and 3/4th of its volume outside another liquid. The density of another liquid is:

a) $\frac{9}{4}g/cc$ b) $\frac{4}{9}g/cc$ c) $\frac{8}{3}g/cc$ d) $\frac{3}{8}g/cc$

186. The value of coefficient of viscosity, in comparison to coefficient of friction, is:

a) very large b) very small c) nearly same d) eight to ten times more

187. The profile of advancing liquid in a tube is a:

a) straight line b) circle c) parabola d) hyperbola

188. A steadily flowing liquid enters a wide tube and continues to flow steadily. What will be nature of flow in the widened part of the tube?

a) Crowded b) Widened c) Will remain same as before

d) May be crowded or widened

189. Two substances of densities P_1 and P_2 are mixed in equal volume and the relative density of mixture is 4. When they are mixed in equal masses, the relative density of the mixture is 3. The values of P_1 and P_2 are:

a) $P_1 = 6$ and $P_2 = 2$ b) $P_1 = 3$ and $P_2 = 5$ c) $P_1 = 12$ and $P_2 = 4$ d) none of these

190. A body is raised through a height h in water. If the density of body is p and that of water is σσ and p > σ, the volume of the body is V; then the change in potential energy of the body is given as:
a) the potential energy remains unchanged b) the potential energy increases by hVpg
c) the potential energy increases by hV(p + σ)g
d) the potential energy increases by hV(p - σ)g

191. A gale blows over a house. The force due to the gale on the roof is:
a) in the downward direction b) in the upward direction c) in the horizontal direction
d) zero

192. A concrete sphere of radius R has a cavity of radius r which is packed with sawdust. The specific gravities of concrete and sawdust are respectively 2.4 and 0.3 for this sphere to flow with its entire volume submerged under water. Ratio of mass of concrete to mass of sawdust will be:
a) 8 b) 4 c) 3 d) zero

193. (A) A man is sitting in a boat which is floating on a pond. If the man drink some water from the pond, the level of the water in the pond decreases.
(R) According to Archimedes' principle, the weight of liquid displaced by body is equal to weight of the body
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

194. (A) Falling raindrops acquire a terminal velocity.
(R) A constant force in the direction of motion and a velocity dependent force opposite to the direction of motion, always result in the acquisition of terminal velocity.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

195. The terminal velocity u of a small steel ball of radius r falling under gravity through a column of viscous liquid of coefficient of viscosity ll depends on mass of the ball m, acceleration due to gravity g, coefficient of viscosity llland radius r. Which of the following relations is dimensionally correct?

a) $v \propto \frac{mgr}{\eta}$ b) $v \propto mg\eta r$ c) $v \propto \frac{mg}{r\eta}$ d) $v \propto \frac{\eta mg}{r}$

196. Water flows steadily through a horizontal pipe of variable cross-section. If the pressure of water is P at a point where flow speed is v, the pressure at another point where the flow speed is 2v, is: (Take density of water as ρ)
a) P-$\frac{3\rho v^2}{2}$ b) P-$\frac{\rho v^2}{2}$ c) P-$\frac{3\rho v^2}{4}$ d) P-ρv^2

197. The force acting on a window of area 50 cm x 50 cm of a submarine at a depth of 2000 m in an ocean, the interior of which is maintained at sea level atmospheric pressure, is : [Density of sea water = 10^3 kg m^{-3}, g = 10m s^{-2}]
a) 5 x 10^5 N b) 25 x 10^5 N c) 5 x 10^6 N d) 25 x 10^6 N

198. We have two narrow capillary tubes T_1 and T_2. Their lengths are l_1, l_2 and radii of cross-sections are r_1, r_2 respectively. The rate of flow of water through T_1 is 8 cm^3 s^{-1} when the pressure difference across its ends is P. What will be the rate of flow of water through T_2, under the same pressure difference, given that $l_1 = l_2$ and $r_1 = 2r_2$?
a) 8 cm^3s^{-1} b) 4 cm^3s^{-1} c) 2 cm^3s^{-1} d) 0.5 cm^3s^{-1}

199. The viscosity of an ideal liquid is:
a) 1 b) 0.5 c) zero d) infinite

200. (A) A piece of ice floats in water. The level of water remains unchanged when the ice melts completely.
(R) According to Archimedes' principle, the loss in weight of the body in the liquid is equal to the weight of the liquid displaced by the immersed part of the body.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

201. The energy emitted per second by a black body at 27°C is 10 J. If the temperature of the black body is increased to 327°C, the energy emitted per second will be:
a) 20 J b) 40 J c) 80 J d) 160 J

202. A U-tube is partially filled with water. Oil which does not mix with water is next poured into one side, until water rises by 25 cm on the other side. If the density of oil is 0.8, the oil level will stand higher than the water level by:
a) 6.25 cm b) 12.50 cm c) 31.75 cm d) 62.50 cm

203. (A) Aeroplanes are made to run on the runway before take off, so that they acquire the necessary lift.
(R) This is as per Bernoulli's theorem, as velocity increases, pressure decreases and vice-versa.

a)

If both assertion and reason are true and reason is the correct explanation of assertion

b)

If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

204. The cylinder is placed in a lift which is moving upwards with an acceleration a, then the pressure on the bottom is:

a) hdg b) $\frac{1}{2}$ hdg c) hd(g + a) d) hd(g -a)

205. A wooden cube just floats inside water, when a 200 g mass is placed on it. When the mass is removed the cube is 2 cm above the water level. The size of the cube is:

a) 5 cm b) 10 cm c) 15 cm d) 20 cm

206. A solid sphere falls with a terminal velocity of 10 cm/sec in air. If it is allowed to fall in vacuum, the terminal velocity will:

a) be equal to 10 cm/sec b) be less than 10 cm/sec c) be more than 10 cm/sec

d) never be attained

207. A solid sphere of volume V and density P floats at the interface of two immiscible liquids of densities ρ_1 and ρ_2 respectively. If $\rho_1 < \rho < \rho_2$, then the ratio of volume of the parts of the sphere in upper and lower liquid is:

a) $\frac{\rho-\rho_1}{\rho_2-\rho}$ b) $\frac{\rho_2-\rho}{\rho-\rho_1}$ c) $\frac{\rho+\rho_1}{\rho+\rho_2}$ d) $\frac{\rho+\rho_2}{\rho+\rho_1}$ e) $\frac{\sqrt{\rho_1\rho_2}}{\rho}$

208. When water flows at a rate Q through a tube of radius r placed horizontally, a pressure difference pdevelops across the ends ofthe tube. If the radius of the tube is doubled and the rate offlow halved, the pressure difference will be:

a) 8p b) p c) p/8 d) p/32

209. Water contained in a tank flows through an orifice of diameter 2 cm, under a constant pressure difference of 10 cm of water column. The rate of flow of water through the orifice is:

a) 44 cc/sec b) 4.4 cc/sec c) 440 cc/sec d) 4400 cc/sec

210. Two tubes A and B are in series. Radius of A is R and that of B is 2R. If water flows through A with velocity v then velocity of water through B is:

a) v/2 b) v c) v/4 d) v/8

211. The Young's modulus of brass and steel are respectively 1.0 x 10^{11} Nm^{-2} and 2.0 x 1011 Nm^{-2}. A brass wire and a steel wire of the same length are extended by 1 mm each under the same force. If radii of brass and steel wires are RB and Rs respectively, then:

a) $R_S = \sqrt{2R_B}$ b) $R_S = R_B/\sqrt{2}$ c) Rs = $4R_B$ d) Rs = $R_B/2$

212. A small sphere of radius r falls from rest in a viscous liquid. As a result, heat is produced due to viscous force. The rate of production of heat when the sphere attains its terminal velocity, is proportional to
a) r^5 b) r^2 c) r^3 d) r^4

213. A rectangular vessel when full of water takes 10 minutes to be emptied through an orifice in its bottom. How much time will it take to be emptied when half filled with water?
a) 9 minute b) 7 minute c) 5 minute d) 3 minute

214. The speeds of air-flow on the upper and lower surfaces of a wing of an aeroplane are v_1 and v_2 respectively. If A is the cross-sectional area of the wing and 'ρ' is the density of air, then the upward lift is:
a) $\frac{1}{2}\rho A(v_1-v_2)$ b) $\frac{1}{2}\rho A(v_1+v_2)$ c) $\frac{1}{2}\rho A\left(v_1^2-v_2^2\right)$ d) $\frac{1}{2}\rho A\left(v_1^2+v_2^2\right)$

215. The aerofils are so designed that the speed of air:
a) on top side is more than on lower side b) on top side is less than on lower side
c) is same on both sides d) is turbulent

216. A stream-lined body falls through air from a height h on the surface of a liquid. Let d and D denote the densities of the materials of the body and the liquid respectively. If D > d, then the time after which the body will be instantaneously at rest, is:
a) $\sqrt{\frac{2h}{g}}$ b) $\sqrt{\frac{2h}{g}\frac{D}{d}}$ c) $\sqrt{\frac{2h}{g}\frac{d}{D}}$ d) $\sqrt{\frac{2h}{g}(\frac{d}{D-d})}$

217. A dam for water reservoir is built thicker at the bottom than at the top because:
a) pressure of water is very large at the bottom due to its large depth
b) water is likely to have more density at the bottom due to its large depth
c) quantity of water at the bottom is large d) none of the above

218. Terminal velocity depends on radius of drop rand viscosity η according to:
a) $v_T \propto r\eta$ b) $vT \propto r^2\eta$ c) $v_T \propto \frac{\eta}{r^2}$ d) $v_T \propto \frac{r^2}{\eta}$

219. Find the lifting force of a 4 kg cork lifebelt in sea water, if the densities of cork and sea water are 0.2×10^3 kg/m^3 and 1.03×10^3 kg/m^3 respectively:
a) 163 N b) 273 N c) 119 N d) 289 N

220. The time period of a simple pendulum is T. The relative density of the bob is σ. The bob is put in water and allowed to oscillate. Assuming there is no friction due to viscosity, etc., what will be the time period of the pendulum?
a) $T(\sigma-1)$ b) $T(\sigma-1)^{1/2}$ c) $T/(\sigma-1)$ d) $T/(\sigma-1)^{1/2}$

221. A wooden block is taken to the bottom of a deep, calm lake of water and then released. It rises up with a:
a) constant acceleration b) decreasing acceleration c) constant velocity
d) decreasing velocity

222. A wooden block is floating in a liquid. 50% of its volume is inside the liquid when the vessel is stationary. Percentage of volume immersed when the vessel moves upwards with an acceleration a = g/2 is:
a) 75% b) 25% c) 50% d) 33.33%

223. The viscosity of gases is due to:
a) adhesive force b) cohesive force c) gravitational force d) diffusion

224. Two capillaries of length L and 2L and of radii R and 2R are connected in series. The net rate of flow of fluid through them will be: (given rate of the flow through single capillary $X=\pi PR^4/8\eta L$)
a) 8/9 X b) 9/8 X c) 5/7 X d) 7/5 X

225. Pressure is a scalar quantity because:
a) it is the ratio of force to area and both force and area are vectors
b) it is the ratio of the magnitudes of the force to area
c) it is the ratio of the component of the force normal to the area and area itself
d) it depends on the size of the area chosen

226. A metallic sphere with an internal cavity weighs 40 g-wt in air and 20 g-wt in water. If the density of the material with cavity be 8 g per cm^3, then the volume of cavity is:
a) zero b) 15 cm^3 c) 5 cm^3 d) 20 cm^3

227. Water rises to height 'h' in capillary tube. If the length of capillary tube above the surface of water is made less than' h', then:
a) water does not rise at all.
b) water rises upto the tip of capillary tube and then starts overflowing like a fountation
c) water rises upto the top of capillary tube and stays there without overflowing
d) water rises upto a point a little below the top and stays there

228. In a laminar flow the velocity of the liquid in contact with the walls of the tube is:
a) zero b) maximum c) in between zero and maximum d) equal to critical velocity

229. A block of aluminum of mass 1kg and volume 3.6×10^{-4} m^3 is suspended from a string and then completely immersed in a container of water. The decrease in tension in the string after immersion is:
a) 9.8 N b) 6.2 N c) 3.6 N d) 1.0 N

230. When a certain weight is suspended from a long uniform wire, its length increases by one em. If the same weight is suspended from another wire of the same material and length but having a diameter half of the first one then the increase in length will be :
a) 0.5 cm b) 2 cm c) 4 cm d) 8 cm

231. We have two different liquids A and B whose relative densities are 0.75 and 1.0 respectively. If we dip solid objects P and Q having relative densities 0.6 and 0.9 in these liquids, then:
a) P floats in A and Q sinks in B b) P sinks in A and Q floats in B
c) P floats in B and Q sinks in A d) P sinks in B and Q floats in A

232. Mercury thermometers can be used to measure temperatures upto

a) 100°C b) 212°C c) 360°C d) 500°C

233. If there were a smaller gravitational effect, which of the following forces do you think would alter in some respect?
a) Viscous forces b) Archimedes' uplift c) Electrostatic forces d) Nuclear forces

234. Three liquids of densities PI' Pz and P3 (with Pl>PZ>P3)' having the same value of surface tension Trise to the same height in three identical capillaries. The angles of contact 91, 92 and 93 obey:
a) $\pi/2 > \theta_1 > \theta_2 > \theta_3 \geq 0$ b) $0 < \theta_1 < \theta_2 < \theta_3 < \pi/2$ c) $\pi/2 < \theta_1 < \theta_2 < \theta_3 < \pi/2$
d) $\pi > \theta_1 > \theta_2 > \theta_3 < \pi/2$

235. A layer of glycerine of thickness 1mm is present between a large surface area and a surface area of $0.1m^2$. With what force the small surface is to be pulled, so that it can move with a velocity of 1 m/s? (Given that coefficient of viscosity =0.07 $kg\text{-}m^{-1}s^{-1}$)
a) 70 N b) 7 N c) 700 N d) 0.70 N

236. In a beaker, there is a hole at the bottom and a hole of same area is at the top and water starts flowing through it with velocity v, then:
a) water level will oscillate about a height of $v^2/2g$
b) water level will rise till a height of $v^2/2g$ is reached and remains constant
c) no water will remain in the beaker d) none of the above

237. (A) The velocity of flow of a liquid is smaller when pressure is larger and vice-versa.
(R) According to Bernoulli's theorem, for the stream- line flow of an ideal fluid, the total energy per unit mass remains constant.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

238. The terminal velocity of a sphere moving through a viscous medium is:
a) directly proportional to the radius of the sphere
b) inversely proportional to the radius of the sphere
c) directly proportional to the square of the radius of sphere
d) inversely proportional to the square of the radius of sphere

239. A block of wood weighs 4N in air and 3N when immersed in a liquid. The buoyant force (in newton) is:
a) zero b) 1 c) 3/4 d) 4/3

240. (A) Weight of a empty balloon measured in air is W_1. If air at atmospheric pressure is filled inside balloon and again weight of the balloon is measured. Weight of balloon in second case is equal to W_1.
(R) Upthurst is equal to weight of the fluid displaced by the body.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

241. Two bodies are in equilibrium when suspended in water from the arms of a balance. The mass of one body is 36 g and its density is 9 g/cc. If the mass of the other is 48 g, its density (in g/cc) is:
a) $\frac{4}{3}$ b) $\frac{3}{2}$ c) 3 d) 5

242. (A) The shape of an automobile is so designed that its front resembles the stream line pattern of the fluid through which it moves.
(R) The shape of the automobile is made stream lined in order to reduce resistance offered by the fluid.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

243. The amount of radiation emitted by a perfectly black body is proportional to
a) Temperature on ideal gas scale b) Fourth root of temperature on ideal gas scale
c) Fourth power of temperature on ideal gas scale
d) Source of temperature on ideal gas scale

244. A balloon of volume 1500 m^3 and weighing 1650 kg with all its equipment is filled with helium (density 0.2 kg/m^3). If the density of air is 1.3 kg/m^3, the pull on the rope tied to the balloon will be:
a) zero b) 300 kg c) 16.5 kg d) 1950 kg

245. (A) A parachute descends slowly whereas a stone dropped from same height falls rapidly.
(R) The viscous force of air on parachute is larger than that of on a falling stone.

a)
If both assertion and reason are true and reason is the correct explanation of assertion

b)
If both assertion and reason are true but reason is not the correct explanation of assertion

c) If assertion is true but reason is false d) If both assertion and reason are false

e) If assertion is false but reason is true

246. A common hydrometer reads specific gravity of liquids. Compared to the 1.6 mark of the stem the mark 1.5 will be:
a) upwards b) downwards c) in the same place
d) may be upward or downward depending upon the hydrometer

247. A large tank filled with water to a height of h is said to be emptied through a small hole at the bottom. The ratio of time taken for the level of water to fall down from h to h/2 and from h/2 to zero is:
a) $\sqrt{2}$ b) $1/\sqrt{2}$ c) $\sqrt{2}$-1 d) $\frac{1}{\sqrt{2}-1}$

248. An open vessel containing water is given a constant acceleration a in the horizontal direction. Then, the free surface of water gets sloped with the horizontal at an angle θ given by:
a) $\theta = tan^{-1}(\frac{a}{g})$ b) $\theta = tan^{-1}(\frac{g}{a})$ c) $\theta = sin^{-1}(\frac{a}{g})$ d) $\theta = cos^{-1}(\frac{g}{a})$

249. An areoplane of mass 3 x 10^4 kg and total wing area of 120 m^2 is in a level flight at some height. The difference in pressure between the upper and lower surface of its wings, (in kilo pascals) is:
a) 2.5 b) 5.0 c) 10.0 d) 12.5

250. 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 is:
a) $Mg\left(1-\frac{d_2}{d_1}\right)$ b) $Mg\frac{d_1}{d_2}$ c) $Mg(d_1-d_2)$ d) Mgd_1d_2

251. A sample of metal weighs 210 g in air, 180 g in water and 120 g in an unknown liquid. Then:
a) the density of metal is 3 g/cm^3 b) the density of the metal is 7 g/cm^3
c) the density of metal is 4 times the density of unknown liquid
d) the metal will float on water

252. In making an alloy, a substance of specific gravity S_1 and mass m_1 is mixed with another substance of specific gravity S_2 and mass m_2 ;then the specific gravity of the alloy is:
a) $(\frac{m_1+m_2}{s_1+s_2})$ b) $(\frac{s_1s_2}{m_1+m_2})$ c) $[\frac{m_1+m_2}{(m_1s_1+m_2/s_2)}]$ d) $[\frac{(m_1s_1+m_2/s_2)}{m_1+m_2}]$

253. A spherical body falling through a viscous liquid of infinite extent ultimately attains a constant value, when:
a) upthrust + weight = viscous drag b) weight + viscous drag = upthrust
c) viscous drag + upthrust = weight d) viscous drag + upthrust > weight

254. The largest average velocity of blood flow in an artery of radius 2×10^{-3} m (if the flow must remain laminar) is (Take viscosity of blood to be 2.084×10^{-3} Pa-s and $\rho_{blood} = 1.06 \times 10^3$ kgm^{-3}). What is the corresponding flow rate?
a) 2.12 ms^{-1}, 1.23 x 105 m^{3}s^{-1} b) 0.98 ms^{-1}, 1.23×10^5 m^{3}s^{-1}
c) 1.72 ms^{-1}, 0.23×10^5 m^{3}s^{-1} d) 0.62 ms^{-1}, 0.23×10^5 m^{3}s^{-1}

255. The Young's modulus of steel is twice that of brass. Two wires of the same length and same area of cross section, one of steel and another of brass, are suspended from the same roof. If we want the lower ends of the wires to be at the same level, then the weights added to the steel and brass wires must be in the ratio of:
a) 4:1 b) 1:1 c) 1 :2 d) 2:1

256. A piece of paraffin wax of density 0.9 g/cc floats on water. A layer of turpentine of density 0.87 g/cc is added on top of water until the wax is entirely submerged. The ratio of the volume of wax immersed in water to that in turpentine is:
a) 3 : 13 b) 87 : 90 c) 90:87 d) 3:10

257. In a turbulent flow, the velocity of the liquid molecules in contact with the walls of the tube is:
a) zero b) maximum c) equal to critical velocity d) may have any value

258. A spherical body is dropped in a viscous liquid of infinite extent. What happens to the net force acting on it?
a) It goes on increasing b) It goes on decreasing, till it becomes zero
c) First increases then decreases d) None of the above

259. Expansion during heating:
a) Occurs only in solids b) Increases the weight of a material
c) Decreases the density of a material
d) Occurs at the same rate for all liquids and solids

260. (A) 1 kg of cotton fibre will weight equals in air when made more fluffy.
(R) Weight of air in cotton will cancel out with the force of extra buoyancy acting on it.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

261. A tiny sphere of mass m and density x is dropped in a jar of glycerine of density y. When the sphere acquires terminal velocity, the magnitude of the viscous force acting on it is:
a) $\frac{mgx}{y}$ b) $\frac{mgy}{x}$ c) $mg(1-\frac{y}{x})$ d) $mg(1+\frac{y}{x})$

262. A metal block having an internal cavity weighs 110 g in air and 80 g in water. If the density of metal is 5.5 g/cc, then the volume of cavity is:
a) 30 cc b) 20 cc c) 10 cc d) 5 cc

263. Two non-mixing liquids of densities P and np (n > 1) are put in a container. The height of each liquid is h. A solid cylinder of length L and density d is put in this container. The cylinder floats with its axis vertical and length pL (p < 1) in the denser liquid. The density d is equal to :
a) {1 + (n + l)p}ρ b) {2 + (n + l)p}ρ c) {2 + (n -1)p}ρ d) {l + (n -1)p}ρ

264. The power radiated by a black body is P and it radiates maximum energy at wavelength λ_0. If the temperature of the black body is now changed so that it radiates maximum energy at wave length $3/4\,'_0\,'$..0, the power radiated by it becomes nP. The value of n is :
a) 3/4 b) 4/3 c) 256/81 d) 81/256

265. (A) To float, a body must displace liquid whose weight is greater than the actual weight of the body.
(R) The body will experience no net downward force, in the case of floating.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

266. An empty balloon weighs W_1. If air equal in weight to W is pumped into the balloon, the weight of the balloon becomes W_2. Suppose that the density of air inside and outside the balloon is same; then:
a) $W_2 = W_1 + W$ b) $W_2 = \sqrt{W_1 W}$ c) $W_2 = W_1$ d) $W_2 = W_1 - W$

267. A wooden block of mass m and density ρ is tied to a string. The other end of the string is fixed to the bottom of a tank. The tank is filled with a liquid of density σ with $\sigma > \rho$. What is the tension in the string?
a) $(\frac{\sigma-\rho}{\sigma})mg$ b) $(\frac{\sigma-\rho}{\rho})mg$ c) $\frac{\rho mg}{\sigma}$ d) $\frac{\sigma mg}{\rho}$

268. (A) A block floats in water with some part outside water. When whole system is given a constant upward acceleration then volume of block inside water remains unchanged in equilibrium.
(R) Net force on the block in both cases is zero.

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

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

269. The height of mercury column in a simple barometer is h. As the tube is inclined to the vertical at an angle α, the length of mercury column along the length of the tube is l; then:
a) $l = \frac{h}{cos\alpha}$ b) 1= h cos α c) l=h d) 1= (h) cos α

270. 16 cm^3 of water flows per second through a capillary tube of radius a cm and of length l em when connected to a pressure head of h ern of water. If a tube of the same length and radius (a/2)cm is connected to the same pressure head the quantity of water flowing through the tube per second will be:
a) 4 cm^3 b) 1 cm^3 c) 8 cm^3 d) 16 cm^3

271. A body cools from a temperature 3T to 2T in 10 minutes. The room temperature is T. Assume that Newton's law of cooling is applicable. The temperature of the body at the end of next 10 minutes will be :
a) T b) 7/4 T c) 3/2 T d) 4/3 T

272. Which of the following has the greatest viscosity?
a) Hydrogen b) Air c) Water d) Ammonia

273. In Bernoulli's theorem which of the following is conserved?
a) Mass b) Energy c) Linear momentum d) Angular momentum

274. An engine pumps water through a hose pipe. Water passes through the pipe and leaves it with a velocity of 2 m/s. The mass per unit length of water in the pipe is 100 kg/m. What is the power of the engine?
a) 400 W b) 200 W c) 100 W d) 800 W

275. A parrot sitting on the floor of a wire cage which is being carried by a boy, starts flying. The boy will feel that the box is now:
a) heavier b) lighter c) same in weight d) lighter in the beginning and heavier later

276. The wet-ability of a surface by a liquid depends primarily on :
a) density b) angle of contact between surface and liquid c) viscosity
d) surface tension

277. The ratio of inertial force to viscous force represents:
a) Magnus effect b) Reynold's number c) Torricells's law d) Relative density

278. A volume V of a viscous liquid flows per unit time due to a pressure head ΔP along a pipe of diameter d and length l. Instead of this pipe, a set of four pipes each of diameter d/2 and length 2l is connected to the same pressure head ΔP. Now the volume of liquid

flowing per unit time is:
a) V/16 b) V/8 c) V/4 d) V

279. The potential energy of particle in a force field is $U=A/r^2 - B/r$, where A and B are positive constants and r is the distance of particle from the centre of the field. For stable equilibrium, the distance of the particle is :
a) B/2A b) 2A/B c) A/B d) B/A

280. If two liquids of same volume but different densities p_1 and p_2 are mixed, then density of mixture is given by:
a) $p = \frac{p_1 p_2}{2}$ b) $p = \frac{p_1 + p_2}{2p_1 p_2}$ c) $p = \frac{2p_1 p_2}{p_1 + p_2}$ d) $p = \frac{p_1 p_2}{p_1 + p_2}$

281. Two bodies of equal mass with volumes V and 2V are equalized on a balance. The larger body is then immersed in oil of density p = 0.9 g/cc. What must be the density of the liquid in which the smaller body is simultaneously immersed, so as not to disturb the equilibrium of the balance?
a) 0.9 g/cc b) 1.8 g/cc c) 0.45 g/cc d) 1.35 g/cc

282. A glass flask having mass 390 g and an interior volume of 500 cm^3 floats on water, when it is lessthan half filled with water. The density of the material of the flask is:
a) 0.8 g/cc b) 2.8 g/cc c) 1.8 g/cc d) 0.28 g/cc

283. Select the correct alternative.
a)
A hollow cylinder of mass m , made heavy at its bottom, is floating vertically in water. It is tilted from its vertical position through an angle e to the left. The restoring force acting on it is mg(sec θ -1).
b)
A block of ice with lead shot embedded in it is floating on water, contained in a vessel. The temperature of the system is maintained at 0^oC as the ice melts. When the ice melts completely, the level of the water in the vessel rises.
c)
A man is sitting in a boat which is floating in a pond. If the man drinks some water from the pond, the level of the water in the pond decreases.
d) None of the above.

284. Two syringes of different cross-sections (without needles) filled with water are connected with a tightly filted rubber tube filled with water. Diameters of the smaller piston and larger piston are 1.0 cm and 3.0 cm respectively. Find the force exerted on the larger piston when a force of 10 N is applied to the smaller piston.
a) 90 N b) 40 N c) 50 N d) 80 N

285. The units of Young's modulus of elasticity are:
a) N/m b) N-m c) N/m^2 d) $N–m^2$

286. A cork ball is floating on the surface of water in a beaker. The beaker is covered with a bell jar and the air is evacuated. What will happen to the ball?

a) Sink a little b) Rise a little c) Remain unchanged d) Sink completely

287. Mercury boils at 367"C. However, mercury thermometers are made such that they can measure temperature up to 500°C.This is done by
a) maintaining vacuum above mercury column in the stem of the thermometer
b) filling nitrogen gas at high pressure above the mercury column
c) filling oxygen gas at high pressure above the mercury column
d) filling nitrogen gas at low pressure above the mercury column

288. (A) The apparent weight of a block of wood floating in water is equal to zero.
(R) The value of acceleration due to gravity (g) in water becomes zero.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

289. Two capillary tubes of the same length but different radii r_1 and r_2 are fitted in parallel to the bottom of a vessel. The pressure head is P. What should be the radius of a single tube that can replace the two tubes so that the rate of flow is same as before?
a) $r_1^4+r_2^4$ b) None of these c) r_1+r_2 d) $r_1^2+r_2^2$

290. Two rain drops reach the earth with different terminal velocities having ratio 9 : 4. Then, the ratio of their volumes is:
a) 3:2 b) 4:9 c) 9:4 d) 27:8

291. A piece of wood is floating in water. When the temperature of water rises, the apparent weight of the wood will:
a) increase b) decrease c) may increase or decrease d) remain the same

292. One poise is:
a) 1 dyne sec/cm^2 b) 1/98.1 kg-f-sec/m^2 c) 10^{-1} kg/m-sec d) any of these

293. As a bubble comes from the bottom of a lake to the top, its radius:
a) increases b) decreases c) does not change d) becomes zero

294. A good lubricant should have:
a) high viscosity b) low viscosity c) moderate viscosity d) high density

295. A sphere of solid material of relative density 9 has a concentric spherical cavity and sinks in water. If the radius of the sphere be R, then the radius of the cavity (r) will be related to R as:
a) $r^3 = \frac{8}{9}R^3$ b) $r^3 = \frac{2}{3}R^3$ c) $r^3 = \frac{\sqrt{8}}{3}R^3$ d) $r^3 = \sqrt{\frac{2}{3}R^3}$

296. In case of a hollow body, if ρ_B and ρ_s represent the densities of body and substance respectively, then:
a) $p_B=p_s$ b) $p_B<p_s$ c) $p_B>p_s$ d) none of these

297. The following four wires are made of same material. Which of these will have the largest extension when the same tension is applied?
a) Length = 50 em, diameter = 0.5 mm b) Length= 100 em, diameter= 1mm
c) Length = 200 em, diameter = 2 mm d) Length= 300 em, diameter= 3 mm

298. More viscous oil is used in summer than in winter in motors due to:
a) rise in temperature in summer; the viscosity of oil decreases
b) rise in temperature in summer the viscosity of oil increases c) S.T. of oil decreases
d) S.T. of oil increases

299. A river of salty water is flowing with a velocity 2 m/s. If the density of the water is 1.2 g/cc, then the kinetic energy of each cubic metre of water is:
a) 2.4 J b) 24 J c) 2.4 kJ d) 4.8 kJ

300. A wire of length I meteres, made of a material of specific gravity 8 is floating horizontally on the surface of water. If it is not wet by water, the maximum diameter of the wire (in millimeters) up to which it can continue to float is: (surface tension of water is T = 70 x 10^{-3}N-m^{-1})
a) 1.1 b) 0.75 c) 0.55 d) 1.5

301. The working of an atomizer depends upon:
a) Bernoulli's theorem b) Boyle's law c) Archimedes' principle
d) Newton's law of motion

302. A cylinder is filled with non-viscous liquid of density d to a height ho and a hole is made at a height h_1 from the bottom of the cylinder. The velocity of liquid issuing out of the hole is:
a) $\sqrt{2gh_0}$ b) $\sqrt{2g(h_0-h_1)}$ c) $\sqrt{dgh_1}$ d) $\sqrt{dgh_0}$

303. A spherical small ball of density ρ is gently placed in a liquid of density $\sigma(\rho > \sigma)$ The initial acceleration of the free fall of the ball will be:
a) $(\frac{\rho+\sigma}{\rho})g$ b) $(\frac{\rho-\sigma}{\sigma})g$ c) $(\frac{\rho-\sigma}{\rho})g$ d) g

304. A piece of wax weighs x g in air. A piece of metal is found to weigh y g in water. It is tied to the wax and both together weigh z g in water. Then, the specific gravity of wax is: (z > y)
a) $\frac{x}{y}$ b) $\frac{y}{x}$ c) $\frac{x}{x(z-y)}$ d) $\frac{x}{x-z}$

305. Some liquid is filled in a cylindrical vessel of radius R. Let F_1 be the force applied by the liquid on the bottom of the cylinder. Now, the same liquid is poured into a vessel of uniform square cross-section of side R. Let F_2 be the force applied by the liquid on the bottom of this new vessel, then:
a) $F_1 = \pi F_2$ b) $F_1=F_2\backslash\pi$ c) $F_1 = \sqrt{\pi}F_2$ d) $F_1 = F_2$

306. A barometer reads 0.76 m. Its torricellian space is 0.09 m long. The volume of air measured at atmospheric pressure to be introduced into space to cause the mercury to drop to 0.57 m is: (the cross-section of the barometer tube is 10^{-4}sq. m)
a) 1.7x 10^{-6} m^3 b) 0.7x 10^{-6} m^3 c) 7x 10^{-6} m^3 d) 7 m^3

307. There is a 1 mm thick layer of water between a plate of area 100 cm^2 and another very big plate. The coefficient of viscosity of water is 0.01 poise. Then, the force required to move the smaller plate with a velocity of 10 cm/sec with respect to the larger plate is:
a) 10 dyne b) 100 dyne c) 1000 dyne d) 10,000 dyne

308. (A) The stream of water flowing at high speed from a garden hose pipe tends to spread like a fountain when held vertically up, but tends to narrow down when held vertically down.
(R) In any steady flow of an incompressible fluid, the volume flow rate of the fluid remains constant.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

309. A body weighs m_1 in a fluid of density d_1 and m_2 in a fluid of density d_2. What would be the weight in a fluid of density d_3?
a) $\frac{m_1(d_3-d_1)-m_2(d_2-d_3)}{(d_2-d_1)}$ b) $\frac{m_1(d_2-d_3)-m_1(d_1-d_3)}{(d_2-d_1)}$ c) $\frac{m_2(d_3-d_1)-m_1(d_3-d_2)}{(d_2-d_1)}$
d) $\frac{m_1(d_2-d_3)-m_2(d_3-d_1)}{(d_2+d_1)}$

310. (A) The stream of water emerging from a water tap "necks down" as it falls.
(R) The volume flow rate at different levels is same.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

311. (A) A man sitting in a boat which is floating on a pond. If the man drinks some water from the pond, the level of water in the pond decreases.
(R) In floating, the weight displaced by body is less than the weight of the body.

a)

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

b)

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

312. (A) The blood pressure in humans is greater at the feet than at the brain.
(R) Pressure of liquid column is proportional to height, density of liquid and acceleration due to gravity.

a)

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

b)

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

c) If assertion is true but reason is false. d) If both assertion and reason are false.

e) If assertion is false but reason is true.

313. The approximate depth of an ocean is 2700 m. The compressibility of water is 45.4×10^{-11} P and density of water is 103 kg/m^3. What fractional compression of water will be obtained at the bottom of the ocean?
a) 0.8×10^{-2} b) 1.0×10^{-2} c) 1.2×10^{-2} d) 1.4×10^{-2}

314. Two identical cylindrical vessels with their bases at same level, each contains a liquid of density d. The height of the liquid in one vessel is h_1 and that in the other vessel is h_2. The area of either base is A. The work done by gravity in equalizing the levels when the two vessels are connected is:
a) $(h_1 - h_2)gd$ b) $(h_1 - h_2)gAd$ c) $\frac{1}{2}(h_1 - h_2)^2gAd$ d) $\frac{1}{4}(h_1 - h_2)^2gAd$

315. A 50 kg girl wearing high heel shoes balances on a single heel. The heel is circular with the diameter 1.0 cm, What is the pressure exerted on the horizontal floor?
a) 3×10^6 Pa b) 2×10^4 Pa c) 6.24×10^6 Pa d) 9×10^3 Pa

316. An aircraft has a mass 4×10^5 kg with total wing area 500 m^2 flying at a speed of 720 km h^{-1}. The density of air at its height is 1.2 kg m^{-3}. The fractional increase in the speed of the air on the upper surface of the wings relative to the lower surface is: (Take g = 10s^{-2})
a) 0.04 b) 0.08 c) 0.17 d) 0.32

317. The flow of liquid is laminar or stream-line is determined by:
a) rate of flow of liquid b) density of fluid c) radius of the tube
d) coefficient of viscosity of liquid

318. A gas flows with a velocity u along a pipe of cross-sectional area S and bent an angle of 90° at a point A. What force does the gas exert on the pipe at A if its density is ρ?

a) $\frac{\sqrt{2}Sv}{\rho}$ b) $\sqrt{2}Sv^2\rho$ c) $\frac{\sqrt{3}Sv^2\rho}{2}$ d) $\sqrt{3}Sv^2\rho$

319. A boy is carrying a bucket of water in one hand and a piece of plastic in the other. After transferring the plastic piece to the bucket (in which it floats) the boy will carry:
a) same load as before b) more load as before c) less load as before
d) either less or more load, depending on the density of plastic

320. A metal plate of area 10^3 cm^2 rests on a layer of oil 6 mm thick. A tangential force of 10^{-2} N is applied on it to move it with a constant velocity of 6 cms^{-1}. The coefficient of viscosity of the liquid is:
a) 0.1 poise b) 0.5 poise c) 0.7 poise d) 0.9 poise

321. Find the density of a block of wood that floats in water with 0.1 of its volume above water:
a) 0.9 g/cc b) 0.9 c) 0.1 g/cc d) 0.1

322. If A denotes the area of free surface of a liquid and h the depth of an orifice of area of cross-section a, below the liquid surface, then the velocity v of flow through the orifice is given by:
a) $v=\sqrt{(2gh)}$ b) $v=\sqrt{(2gh)}\sqrt{\left(\frac{A^2}{A^2-a^2}\right)}$ c) $v=\sqrt{(2gh)}\sqrt{\left(\frac{A}{A-a}\right)}$ d) $v=\sqrt{(2gh)}\sqrt{\left(\frac{A^2-a^2}{A^2}\right)}$

323. The rate of flow of water in a capillary tube of length l and radius r is V. The rate of flow in another capillary tube of length 2l and radius 2r for same pressure difference would be:
a) 16 V b) 9 V c) 8 V d) 2 V

324. (A) When an ice cube, floating in a glass of water melts, the water remains unchanged.
(R) The volume of ice on melting increases.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

325. (A) To empty an oil tank, two holes are made.
(R) Oil will come out of two holes so it will be emptied faster.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

326. A certain number of spherical drops of a liquid of radius 'T' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T is the surface tension of the liquid, then:
a) energy = 4VT (l/r -l/R) is released b) energy = 3VT (l/r + l/R) is absorbed
c) energy = 3VT (l/r - l/R) is released d) energy is neither released nor absorbed

327. A closed vessel is half-filled with water. There is a hole near the top of the vessel and air is pumped out from this hole:
a) the water level will rise up in the vessel
b) the pressure at the surface of water will decrease
c) the force exerted due to the water on the bottom of the vessel will decrease
d) the density of the liquid will decrease

328. A balloon with mass 'm' is descending down with an acceleration' a' where a < g. How much mass should be removed from it so that it starts moving up with an acceleration' a'?
a) 2ma/(g + a) b) 2ma/(g-a) c) ma/(g + a) d) ma/(g - a)

329. A raft of wood (density 600 kg/m^3) of mass 120 kg floats in water. How much weight can be put on the raft to make it just sink?
a) 120 kg b) 200 kg c) 40 kg d) 80 kg

330. The value of g at a place decreases by 2%. The barometric height of mercury:
a) increases by 2% b) decreases by 2% c) remains unchanged
d) sometimes increases and sometimes decreases

331. 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

332. A copper ball of radius rtravels with a uniform speed v in a viscous fluid. If the ball is changed with another ball of radius 2r, the new uniform speed will be:
a) v b) 2v c) 4v d) 8v

333. A container of large uniform cross-sectional area A resting on a horizontal surface holds two immiscible, non-viscous and incompressible liquids of densities d and 2d, each of height (H/2) The lower density liquid is open to the atmosphere having pressure P_0. A tiny hole of area s (s<< A)is punched on the vertical side of the container at a height h $\left(h << \frac{H}{2}\right)$. The initial speed of efflux of the liquid at the hole is:
a) (3H-4h)g b) $\frac{(3H-4H)g}{2}$ c) $\sqrt{(3H-4h)g}$ d) $\sqrt{\frac{(3H-4h)g}{2}}$

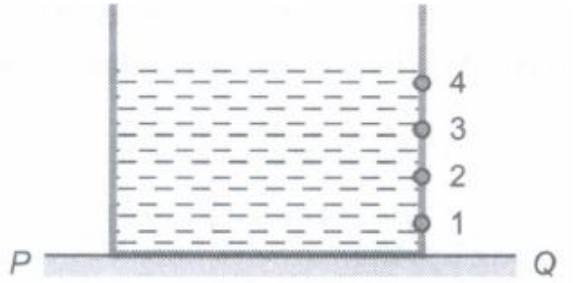
334. Paint-gun or scent sprayer depends upon:
a) Bernoulli's principle b) Boyle's law c) Faraday's law d) Archimedes' principle
e) Newton's law of motion

335. (A) The size of the needle of a syringe controls flow rate better than the thumb pressure exerted by a doctor while administering an injection.
(R) Flow rate is independent of pressure exerted by the thumb of the doctor.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

336. (A) Railway tracks are laid on small sized wooden sleepers.
(R) Small sized wooden' sleepers are used so that train exert more pressure on the railway track. Due to which train does not leave the track.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

337. Sixty four spherical rain drops of equal size are falling vertically through air with a terminal velocity 1.5 ms^{-1}. If these drops coalesce to form a big spherical drop, then terminal velocity of big drop is:
a) 8 ms^{-1} b) 16 ms^{-1} c) 24 ms^{-1} d) 32 ms^{-1}

338. A cylindrical vessel of 90 cm height is kept filled upto the brim. It has four holes 1, 2, 3, 4 which are respectively at heights of 20 cm, 30 cm, 45 cm and 50 cm from the horizontal floor PQ. The water falling at the maximum horizontal distance from the vessel comes from;



a) Hole number 4 b) Hole number 3 c) Hole number 2 d) Hole number 1

339. A Centigrade and a Fahrenheit thermometers are dipped in boiling water. The water temperature is lowered until the Fahrenheit thermometer registers a temperature of 140°C.The fall of temperature as registered by the centigrade thermometer is:
a) 80°C b) 40°C c) 50°C d) 90°C

340. A trough full of water is placed on a spring balance. If we put our hand in water touching the trough, how will the reading of balance change?
a) It will remain unchanged b) It will decrease c) It will rise
d) It is not possible to predict

341. (A) Viscosity of liquid is the property of liquid by virtue of which it opposes the relative motion amongst its different layers.
(R) Viscosity of liquid increases rapidly with the rise of temperature.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

342. Two thermometers are constructed in the same way excepted that one has a spherical bulb and the other a cylindrical bulb, which one will respond quickly to temperature changes
a) spherical bulb thermometer b) Cylindrical bulb thermometer c) both equally
d) None of the above

343. The onset of turbulance in a liquid is determined by:
a) Pascal's law b) Reynold's number c) Toricelli's law d) Bernoulli's principle

344. An inverted bell lying at the bottom of a lake 47.6 m deep has 50 cm^3 of air trapped in it. The bell is brought to the surface of the lake. The volume of the trapped air will be: (atmospheric pressure 70 cm of Hg and density of Hg = 13.6 g/cc.)
a) 350 cm^3 b) 300 cm^3 c) 25.0 cm^3 d) 22 cm^3

345. (A) A piece of cork embedded inside an ice block, floats in water. If ice melts completely, the water level remains unchanged.
(R) Ice and water have same density.
a)
If both assertion and reason are true and reason is the correct explanation of assertion.
b)
If both assertion and reason are true but reason is not the correct explanation of assertion.
c) If assertion is true but reason is false. d) If both assertion and reason are false.
e) If assertion is false but reason is true.

346. A bird of mass 1.23 kg is able to hover by imparting a downward velocity 10 m/s uniformly to air of density p kg/m^3 over an effective area 0.1 m^2. If the acceleration due to gravity is 10 m/s^2, then the magnitude of p (in $kg.m^3$) is:
a) 0.0123 b) 0.123 c) 1.23 d) 1.32

347. (A) Aeroplanes are made to run on the runway before take off, so that they acquire the necessary lift.
(R) According to Bernoulli's theorem, as velocity increases pressure decreases and vice-versa.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

348. The flow rate of water from a tap of diameter 1.25 cm is 3 L per min. The coefficient of viscosity of water is 10^{-3} Pa-s. The nature of flow is:
a) unsteady b) turbulent c) laminar d) none of these

349. The water flows from a tap of diameter 1.25 cm with a rate of 5 x 10^{-5} m^3 s^{-1}. The density and coefficient of viscosity of water are 10^3kg m^{-3} and 10^{-3} Pa, respectively. The flow of water is:
a) steady with Reynold's number 5100 b) turbulent with Reynold's number 5100
c) steady with Reynold's number 3900 d) turbulent with Reynold's number 3900

350. In a plant, a sucrose solution of coefficient of viscosity 0.0015 N-s/m^2 is driven at a velocity of 10^{-3} m/s through xylem vessels of radius 2 μm and length 5 μm. The hydrostatic pressure difference across the length of xylem vessels (in N/m^2) is:
a) 5 b) 8 c) 10 d) 15

351. (A) The viscosity of liquid increases rapidly with rise of temperature.
(R) Viscosity of a liquid is the property of the liquid by virtue of which it opposes the relative motion amongst its different layers.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

352. The rate of outflow of liquid through an orifice does not depend upon:
a) radius of the orifice b) height ofliquid column c) acceleration due to gravity
d) density of the liquid

353. A metal ball B_1 (density 3.2 g cm^{-3}) is dropped in water while another metal ball B_2 (density 6.0 g cm $^{-3}$) is dropped in a liquid of density 1.6 g em -3. If both the balls have the same diameter and attain the same terminal velocity, the ratio of viscosity of water to

that of the liquid is :
a) 2.0 b) 0.5 c) 4.0 d) indeterminate due to insufficient data

354. A cylindrical vessel of 92 cm height is kept filled upto the brim. It has four holes 1, 2, 3 and 4 which are respectively at heights of 20 cm, 30 cm, 46 cm and 80 cm from the horizontal floor. The water falling at the maximum horizontal distance from the vessel comes from:
a) hole no. 4 b) hole no. 3 c) hole no. 2 d) hole no. 1

355. Water is moving with a speed of 5.0 m/s through a pipe with cross-sectional area of 4.0 cm^2. The water gradually descends 10 m as the pipe increase in area to 8.0 cm^2. If the pressure at the upper level is 1.5 x 10^5 Pa, the pressure at lower level will be :
a) 2.8 x 10^5 Pa b) 2.6 x 10^5 Pa c) 2.4 x 10^5 Pa d) 2.1 x 10^5 Pa

356. A wooden block is floating in a water tank. The block is pressed to its bottom. During the process, work done is equal to:
a) work done against upthrust exerted by the water
b) work done against upthrust plus loss of gravitational potential energy of the block
c) work done against upthrust minus loss of gravitational potential energy of the block
d) none of the above

357. Viscosity of liquids:
a) increases with increase in temperature b) is independent of temperature
c) decreases with decrease in temperature d) decreases with increase in temperature

358. A piece of solid weighs 120 g in air, 80 g in water and 60 g in a liquid. The relative density of the solid and that of the liquid are respectively:
a) 3,2 b) 2,3/4 c) 3/2,2 d) 3,3/2

359. A rectangular film of liquid is extended from (4 cm x 2 cm) to (5 cm x 4 cm). If the work done is 3 x 10^{-4} J, the value of the surface tension of the liquid is:
a) 8.0Nm^{-1} b) 0.250Nm^{-1} c) 0.125Nm^{-1} d) 0.2Nm^{-1}

360. An empty balloon weighs 1g. The balloon is filled with water to the neck and tied with a massless thread. The weight of balloon along with water is 101 g. The balloon filled with water is weighed when fully immersed. Then, its weight in water is:
a) 1 g b) 101 g c) 201 g d) 51 g

361. A piece of ice is floating in ajar containing water. When the ice melts, the temperature of water falls from 4° C to 1°C. Then, the level of water?
a) rises b) falls c) unchanged d) none of these

362. A black body radiates energy at the rate of E W/m^2 at a high temperature T K. When the temperature is reduced to T/2K, the radiant energy will be
a) E/16 b) E/4 c) 4E d) 16E

363. A rectangular block is 5 cm x 5 cm x 10 cm in size. The block is floating in water with 5 cm side vertical. If it floats with 10 cm side vertical, what change will occur in the level of water?

a) No change b) It will rise c) It will fall

d) It may rise or fall depending on the density of the block

364. Why the dam of water reservoir is thick at the bottom?

a) Quantity of water increases with depth b) Density of water increases with depth

c) Pressure of water increases with depth

d) Temperature of water increases with depth

365. On a new scale of temperature (which is linear), a called the W scale, the freezing and boiling point of water are 39°W and 239°W respectively. What will be the temperature of 39° C celsius scale?

a) 78°W b) 117°C c) 200°C d) 139°W

366. A small sphere of mass m is dropped from a great height. After it has fallen 100 metres, it has attained its terminal velocity and continues to fall at that speed. The work done by air friction against the sphere during the first 100 metres offall is:

a) greater than the work done by air friction in the second 100 metres

b) less than the work done by air friction in the second 100 metres c) equal to 100 mg

d) greater than 100 mg

367. The cylindrical tube of a spray pump has a cross-section of 8 cm^2, one end of which has 40 fine holes each of area 10^{-8} m^2. If the liquid flows inside the tube with a speed of 0.15 m min^{-1}, the speed with which the liquid is ejected through the holes is:

a) 50 ms^{-1} b) 5 ms^{-1} c) 0.05 ms^{-1} d) 0.5 ms^{-1}

368. The total area of cross-section is 0.25 m^2. If the blood is flowing at the rate of 100 cm^3/sec, then the average velocity of flow of blood through the capillaries is:

a) 0.4 mm/sec b) 4 mm/sec c) 25 mm/sec d) 400 mm/sec

369. A large block of ice 5 m thick has a vertical hole drilled through it and is floating in the middle of a lake. The minimum length of the rope required to scoop up a bucket of water through the hole is: (density of ice = 0.9 g/cc)

a) 5.5 m b) 5 m c) 4.5 m d) 0.5 m

370. Which of the following relations is true :

a) 3Y = K (1-σ) b) $K = 9\eta Y / Y + \eta$ c) $\sigma = (6K + \eta)Y$ d) $\sigma = (0.5Y - \eta)/n$

371. A water barrel having water upto a depth d is placed on a table of height h. A small hole is made on the wall of the barrel at its bottom. If the stream of water coming out of the hole falls on the ground at a horizontal distance R from the barrel, then the value of d is:

a) $\frac{4h}{R^2}$ b) $4hR^2$ c) $\frac{R^2}{4h}$ d) $\frac{h}{4R^2}$

372. A rubber cord catapult has cross-sectional area 25 nun 2 and initial length of rubber cord is 10 cm. It is stretched to 5 cm and then released to project a missile of mass 5 gm. Taking Y_{rubber} = 5 x 108 N/m^2 velocity of projected missile is :

a) 20 m/s b) 100 m/s c) 250 m/s d) 200 m/s

373. (A) For Reynolds number R_e > 2000, the flow of fluid is turbulent.
(R) Inertial forces are dominant compared to the viscous forces at such high Reynolds number.
a)
If both assertion and reason are true and reason is the correct explanation of assertion
b)
If both assertion and reason are true but reason is not the correct explanation of assertion
c) If assertion is true but reason is false d) If both assertion and reason are false
e) If assertion is false but reason is true

374. Pressure at the bottom of a tank of water is 3P, where P is atmospheric pressure. If the water is drawn out till the level of water is lowered by one fifth, then the pressure at the bottom of the tank is:
a) 2P b) 13P/5 c) 8P/5 d) 4P/5

375. 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 come back slowly to its earlier position
b) It will remain submerged where it is left c) It will sink d) It will come out violently

376. An air bubble of 1cm radius is rising at a steady rate of 2.00 mm/sec through a liquid of density 1.5 gm per cm^3. Neglect density of air. If g is 1000 cm/sec^2, then the coefficient of viscosity of the liquid is:
a) 0.166 x 10^3 poise b) 166 x 10^3 poise c) 1.66 x 10^3 poise d) 16.6 x 10^3 poise

377. A ball whose density is 0.4 x 10^3 kg/m^3 falls into water from a height of 9 cm. To what depth does the ball sink?
a) 9 cm b) 6 cm c) 4.5 cm d) 2.25 cm

378. An inverted vessel (diving bell) lying at the bottom of a lake, 47.6 m deep, has 50 cm^3 of air trapped in it. The bell is brought to the surface of lake. The volume of the trapped air will now be: (atmospheric pressure is 70 cm of mercury, density of mercury = 13.6 $g/cm^3$and g = 980 cm/sec^2)
a) 350 cm^3 b) 300 cm^3 c) 250 cm^3 d) 200 cm^3

379. An aeroplane gets its upward lift due to a phenomenon described by the:
a) Archimedes' principle b) Bernoulli's principle c) Buoyancy principle
d) Pascal's law

380. A ball of mass m and radius r is released in viscous liquid. The value of its terminal velocity is proportional to:
a) l/r only b) m/r c) $(m/r)^{1/2}$ d) m only

381. A beam of metal supported at the two ends is loaded at the centre. The depression at the centre is proportional to :
a) Y^2 b) Y c) 1/Y d) $1/Y^2$

382. The top surface of an incompressible liquid is open to the atmosphere. The pressure at a depth h below the surface is P_1. How does the pressure P_2 at depth $h_2 = 2h_1$ compare with P_1?
a) $P_2 > 2P_1$ b) $P_2 = 2P_1$ c) $P_2 < 2P_1$ d) $P_2 = P_1$

383. A manometer connected to a closed tap reads 3.5×10^5 newton/metre^2. When the valve is opened, the reading of manometer falls to 3.0×10^5 newton per metre 2, then velocity of flow of water is:
a) 100 m/s b) 10 m/s c) 1 m/s d) $10\sqrt{10}$ m/s

384. A hot body at temperature T loses heat to the surrounding temperature T_s by radiation. If the difference in temperature is small then the rate of loss of heat by the hot body is proportional to :
a) $T - T_s$ b) $(T - T_S)^2$ c) $(T - T_S)^{l/2}$ d) $(T - T_S)^4$

385. A wooden ball of density D is immersed in water of density d to a depth h below the surface of water and then released. Upto what height will the ball jump out of water?
a) $\frac{d}{D}h$ b) $(\frac{d}{D} - 1)h$ c) h d) zero

386. A body of density d_1 is counterpoised by Mg of weights of density d_2 in air of density d. Then, the true mass of the body is:
a) M b) $M(1 - \frac{d}{d_2})$ c) $M(1 - \frac{d}{d_1})$ d) $M(\frac{1 - d/d_2}{1 - d/d_1})$

387. A small drop of water falls from rest through a large height h in air; the final velocity is:
a) proportional to $\sqrt{h}$ b) proportional to h c) inversely proportional to h
d) almost independent of h

388. If two liquids of same masses but different densities p_1 and p_2 respectively are mixed, then density of mixture is given by:
a) $p = \frac{p_1 + p_2}{2}$ b) $p = \frac{p_1 + p_2}{2p_1p_2}$ c) $p = \frac{2p_1p_2}{p_1 + p_2}$ d) $p = \frac{p_1p_2}{p_1 + p_2}$