(A) ρ_L . V_g
(B) ρ_L . A.H_g
(C) ρ_L . $V_g/2$
(D) ρ_L .$V_g/3$
Answer: Option B

05. In case of unsteady fluid flow, conditions & flow pattern change with the passage of time at a position in a flow situation. Which of the following is an example of unsteady flow?
(A) Discharge of water by a centrifugal pump being run at a constant rpm
(B) Water flow in the suction and discharge pipe of a reciprocating pump
(C) Water discharge from a vertical vessel in which constant level is maintained
(D) Low velocity flow of a highly viscous liquid through a hydraulically smooth pipe
Answer: Option B

06. Stoke's equation is valid in the Reynolds number range
(A) 0.01 to 0.1
(B) 0.1 to 2
(C) 2 to 10
(D) 10 to 100
Answer: Option A

07. Which of the following is the most common pump for pumping either raw sewage or sludge?
(A) Electromagnetic pump
(B) Centrifugal pump
(C) Reciprocating pump
(D) Gear pump
Answer: Option C

08. Purpose of relief valve in a reciprocating pump is to
(A) Protect the pump against developing excessive pressure
(B) Facilitate unidirectional flow of liquid
(C) Reduce the discharge pressure
(D) Control the rate of discharge
Answer: Option A

09. In centrifugal pumps, cavitation occurs, when pressure of the impeller eye or vane becomes
(A) Less than atmospheric pressure
(B) More than liquid vapor pressure
(C) Less than liquid vapor pressure
(D) More than atmospheric pressure
Answer: Option C

10. In isotropic turbulence, the _____ are equal to each other.
(A) Temporal velocity components
(B) Mean square of velocity fluctuations in the three co-ordinate directions
(C) Root mean square of velocity fluctuations in the three co-ordinate directions
(D) None of these
Answer: Option B

11. When the water is warm, the height to which it can be lifted by a pump
(A) Decreases due to reduced viscosity
(B) Decreases due to reduced vapour pressure
(C) Increases due to increased vapour pressure
(D) Decreases due to increased frictional resistance
Answer: Option B

12. What is the maximum theoretical suction lift (metres) of a reciprocating pump?
(A) 5
(B) 10
(C) 50
(D) 100
Answer: Option B

13. Pressure drop in a fluidised bed reactor is _____ that in a similar packed bed reactor.
(A) Less than

(B) Greater than
(C) Same as
(D) None of these
Answer: Option B

14. Which of the following facilitates close control of flow of fluids?
(A) Gate valve
(B) Globe valve
(C) Butterfly valve
(D) Check valve
Answer: Option B

15. In which of the following body shapes, the pressure drag is large compared to the friction drag?
(A) Stream line body
(B) Two dimensional body
(C) Bluff body
(D) None of these
Answer: Option C

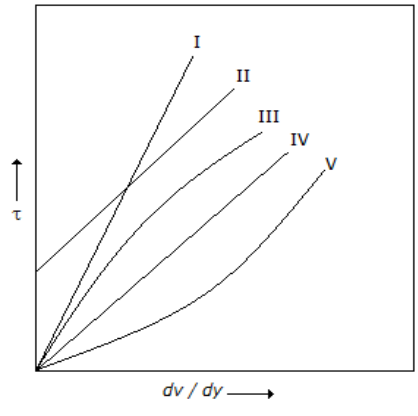
16. Lower BWG means _____ of the tube.
(A) Lower thickness
(B) Lower cross-section
(C) Outer diameter
(D) Inner diameter
Answer: Option B

17. Pick out the wrong statement.
(A) A fluid mass is free from shearing forces, when it is made to rotate with a uniform velocity
(B) Newton's law of viscosity is not applicable to the turbulent flow of fluid with linear velocity distribution
(C) Laminar flow of viscous liquids is involved in the lubrication of various types of bearings
(D) Rise of water in capillary tubes reduces with the increasing diameter of capillary tubes
Answer: Option B

18. Pressure drop (Δp) for a fluid flowing in turbulent flow through a pipe is a function of velocity (V) as
(A) $V^{1.8}$
(B) $V^{-0.2}$
(C) $V^{2.7}$
(D) V^{2}
Answer: Option D

19. Which of the following is a Newtonian fluid?
(A) Rubber latex
(B) Sewage sludge
(C) Quicksand
(D) Non-colloidal solution
Answer: Option D

20. During fluid flow, variation of shear stress (τ) with velocity gradient a (dv/dy) constant pressure temperature is shown below in the figure. In the figure, Bingham plastic is represented by the curve:



(A) V
(B) II
(C) III
(D) I
Answer: Option B

21. Centrifugal pumps as compared to reciprocating pumps
(A) Run at a lower speed for the same discharge
(B) Do not need priming
(C) Deliver fluid with pulsating/fluctuating discharge
(D) Can be run with discharge line valve closed for a short interval
Answer: Option D

22. In magnetic flow meters, voltage generation is
(A) Due to the motion of conducting fluid through an externally generated uniform field
(B) Proportional to the fluid velocity
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

23. Transition length for a turbulent fluid entering into a pipe is around _____ times the pipe diameter.
(A) 5
(B) 50
(C) 500
(D) 5000
Answer: Option B

24. The pressure co-efficient is the ratio of pressure forces to _____ forces.
(A) Viscous
(B) Inertial
(C) Gravity
(D) Surface tension
Answer: Option A

25. The boundary layer thickness at a given section along a flat plate _____ with increasing Reynold's number.
(A) Increases
(B) Decreases
(C) Remain same
(D) May increase or decrease
Answer: Option B

26. Prandtl mixing length is
(A) Applicable to laminar flow problems
(B) A universal constant
(C) Zero at the pipe wall
(D) None of these
Answer: Option C

27. Drag co-efficient for flow past immersed body is the ratio of _____ to the product of velocity head and density.
(A) Shear stress
(B) Shear force
(C) Average drag per unit projected area
(D) None of these
Answer: Option C

28. Viscosity of water at 40°C lies in the range of
(A) 1×10^{-3} to 2×10^{-3} kg/m.s
(B) 0.5×10^{-3} to 1×10^{-3} kg/m.s
(C) 1 to 2 kg/m.s
(D) 0.5 to 1 kg/m.s
Answer: Option B

29. In continuous fluidisation

(A) Solids are completely entrained
(B) The pressure drop is less than that for batch fluidisation
(C) There is no entrainment of solids
(D) Velocity of the fluid is very small
Answer: Option A

30. Potential flow is characterised by the

(A) Irrotational and frictionless flow
(B) Irrotational and frictional flow
(C) One in which dissipation of mechanical energy into heat occurs
(D) Formation of eddies within the stream
Answer: Option A

31. In a free vortex, the

(A) Velocity changes linearly with radial distance
(B) Flow is necessarily rotational
(C) Radial component of velocity is same everywhere
(D) Stream lines are not circular
Answer: Option A

32. Applicability of Bernoulli's equation is limited to a/an _____ fluid, that does not exchange shaft work with the surroundings.

(A) Incompressible
(B) Non-viscous
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

33. The location of centre of pressure, which defines the point of application of the total pressure force on the surface, can be calculated by applying the principle of moments according to which "sum of the moment of the resultant force about an axis is equal to the sum of the components about the same axis". The centre of pressure of a rectangular surface (of width 'w') immersed vertically in a static mass of fluid is at a depth of (where, y = depth of the liquid)

(A) $1/(y/3)$
(B) $2y/3$
(C) $1/(y/4)$
(D) $3y/4$
Answer: Option B

34. The equation relating friction factor to Reynold number, $f^{-0.5} = 4 \log_e (N_{Re}/\sqrt{f})^{-0.4}$, is called the _____ equation.

(A) Nikuradse
(B) Von-Karman
(C) Blasius
(D) Colebrook
Answer: Option A

35. Fluid flow through a packed bed is represented by the _____ equation.

(A) Fanning's
(B) Ergun's
(C) Hagen-Poiseuille's
(D) None of these
Answer: Option B

36. Which of the following relationship is valid for the equilibrium position of the float in a Rotameter? (Where, D_f= Drag force on the float B_f = Buoyant force on the float W_f = Weight of the float).

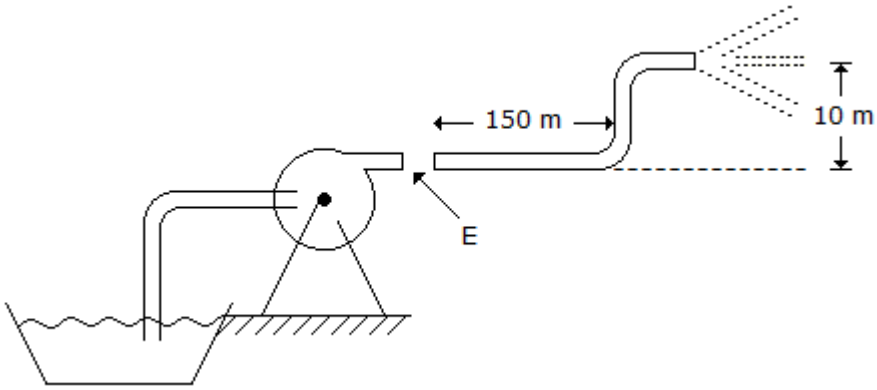
(A) $D_f + B_f = W_f$
(B) $D_f = B_f + W_f$
(C) $D_f + B_f + W_f = 0$
(D) None of these
Answer: Option A

37. Air vessel of a reciprocating pump is initially filled with

(A) Atmospheric air
(B) Compressed air
(C) Water
(D) None of these
Answer: Option B

38. Fluid resistance to shear depends upon its
(A) Rate of transfer of molecular momentum
(B) Cohesion
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

39. A centrifugal pump is used to pump water through a horizontal distance of 150 m, and then raised to an overhead tank 10 m above. The pipe is smooth with an I.D of 50 mm. What head (m of water) must the pump generate at its exit (E) to deliver water at a flow rate of 0.001 m^3/s? The Fanning friction factor, *f* is 0.0062.



(A) 10 m
(B) 11 m
(C) 11.8 m
(D) 30 m
Answer: Option B

40. Forces acting on a particle settling in fluid are _____ forces.
(A) Gravitational & buoyant
(B) Centrifugal & drag
(C) Gravitational or centrifugal buoyant drag
(D) External, drag & viscous
Answer: Option C

41. Fanning friction factor equation applies to the _____ fluid flow.
(A) Non-isothermal condition of
(B) Compressible
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option D

42. The ratio of the depth of flow to the diameter of the channel for maximum discharge in a circular channel in open channel flow is
(A) 0.1
(B) 0.55
(C) 0.95
(D) 1.85
Answer: Option C

43. A pressure of 10 m head of water is equivalent to _____ kN/m^2.
(A) 98
(B) 147
(C) 196
(D) 49
Answer: Option A

44. In case of turbulent flow of fluid through a circular pipe, the

(A) Mean flow velocity is about 0.5 times the maximum velocity
(B) Velocity profile becomes flatter and flatter with increasing Reynolds number
(C) Point of maximum instability exists at a distance of 2r/3 from the pipe wall (r = pipe radius)
(D) Skin friction drag, shear stresses, random orientation of fluid particles and slope of velocity profile at the wall are more
Answer: Option D

45. The maximum discharge through a circular channel takes place, when the depth of the fluid flow is _____ times the pipe diameter.
(A) 0.25
(B) 0.5
(C) 0.66
(D) 0.95
Answer: Option D

46. The ratio of pressure forces to inertial forces is called the _____ number.
(A) Froude
(B) Euler
(C) Reynold
(D) Mach
Answer: Option B

47. Air vessel fitted to a reciprocating pump
(A) Increases the work done
(B) Decreases the work done
(C) Causes cavitation
(D) Results in non-uniform discharge
Answer: Option B

48. Pick out the Kozeny-Carman equation (valid for low N_{Re}) for fluid flow through a packed bed of solids.
(A) $\Delta p/\rho = 4f\,(L/D)\,(V^2/2g_c)$
(B) $f_P = (150\,(1 - \varepsilon)/N_{Re}) + 1.75$
(C) $(-\Delta p.\, g_c.\, D_P{}^2.\varepsilon^3)/(L.\, \bar{V}_0.\, \mu\,(1 - \varepsilon)^2) = 150$
(D) $(-\Delta p/\delta.L)\,(gc/\bar{V}_0^2)\,(D_P.\varepsilon^3/(1 - \varepsilon)) = 1.75$
Answer: Option C

49. Pressure drop in packed bed for turbulent flow is given by the _____ equation.
(A) Kozeny-Carman
(B) Blake-Plummer
(C) Leva's
(D) Hagen-Poiseuille's
Answer: Option B

50. A pump operating under specific conditions delivers insufficient quantity of liquid. This may be set right by
(A) Decreasing the size of the inlet pipe
(B) Increasing the size of the inlet pipe
(C) Lowering the pump position
(D) Both (B) and (C)
Answer: Option D

51. The _____ pressure is measured by a static tube.
(A) Dynamic
(B) Static
(C) Total
(D) None of these
Answer: Option B

52. A hydraulic accumulator comprises of
(A) A storage device and a control valve
(B) A cylinder and a plunger
(C) Two pistons and two cylinders
(D) A storage tank and a ram pump
Answer: Option B

53. Pascal law is not applicable for a/an _____ fluid.

(A) Accelerating frictionless
(B) Static
(C) Uniformly moving
(D) None of these
Answer: Option D

54. Fanning friction factor for laminar flow of fluid in a circular pipe is

(A) Not a function of the roughness of pipe wall
(B) Inversely proportional to Reynolds number
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

55. _____ pump is the most suitable device for discharging a liquid against a pressure of ≥ 1500 kgf/cm^2.

(A) Centrifugal
(B) Piston
(C) Plunger
(D) Vane
Answer: Option C

56. In laminar flow through a round tube, the discharge varies

(A) Linearly as the viscosity
(B) Inversely as the pressure drop
(C) Inversely as the viscosity
(D) As the square of the radius
Answer: Option C

57. In a/an _____, the flow rate of fluids is obtained by measuring the difference between the impact and the static pressure.

(A) Rotameter
(B) Pitot tube
(C) Venturimeter
(D) Flow nozzle
Answer: Option B

58. The ratio of inertial forces to viscous forces is called the _____ number.

(A) Weber
(B) Mach
(C) Froude
(D) Reynold
Answer: Option D

59. The fluid velocity varies as the square root of the cylindrical pipe diameter in case of steady state laminar flow at constant pressure drop of _____ fluid.

(A) Dilatent
(B) Pseudo-plastic
(C) Bingham plastic
(D) Newtonian
Answer: Option A

60. Which of the following can be used to create a flow of gas, where no significant compression is required?

(A) Reciprocating compressor
(B) Blower
(C) Axial flow compressor
(D) Centrifugal compressor
Answer: Option B

61. Bernoulli's equation is not applicable, when the flow is

(A) Irrotational
(B) Incompressible
(C) Viscous

(D) All (A), (B) & (C)
Answer: Option D

62. In case of a pipe exit fitted with a nozzle, the
(A) Conversion of kinetic head to pressure head is facilitated
(B) Conversion of pressure head to kinetic head is facilitated
(C) Power transmitted through the nozzle is maximum, when the head lost due to friction in the pipe is equal to one third of the total supply head
(D) Both (B) and (C)
Answer: Option D

63. Horsepower increase of a centrifugal gas compressor without altering the volumetric flow rate will _____ the gas discharge pressure.
(A) Increase
(B) Decrease
(C) Not change
(D) Exponentially decrease
Answer: Option A

64. With increase in molecular weight of the gas, the head developed by a centrifugal compressor will
(A) Decrease
(B) Increase
(C) Remain same
(D) Unpredictable
Answer: Option A

65. Newton's law of viscosity relates the
(A) Shear stress and velocity
(B) Velocity gradient and pressure intensity
(C) Shear stress and rate of angular deformation in a fluid
(D) Pressure gradient and rate of angular deformation
Answer: Option C

66. Pick out the wrong statement.
(A) The eddy viscosity is a function of the type of turbulence involved
(B) The eddy viscosity is a fluid property
(C) The viscosity of gas increases with increase in temperature
(D) The viscosity of a liquid increases with decrease in temperature
Answer: Option B

67. Which is the most efficient and best for measuring very small flow rate of gases?
(A) Venturimeter
(B) Orificemeter
(C) Rotameter
(D) Flow nozzle
Answer: Option C

68. One poise (unit of absolute/dynamic viscosity) is equivalent to one
(A) gm/cm^2. sec
(B) gm/cm. sec
(C) cm^2/sec
(D) m^2/sec
Answer: Option B

69. For laminar flow of a fluid through a packed bed of spheres of diameter d, the pressure drop per unit length of bed depends upon the sphere diameter as
(A) d
(B) d^2
(C) d^4
(D) $\frac{1}{d^2}$
Answer: Option D

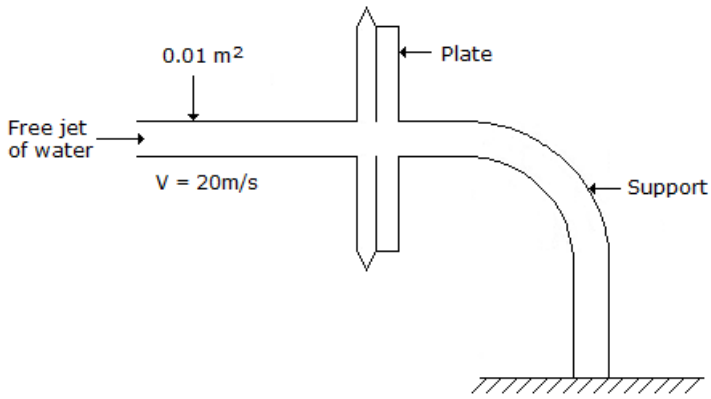
70. Drag is defined as the force exerted by the
(A) Fluid on the solid in a direction opposite to flow

(B) Fluid on the solid in the direction of flow
(C) Solid on the fluid
(D) None of these
Answer: Option B

71. For laminar flow of Newtonian fluid in a circular pipe, the velocity distribution is a function of the distance 'd' measured from the centre line of the pipe, and it follows a _____ relationship.
(A) Logarithmic
(B) Parabolic
(C) Hyperbolic
(D) Linear
Answer: Option B

72. Power required by a centrifugal pump is proportional to (where, D = diameter, N = r.p.m)
(A) N^2D^3
(B) ND^2
(C) N^2D
(D) N^3D^5
Answer: Option D

73. A free jet of water of cross-sectional area 0.01m^2 and a velocity of 20 m/s strikes a plate and then flows in a plane parallel to the plate as shown in the figure below. The horizontal component of the force on the support is



(A) 200 N
(B) 400 N
(C) 2000 N
(D) 4000 N
Answer: Option D

74. Pick out the wrong statement.
(A) Surface tension of a liquid is because of the difference in magnitude of adhesive & cohesive forces
(B) A hydrometer used for the determination of specific gravities of liquids works on the principle of buoyant forces
(C) In case of unsteady fluid flow, the velocity at any given point does not change with time
(D) Turbulent fluid flow is characterised by the rapid fluctuation of instantaneous pressure & velocity at a point
Answer: Option C

75. A relief valve
(A) Provides back pressure for a cylinder
(B) Unloads a pump
(C) Is a directional control valve
(D) None of these
Answer: Option C

76. What is the shear rate at the pipe wall, in case of laminar flow of Newtonian fluids in a pipe of diameter 'D' & length 'L' incurring a pressure drop 'Δp' with average velocity 'V_{avg}'?
(A) $D\ \Delta p/8L$
(B) $D\ \Delta p/4L$
(C) $8\ V_{avg}/D$

(D) 4 V_{avg}/D
Answer: Option C

77. Function of air vessel provided in a reciprocating pump is to
(A) Reduce discharge fluctuation
(B) Reduce the danger of cavitation
(C) Avoid the necessity of priming
(D) Increase the pump efficiency
Answer: Option A

78. Low specific speed of a pump implies that, it is a/an _____ pump.
(A) Axial flow
(B) Centrifugal
(C) Mixed flow
(D) None of these
Answer: Option B

79. For turbulent flow of Newtonian fluid in a circular cross-section pipe, the ratio of maximum to average fluid velocity is
(A) 0.5
(B) 1
(C) 0.66
(D) < 0.5
Answer: Option B

80. Actual lift of a pump is always less than the theoretical lift and is limited by the
(A) Specific gravity & temperature of the liquid
(B) Leakage & pressure decreasing at higher elevations
(C) Frictional resistance through pipes, fittings & passages
(D) All (A), (B) and (C)
Answer: Option D

81. In Newton's law range, the drag co-efficient for the motion of spherical particle in a stationary fluid is
(A) 0.44
(B) 0.044
(C) 4.4
(D) 44
Answer: Option A

82. Mach number is the ratio of the speed of the
(A) Fluid to that of the light
(B) Light to that of the fluid
(C) Fluid to that of the sound
(D) Sound to that of the fluid
Answer: Option C

83. In parallel pipe problems, the
(A) Head loss is the same through each pipe
(B) Discharge is the same through all the pipes
(C) Total head loss is equal to the sum of the head losses through each pipe
(D) None of these
Answer: Option A

84. What type of motion the fluid element undergoes, when it changes from one position to another position, such that the angle between the two sides changes?
(A) Rotation
(B) Translation
(C) Linear deformation
(D) Angular deformation
Answer: Option D

85. A tube is specified by its
(A) Thickness only
(B) Outer diameter only

(C) Thickness & outer diameter both
(D) Inner diameter
Answer: Option C

86. In a fluidised bed reactor
(A) Temperature gradients are very high
(B) Temperature is more or less uniform
(C) Hot spots are formed
(D) Segregation of the solids occurs
Answer: Option B

87. Poise is converted into stoke by
(A) Multiplying with density (gm/c.c)
(B) Dividing by density (gm/c.c)
(C) Multiplying with specific gravity
(D) Dividing by specific gravity
Answer: Option B

88. For a fluid rotating at constant angular velocity about vertical axis as a rigid body, the pressure intensity varies as the
(A) Square of the radial distance
(B) Radial distance linearly
(C) Inverse of the radial distance
(D) Elevation along vertical direction
Answer: Option A

89. Slurries can be most conveniently pumped by a _____ pump.
(A) Screw
(B) Reciprocating
(C) Gear
(D) Centrifugal
Answer: Option D

90. For a given fluid flow rate, which of the following incurs maximum head loss?
(A) Orificemeter
(B) Venturimeter
(C) Flow nozzle
(D) All of them incur the same head loss
Answer: Option A

91. Pick out the Blake-Plummer equation (valid for large N_{Re}) for fluid flow through beds of solids.
(A) $\Delta p/\rho = 4f\,(L/D)\,(V^2/2g_c)$
(B) $f_P = [150\,(1 - \varepsilon)/N_{Re}] + 1.75$
(C) $(-\Delta p.\, g_c.\, D_P{}^2.\varepsilon^3)/(L.\, \bar{V}_0.\, \mu\,(1 - \varepsilon)^2) = 150$
(D) $(-\Delta p/\delta.L)\,(g_c/\bar{V}_0{}^2)\,(D_P.\varepsilon^3/(1 - \varepsilon)) = 1.75$
Answer: Option D

92. I.D. of 1/4" schedule 40 pipe is 0.364". I.D. of a 1/2" schedule 40 pipe would be _____ inch
(A) 4.728
(B) 0.5
(C) 0.622
(D) 0.474
Answer: Option C

93. Which of the following is most prone to pulsating discharge flow?
(A) Centrifugal pump
(B) Reciprocating pump
(C) Gear pump
(D) Axial flow pump
Answer: Option C

94. With the increase in depth, the hydrostatic pressure in an un-accelerated incompressible fluid (in a constant gravitational field)

(A) Decreases
(B) Increases linearly
(C) Increases exponentially
(D) Remain constant
Answer: Option B

95. A centrifugal pump has the following specifications:
Power = 4 H.P.; Speed = 800 rpm
Head = 8 metres
Flow = 1000 litres/minutes.
If its speed is halved, the new discharge will be _____ litres/minute.
(A) 500
(B) 200
(C) 1000
(D) 750
Answer: Option A

96. Pressure drop for turbulent fluid flow through a circular pipe is given by
(A) $64/R_e$
(B) $32\mu LV/g_c.D^2$
(C) $4f\,(L/D)\,(v^2/2g_c).\,\rho$
(D) $f\,(L/D)\,(v^2/2g_c).\,\rho$
Answer: Option C

97. Discharge in laminar flow through a pipe varies
(A) As the square of the radius
(B) Inversely as the pressure drop
(C) Inversely as the viscosity
(D) As the square of the diameter
Answer: Option A

98. An isentropic process is the one, in which
(A) pv = constant
(B) pv^r = constant
(C) pv^r = constant, and process is reversible
(D) None of these
Answer: Option C

99. Self-priming centrifugal pump can be used for
(A) Booster service
(B) Pumping liquid fertilisers (e.g. liquid NH_3)
(C) Pumping industrial wastes
(D) All (A), (B) and (C)
Answer: Option D

100. A Pitot tube indicates 5 cm of water (manometer) when it is being used for measuring velocity of air. The velocity of air in m/sec is
(A) 5
(B) 14.1
(C) 56.22
(D) 28.2
Answer: Option D

101. In deriving Bernoulli's equation, fluid is assumed to be
(A) Incompressible, frictionless, steady, along a streamline
(B) Uniform, steady, incompressible, along a streamline
(C) Steady, density being pressure dependent, frictionless
(D) None of these
Answer: Option A

102. The speed of a sound wave in a gas is analogous to the speed of
(A) An elementary wave in an open channel
(B) Flow in an open channel
(C) A disturbance travelling upstream in moving fluid
(D) None of these

Answer: Option A

103. Equivalent length of a pipe fitting is

(A) Dependent on Reynolds number
(B) Independent of Reynolds number
(C) Dependent on the length of the pipe
(D) None of these
Answer: Option A

104. Which of the following is used for very accurate measurement of flow of gas at low velocity?

(A) Pitot tube
(B) Rotameter
(C) Segmental orificemeter
(D) Hot wire anemometer
Answer: Option D

105. The Kozeny-Carman equation, rewritten in terms of non-dimensional numbers gives ($\Delta P/pu^2$) proportional to

(A) $(L/D_p)/R_e$
(B) $R_e/(D_p/L)$
(C) $(L/D_p)/R_e^2$
(D) $R_e^2/(D_p/L)$
Answer: Option A

106. Which law/principle of solid mechanics is similar/equivalent to Newton's law of viscosity in fluid mechanics?

(A) Archimedes principle
(B) Newton's second law of motion
(C) Hooke's law
(D) Newton's third law of motion
Answer: Option C

107. Reynolds number for flow of water at room temperature through 2 cm dia pipe at an average velocity of 5 cm/sec is around

(A) 2000
(B) 10
(C) 100
(D) 1000
Answer: Option D

108. Pick out the correct statement pertaining to transition/ entrance length in fluid flow.

(A) The length of entrance region of pipe, in which full development of fluid flow takes place such that velocity profile does not change downstream, is called the transition length
(B) Transition length for laminar flow of Newtonian fluids in a pipe of diameter 'd' is equal to 0.05. $D.N_{Re}$
(C) Transition length for turbulent flow of Newtonian fluids in a smooth pipe of diameter 'd' is equal to 50 D
(D) All (A), (B) and (C)
Answer: Option D

109. In the complete turbulence zone (in rough pipes), the

(A) Rough and smooth pipes have the same friction factor
(B) Laminar film covers the roughness projections
(C) Friction factor depends upon NR_e only
(D) Friction factor is independent of the relative roughness
Answer: Option D

110. In a dry packed bed, the pressure drop will be changed by increasing the flow rate as

(A) $V^{1.8}$
(B) $V^{-0.8}$
(C) V
(D) V^{-1}
Answer: Option A

111. What is the value of Fanning friction factor f ' for smooth pipe at $N_{Re} = 10^6$ approximately?

(A) 0.003
(B) 0.01
(C) 0.1
(D) 0.3
Answer: Option A

112. Toothpaste is a

(A) Bingham plastic
(B) Pseudo-plastic
(C) Newtonian liquid
(D) Dilatent
Answer: Option D

113. For turbulent flow of an incompressible fluid through a pipe, the flow rate '*Q*' is proportional to (ΔP)*n*, where ΔP is the pressure drop. The value of exponent '*n*' is

(A) 1
(B) 0
(C) < 1
(D) > 1
Answer: Option C

114. Drag force on the float of a Rotameter is (where *Q* = flow rate of the)

(A) $\propto Q$
(B) $\propto \sqrt{Q}$
(C) $\propto Q^2$
(D) Constant
Answer: Option D

115. A piezometer provided in the pipe measures

(A) Friction factor
(B) Static pressure
(C) Dynamic pressure
(D) None of these
Answer: Option B

116. The boundary layer is that part of a moving fluid, in which the fluid velocity is

(A) Affected by the fluid flow pressure
(B) Constant
(C) Affected by the presence of a solid boundary
(D) All (A), (B) and (C)
Answer: Option C

117. Which of the following equations is valid for laminar flow of a fluid through packed bed?

(A) Fanning equation
(B) Kozeny - Karman equation
(C) Hagen-Poiseuille equation
(D) Blake-Plummer equation
Answer: Option B

118. The Prandtl mixing length is

(A) Zero at the pipe wall and is a universal constant
(B) Independent of radial distance from the pipe axis
(C) Independent of the shear stress
(D) Useful for computing laminar flow problems
Answer: Option D

119. As per Newton's law of viscosity, the shear stress for a given rate of angular deformation of fluid is proportional to (where, μ = fluid viscosity)

(A) $1/\mu$
(B) μ
(C) μ^2
(D) $1/\mu^2$
Answer: Option B

120. The ratio of actual discharge to theoretical discharge through an orifice is equal to

(A) C_c . C_v
(B) C_c . C_d
(C) C_v . C_d
(D) C_d/C_v
Answer: Option A

121. The distribution of shear stress in a stream of fluid in a circular tube is

(A) Linear with radius for turbulent flow only
(B) Linear with radius for laminar flow only
(C) Linear with radius for both laminar & turbulent flow
(D) Parabolic with radius for both laminar & turbulent flow
Answer: Option C

122. Foot valves are provided in the suction line of a centrifugal pump to

(A) Avoid priming, every time we start the pump
(B) Remove the contaminant present in the liquid
(C) Minimise the fluctuation in discharge
(D) Control the liquid discharge
Answer: Option A

123. Which of the following is dimensionless?

(A) Angular velocity
(B) Fanning friction factor
(C) Specific volume
(D) None of these
Answer: Option B

124. What is the ratio of displacement thickness to nominal thickness for a linear distribution of velocity in the boundary layer on a flat plate?

(A) 0.5
(B) 1
(C) 1.5
(D) 2
Answer: Option A

125. A floating/submerged body is always stable, if its centre of gravity

(A) Lies above its centre of buoyancy
(B) And centre of buoyancy coincide
(C) Lies below its centre of buoyancy
(D) Lies above its metacentre
Answer: Option C

126. In case of end to end connection of two or more pipes in series, the _____ each pipe.

(A) Same rate of flow passes through
(B) Head loss is same through
(C) Rate of flow in each pipe is proportional to the length of
(D) Total flow rate is the sum of flow rate in
Answer: Option A

127. Boundary layer separation is caused by the

(A) Reduction of pressure below vapour pressure
(B) Reduction of pressure gradient to zero
(C) Adverse pressure gradient
(D) Reduction of boundary layer thickness to zero
Answer: Option C

128. The energy loss over a length of pipeline according to Darcy-Weisbach equation for pipe flow is _____ the mean velocity of flow.

(A) Directly proportional to
(B) Directly proportional to square of
(C) Inversely proportional to
(D) Inversely proportional to square of
Answer: Option B

129. Which of the following conditions must be satisfied for lift force to be developed?

(A) The body should be bluff body
(B) The body should be stream lined
(C) Circulation around the body is essentially required
(D) The main stream velocity must approach the velocity of sound in that fluid medium
Answer: Option C

130. Existence of boundary layer in fluid flow is because of the

(A) Surface tension
(B) Fluid density
(C) Fluid viscosity
(D) Gravity forces
Answer: Option C

131. Correction for capillary effect in manometers (used for pressure measurement) need not be applied, if diameter of the manometer tube is _____ mm.

(A) < 4
(B) > 4
(C) > 12.5
(D) < 10
Answer: Option C

132. Pick out the correct statement pertaining to Venturimeter.

(A) A Venturimeter with a fixed pressure drop discharges more, when the flow is vertically downward, than when the flow is vertically upward
(B) The co-efficient of contraction of a Venturimeter is always unity
(C) For a fixed pressure drop, the discharge of a gas through a Venturimeter is greater, when compressibility is taken into account, than when it is neglected
(D) None of these
Answer: Option D

133. Diaphragm valves are used for handling _____ fluids.

(A) Corrosive
(B) Viscous
(C) Non-Newtonian
(D) Solid suspended
Answer: Option A

134. The continuity equation of fluid mechanics utilises the principle of conservation of

(A) Momentum
(B) Mass
(C) Energy
(D) Both (B) & (C)
Answer: Option B

135. Vane anemometer

(A) Is an area meter
(B) Is a variable head meter
(C) Rotates an element at a speed determined by the velocity of the fluid in which the meter is immersed
(D) None of these
Answer: Option C

136. The head loss due to sudden contraction is proportional to

(A) Velocity
(B) Velocity head
(C) Turbulence
(D) None of these
Answer: Option B

137. The fluid velocity varies as the square of the cylindrical pipe diameter, in case of steady state laminar flow at constant pressure drop, for _____ fluid.

(A) Newtonian
(B) Dilatant
(C) Pseudo-plastic

(D) Non-Newtonian
Answer: Option A

138. Critical velocity in a pipe flow
(A) Increases as fluid viscosity increases
(B) Increases as pipe diameter increases
(C) Independent of fluid density
(D) None of these
Answer: Option B

139. The time of oscillation of a floating body is
(A) Longer, if Metacentric height is increased
(B) Independent of the Metacentric height
(C) Dependent on the buoyant forces only
(D) None of these
Answer: Option D

140. Consider two pipes of same length and diameter through which water is passed at the same velocity. The friction factor for rough pipe is f_1 and that for smooth pipe is f_2. Pick out the correct statement.
(A) $f_1 = f_2$
(B) $f_1 < f_2$
(C) $f_1 > f_2$
(D) Data not sufficient to relate f_1 & f_2
Answer: Option C

141. For turbulent fluid flow in pipe, the expression for Prandtl one seventh power law is (where, r = pipe radius, x = distance).
(A) $V/V_{max} = (x/r)^{1/7}$
(B) $V/V_{max} = (r/x)^{1/7}$
(C) $V/V_{max} = (x.r)^{1/7}$
(D) None of these
Answer: Option A

142. Choose the set of pressure intensities that are equivalent.
(A) 4.33 psi, 10 ft. of water, 8.83 inches of Hg
(B) 4.33 psi, 10 ft. of water, 20.7 inches of Hg
(C) 10 psi, 19.7 ft. of water, 23.3 inches of Hg
(D) 10 psi, 19.7 ft. of water, 5.3 inches of Hg
Answer: Option A

143. The Reynolds number for an ideal fluid flow is
(A) 4
(B) 2100-4000
(C) 4000
(D) ∞
Answer: Option D

144. Velocity head on sudden enlargement in a horizontal pipe is converted into _____ head.
(A) Elevation
(B) Pressure
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option B

145. A centrifugal pump has the following specifications:
Power = 4 H.P.; Speed = 800 rpm
Head = 8 metres
Flow = 1000 litres/minutes.
If its speed is halved, then the new head will be _____ metres.
(A) 2
(B) 4
(C) 8
(D) 5.5

Answer: Option A

146. Transition length for turbulent flow in smooth pipe is equal to _____ times the pipe diameter.

(A) 0.5
(B) 5
(C) 50
(D) 500
Answer: Option C

147. Enamels and paints are generally _____ fluid.

(A) Rheopectic
(B) Pseudo-plastic
(C) Thixotropic
(D) Dilatant
Answer: Option B

148. Stoke's law is valid, when the particle Reynolds number is

(A) < 1
(B) > 1
(C) < 5
(D) None of these
Answer: Option A

149. The distance between metacentre and _____ is called metacentric height.

(A) Water surface
(B) Centre of gravity
(C) Centre of buoyancy
(D) None of these
Answer: Option B

150. If two capillary tubes of dia 0.5 mm and 1 mm are dipped in a pot containing mercury, then the rise of mercury is

(A) Same in both the tubes
(B) Greater in 1 mm dia tube
(C) Greater in 0.5 mm dia tube
(D) Zero in both the tubes
Answer: Option C

151. _____ is an example of axial flow impeller.

(A) Paddle
(B) Turbine
(C) Propeller
(D) All (A), (B) and (C)
Answer: Option C

152. The blades of a centrifugal impeller are said to be curved forward, if the _____ of the motion of impeller blades.

(A) Inlet tip of a blade curves in a direction opposite to that
(B) Outlet tip of a blade curves in a direction opposite to that
(C) Inlet tip of a blade is towards the direction
(D) Outlet tip of a blade is towards the direction
Answer: Option D

153. An ideal fluid is

(A) Frictionless & incompressible
(B) One, which obeys Newton's law of viscosity
(C) Highly viscous
(D) None of these
Answer: Option A

154. A liquid is pumped at the rate of 600 litres using 1000 rpm. If the rpm is changed to 1100, the liquid pumped is _____ litres.

(A) 600
(B) 660

(C) 1.1
(D) 60
Answer: Option B

155. Plunger pumps are used for
(A) Higher pressure
(B) Slurries
(C) Viscous mass
(D) None of these
Answer: Option A

156. A weir is used to measure the large water discharge rate from a river or from an open channel. A weir is not of _____ shape.
(A) Circular
(B) Rectangular
(C) Triangular
(D) Trapezoidal
Answer: Option A

157. The maximum delivery pressure of a reciprocating compressor may be about _____ kg/cm^2.
(A) 1000
(B) 2000
(C) 3000
(D) 4000
Answer: Option D

158. Centrifugal pump can't be used to pump
(A) Molten sodium (used as a coolant in Fast Breeder Reactor)
(B) Moderately viscous vegetable oil used in soap industry
(C) Thick molten soap at 80°C
(D) None of the above
Answer: Option C

159. Identification of pipelines carrying different liquids and gases is done by the _____ of the pipe.
(A) Diameter
(B) Colour
(C) Altitude
(D) None of these
Answer: Option B

160. _____ flow means the flow of incompressible fluid with no shear.
(A) Potential
(B) Streamline
(C) Creep
(D) Boundary layer
Answer: Option A

161. Which of the following is not a dimension-less parameter?
(A) Pressure-co-efficient
(B) Froude number
(C) Kinematic viscosity
(D) Weber number
Answer: Option C

162. Boundary layer thickness in laminar flow over a flat plate increases as(where, d = distance from the leading edge.)
(A) $\sqrt{d}$
(B) $d^{1/3}$
(C) d^2
(D) $d^{2/3}$
Answer: Option A

163. Purpose of air lift pump is to

(A) Compress air
(B) Lift compressed air
(C) Lift water from a well by using compressed air
(D) Lift air under negative pressure
Answer: Option C

164. Normal depth in open channel flow is the depth of flow in the channel
(A) Corresponding to uniform flow
(B) Measured normal to the channel bed
(C) Corresponding to steady flow
(D) None of these
Answer: Option A

165. Pressure co-efficient is the ratio of pressure forces to _____ forces.
(A) Gravity
(B) Inertial
(C) Viscous
(D) None of these
Answer: Option B

166. Ratio of inertial forces to surface tension forces is called the _____ number.
(A) Euler
(B) Froude
(C) Mach
(D) Weber
Answer: Option D

167. Select the correct practical example of steady non-uniform flow.
(A) Motion of water around a ship in a lake
(B) Motion of river around bridge piers
(C) Steadily decreasing flow through a reducing section
(D) Steadily increasing flow through a pipe
Answer: Option C

168. Two piping system are said to be equivalent, when the _____ are same.
(A) Fluid flow rate & friction loss
(B) Length & friction factor
(C) Diameter & friction factor
(D) Length & diameter
Answer: Option A

169. A centrifugal pump used to pump water is used to pump an oil with specific gravity of 0.8 at the same rate. The power consumption will now
(A) Increase
(B) Decrease
(C) Remain same
(D) Data insufficient to predict
Answer: Option B

170. In which of the following cases, it is possible for flow to occur from low pressure to high pressure?
(A) Flow of liquid upward in a vertical pipe
(B) Flow through a converging section
(C) Flow of air downward in a pipe
(D) Impossible in a constant cross-section conduit
Answer: Option B

171. Which of the following must be followed by the flow of a fluid (real or ideal)?
(I) Newton's law of viscosity.
(II) Newton's second law of motion.
(III) The continuity equation.
(IV) Velocity of boundary layer must be zero relative to boundary.
(V) Fluid cannot penetrate a boundary.
(A) I, II, III
(B) II, III, V

(C) I, II, V
(D) II, IV, V
Answer: Option B

172. An ideal plastic substance indicates no deformation, when stressed upto yield stress, but behaves like a Newtonian fluid beyond yield stress. Which of the following is an ideal plastic?
(A) Sewage sludge
(B) Rubber latex
(C) Blood
(D) Sugar solution
Answer: Option A

173. For steady ideal fluid flow, the Bernoulli's equation states that the
(A) Velocity is constant along a stream line
(B) Energy is constant throughout the fluid
(C) Energy is constant along a stream line, but may vary across stream lines
(D) None of these
Answer: Option C

174. In an incompressible flow of fluid, the fluid
(A) Temperature remains constant
(B) Compressibility is greater than zero
(C) Density does not change with pressure & temperature
(D) Is frictionless
Answer: Option C

175. The velocity for subsonic flow in a pipeline
(A) Increases in the downstream direction
(B) Is constant
(C) Decreases in the downstream direction
(D) Is independent of the area of flow
Answer: Option A

176. A Venturimeter measures the
(A) Velocity head
(B) Pressure
(C) Point velocity
(D) None of these
Answer: Option D

177. Scale up of agitator design requires
(A) Geometrical similarity only
(B) Dynamic similarity only
(C) Both geometrical and dynamic similarity
(D) All geometrical, dynamic and kinematic similarity
Answer: Option D

178. The discharge through a rectangular weir varies as
(A) $H^{1/2}$
(B) $H^{5/2}$
(C) $H^{2/5}$
(D) $H^{3/2}$
Answer: Option D

179. The percentage slip in a reciprocating pump set is given by the % of (where, Q_1 = actual discharge Q_2 = theoretical discharge).
(A) Q_1/Q_2
(B) Q_2/Q_1
(C) $(Q_2 - Q_1)/Q_1$
(D) $(Q_2 - Q_1)/Q_2$
Answer: Option D

180. To handle smaller quantity of fluid at higher discharge pressure, use a _____ pump.
(A) Reciprocating
(B) Centrifugal

(C) Volute
(D) Rotary vacuum
Answer: Option A

181. Glass pipes can be joined by
(A) Flanges
(B) Welding
(C) Soldering
(D) Bell and spigot joint
Answer: Option D

182. Froude number is not a factor
(A) For Reynolds number greater than 300
(B) When there is no vortex formation
(C) For unbaffled tank
(D) None of these
Answer: Option B

183. For the same terminal conditions and fitting size, the least friction loss is incurred in a/an
(A) T-joint
(B) Union
(C) 45° elbow
(D) 90°bend
Answer: Option B

184. Check valve is used for _____ flow.
(A) Very precise control of
(B) Unidirectional
(C) Multidirectional
(D) None of these
Answer: Option B

185. At what value of crank angle (roughly), no flow of water from or into the air vessel takes place in case of a double acting reciprocating pump?
(A) 40° and 140°
(B) 45° and 60°
(C) 90° and 80°
(D) 20° and 120°
Answer: Option A

186. In turbulent flow, the
(A) Fluid particles move in an orderly manner
(B) Momentum transfer is on molecular scale only
(C) Shear stress is caused more effectively by cohesion than momentum transfer
(D) Shear stresses are generally larger than in a similar laminar flow
Answer: Option D

187. The ratio of maximum to average velocity in case of streamline flow between parallel plates is
(A) 1
(B) 1.5
(C) 2
(D) 2.5
Answer: Option B

188. Bernoulli's equation for steady, frictionless, continuous flow states that the _____ at all sections is same.
(A) Total pressure
(B) Total energy
(C) Velocity head
(D) None of these
Answer: Option B

189. The valve commonly used in pipes larger than 2" dia is a
(A) Globe valve

(B) Plug-cock
(C) Gate valve
(D) Check valve
Answer: Option C

190. A streamline is a line in flow field,
(A) That is traced by all the fluid particles passing through a given point
(B) Along which a fluid particle travels
(C) Such that at every point on it, the velocity is tangential to it
(D) None of these
Answer: Option C

191. The energy loss in flow through Venturimeter is less than that through flow nozzle, because in case of a flow nozzle, the
(A) Length is shorter
(B) Throat diameter is more
(C) Sudden expansion of flow in the downstream occurs
(D) Distance between the throat and the inlet is more
Answer: Option C

192. The co-efficient of discharge of an orificemeter is a function of
(A) Reynolds number at the orifice
(B) Ratio of orifice dia to pipe dia
(C) Both (A) and (B)
(D) None of the above parameters, and has a constant value of 0.61
Answer: Option C

193. Which of the following equations applies to the fluid flow through a packed bed for very large Reynolds number?
(A) Fanning equation
(B) Blake-Plummer equation
(C) Hagen-Poiseuille equation
(D) Kozeny-Carman equation
Answer: Option B

194. A 2" gate valve fitted in a pipe is replaced by a similar globe valve. Pressure drop in gate valve was Δp. For the same discharge, the pressure drop across globe valve is
(A) Δp
(B) $< \Delta p$
(C) $> \Delta p$
(D) Δp^2
Answer: Option C

195. Which of the following flow measuring devices is an area meter?
(A) Venturimeter
(B) Orificemeter
(C) Anemometer
(D) Rotameter
Answer: Option D

196. A centrifugal pump designed to pump water is employed to pump a more viscous oil. In the later case, the pump
(A) Develops a lower head
(B) Capacity is reduced
(C) Requires more power
(D) All (A), (B) and (C)
Answer: Option D

197. Colebrook equation for friction factor in turbulent flow is given by,
$f^{0.5} = -4 \log_e [(\varepsilon/D) + (1.26/N_{Re} \sqrt{F})$. It reduces to Nikuradse equation for a value of (ϵ/D) equal to
(A) 0
(B) 1
(C) ∞
(D) 0.5
Answer: Option B

198. The pressure and power requirement of a gas fan at constant speed & capacity varies _____ the gas density.

(A) Directly as
(B) Inversely as square root of
(C) Inversely as
(D) As square of
Answer: Option A

199. Potential function is applicable only for _____ flow.

(A) Irrotational
(B) Turbulent
(C) Steady
(D) None of these
Answer: Option A

200. The maximum depth from which a centrifugal pump can draw water is

(A) Dependent on the speed of the pump
(B) Dependent on the power of the pump
(C) 34 feet
(D) 150 feet
Answer: Option C

201. The effect of solid boundary on the fluid flow is confined to the boundary layer, except for fluids

(A) Having high viscosities
(B) Moving at low velocities
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

202. Laminar flow is characterised by the nonexistence of

(A) Pressure fluctuation
(B) Eddies
(C) Deviating velocities
(D) All (A), (B) & (C)
Answer: Option D

203. The losses in open channel flow generally vary as the

(A) Inverse of the roughness
(B) First power of the roughness
(C) Square of the velocity
(D) Inverse square of hydraulic radius
Answer: Option B

204. The capillary rise of mercury is maximum in glass tube of dia _____ mm.

(A) 0.5
(B) 1
(C) 2
(D) 5
Answer: Option A

205. Flow rate of high velocity flue gas discharged through a stack to the atmosphere can be most conveniently measured by a

(A) Pitot tube
(B) Manometer
(C) Rotameter
(D) None of these
Answer: Option A

206. Boundary layer exists in flow

(A) Of real fluids
(B) Over flat surfaces only
(C) In pipes only
(D) Of ideal fluids only

Answer: Option A

207. The actual velocity at vena-contracta for flow through an orifice from a reservoir is given by

(A) $C_v \cdot \sqrt{(2gH)}$
(B) $C_c \cdot \sqrt{(2gH)}$
(C) $C_d \cdot \sqrt{(2gH)}$
(D) $C_v \cdot V_a$
Answer: Option A

208. The most serious disadvantage of an orificemeter is that

(A) It is not very accurate
(B) It is very costly
(C) Most of the pressure drop is not recoverable
(D) It is not suitable for measuring gas flow
Answer: Option C

209. The component of acceleration resulting due to unsteady nature of flow is called _____ acceleration.

(A) Normal
(B) Local
(C) Convective
(D) Tangential
Answer: Option B

210. Drag is the force component exerted on an immersed object,

(A) Passing the centroid of the body at 60°to the direction of motion
(B) The component being parallel to the flow direction
(C) The component being normal to the flow direction
(D) None of these
Answer: Option B

211. In hindered settling, the particles are

(A) Placed farther from the wall
(B) Not affected by other particles and the wall
(C) Near each other
(D) None of these
Answer: Option C

212. Paper pulp is an example of _____ fluid.

(A) Dilatant
(B) Bingham plastic
(C) Newtonian
(D) Pseudo-plastic
Answer: Option B

213. The vent valve provided in a liquid handling centrifugal pump is

(A) Generally a needle valve
(B) Used to release any gases that might be vapour locking the pump
(C) Helpful in easy removal of samples
(D) All (A), (B) and (C)
Answer: Option D

214. Capacity of a rotary gear pump can be varied by

(A) Changing the speed of rotation
(B) Bleeding air into suction
(C) Bypassing liquid from the suction or discharge line
(D) All (A), (B) and (C)
Answer: Option D

215. For laminar flow of a shear thinning liquid in a pipe, if the volumetric flow rate is doubled, the pressure gradient will increase by a factor of

(A) 2
(B) < 2
(C) > 2

(D) 1/2
Answer: Option A

216. If three pipes of different diameters, lengths & friction factors are connected in parallel, then (where, Q = flow rate, V= fluid velocity f = friction factor).
(A) $Q = Q_1 + Q_2 + Q_3$
(B) $V_1 = V_2 = V_3$
(C) $Q_1 = Q_2 = Q_3$
(D) $f = f_1 + f_2 + f_3$
Answer: Option A

217. The valve used for very remote and accurate control of fluid is a _____ valve.
(A) Needle
(B) Globe
(C) Gate
(D) Butterfly
Answer: Option A

218. Drag co-efficient C_D, in Stoke's law range is given by
(A) $C_D = 16/R_e.p$
(B) $C_D = 24/R_e.p$
(C) $C_D = 18.4/R_e.p$
(D) $C_D = 0.079/R_e^{0.25}.p$
Answer: Option B

219. A bed of spherical particles (specific gravity 2.5) of uniform size 1500 μm is 0.5 m in diameter and 0.5 m high. In packed bed state, the porosity may be taken as 0.4. Ergun's equation for the above fluid-particle system (in SI units) is given below:
$\Delta P/L = 375 \times 10^3 V_{OM} + 10.94 \times 10^6 V^2_{OM}$ (SI units)
If water is to be used as the fluidising medium, in actual operation, the above bed has a height = 1 m. What is the porosity of the fluidised bed?
(A) 0.2
(B) 0.5
(C) 0.7
(D) 0.8
Answer: Option C

220. Design of the casing of centrifugal pump should be such as to minimise the
(A) Back flow through impeller
(B) Loss of kinetic head
(C) Loss of static head
(D) None of these
Answer: Option B

221. A rectangular surface 3' × 4', has the lower 3 edge horizontal and 6' below a free oil surface (sp. gr. 0.8). The surface inclination is 300 with the horizontal. The force on one side of the surface is (where, y = specific weight of water)
(A) 39.6y
(B) 48y
(C) 49.2y
(D) 58y
Answer: Option B

222. Quicksand is an example of a _____ fluid.
(A) Bingham plastic
(B) Dilatant
(C) Newtonian
(D) Pseudo plastic
Answer: Option B

223. What is the unit of kinematic viscosity in SI unit?
(A) M^2/sec
(B) N/m^2. sec
(C) Kg. sec/m
(D) None of these

Answer: Option A

224. The fluid velocity varies as the cube of the cylindrical pipe diameter in case of steady state laminar flow at constant pressure drop for _____ fluid.

(A) Newtonian
(B) Pseudo-plastic
(C) Dilatent
(D) Bingham plastic
Answer: Option B

225. U_{mf} is the minimum fluidisation velocity for a bed of particles. An increase in the superficial gas velocity from 2 U_{mf} to 2.5 U_{mf} results in (all velocities are smaller than the entrainment velocity of the particles) no change in the

(A) Drag on particles
(B) Drag on column walls
(C) Bed height
(D) Bed voidage
Answer: Option C

226. The peripheral velocity at inlet of a centrifugal pump having inlet diameter of 25 cms and rotating at 950 rpm is _____ m/sec.

(A) 1.8
(B) 12.4
(C) 186.2
(D) 736.4
Answer: Option B

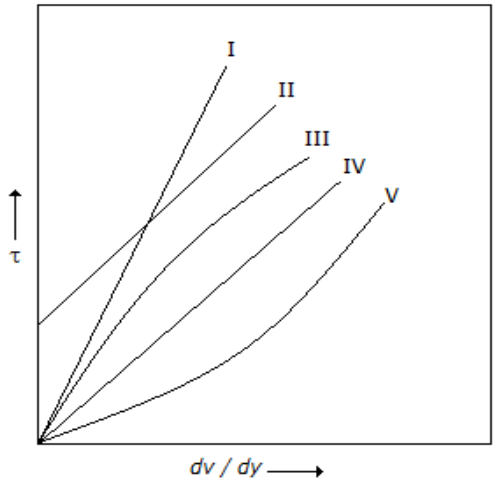
227. The main factor on which the behaviour of a mass of fluidised solid depends mainly is the

(A) Fluid characteristics
(B) Particle size
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

228. Hot wire anemometer is used to measure the

(A) Velocity of liquids
(B) Temperature of liquids
(C) Velocity of gases
(D) Pressure of liquids
Answer: Option C

229. Curve III in the bellow diagram represents a/an



(A) Dilatent fluid
(B) Pseudo plastic fluid
(C) Ideal plastic
(D) None of these
Answer: Option B

230. The pressure intensity is the same in all directions at a point in a fluid

(A) Only when the fluid is frictionless

(B) Only when the fluid is at rest having zero velocity
(C) When there is no motion of one fluid layer relative to an adjacent layer
(D) Regardless of the motion of one fluid layer relative to an adjacent layer
Answer: Option C

231. The capacity of a centrifugal pump Can be increased by increasing the
(A) Impeller diameter or speed
(B) Number of pumps and joining them in series
(C) Number of pumps and joining them in parallel
(D) All (A), (B) and (C)
Answer: Option D

232. Hydraulic mean radius for flow through packed bed of spherical particle of size, 'D_p, with porosity 'ε' is
(A) $(D_p/6)\ (\varepsilon/1-\varepsilon)$
(B) $(D_p/6)\ (1-\varepsilon/\varepsilon)$
(C) $\frac{2}{3}D_p\ (1-\varepsilon/\varepsilon)$
(D) $\frac{2}{3}D_p\ (\varepsilon/1-\varepsilon)$
Answer: Option A

233. The unit of velocity head is
(A) ft-lb/sec
(B) ft-lb/ft^3
(C) ft-lbf/lb
(D) ft-lbf/sec
Answer: Option C

234. Gradually varying fluid flow is an example of _____ flow.
(A) Non-steady uniform
(B) Non-steady non-uniform
(C) Steady uniform
(D) Steady non-uniform
Answer: Option A

235. The head loss in turbulent flow in pipe is proportional to(where, V = velocity of fluid through the pipe)
(A) V^2
(B) $1/V^2$
(C) $1/V$
(D) V
Answer: Option A

236. Disc compensators are provided in large diameter fuel gas carrying pipelines to
(A) Keep the pipe in proper orientation
(B) Make the pipe joint leak-proof
(C) Account for contraction/expansion of pipe due to temperature changes of the surroundings
(D) Account for the pressure variation side the pipeline
Answer: Option C

237. Piezometric head is the sum of the _____ heads.
(A) Elevation & kinetic energy
(B) Elevation & pressure
(C) Kinetic energy & pressure
(D) None of these
Answer: Option B

238. For a given Reynolds number, in a hydraulically smooth pipe, further smoothening _____ the friction factor.
(A) Brings about no further reduction of
(B) Increases
(C) Decreases
(D) None of these
Answer: Option A

239. Prandtl number is a measure of the

(A) Heat conduction to viscosity of a fluid
(B) C_p/C_v of a fluid
(C) Elastic force to pressure force in the fluid flow
(D) Inertial force to elastic force in the fluid flow
Answer: Option A

240. Horsepower requirement for given pump capacity depends upon the
(A) Specific gravity of the liquid
(B) Suction lift
(C) Discharge head
(D) All (A), (B) and (C)
Answer: Option D

241. Potential flow is the flow of
(A) Compressible fluids with shear
(B) Compressible fluids with no shear
(C) Incompressible fluids with shear
(D) Incompressible fluids with no shear
Answer: Option D

242. The buoyant force acting on a floating body is dependent on the
(A) Viscosity of the liquid
(B) Weight of the liquid displaced
(C) Depth of immersion of the body
(D) Surface tension of the liquid
Answer: Option B

243. Weber number is the ratio of inertial force to _____ force.
(A) Surface tension
(B) Gravity
(C) Viscous
(D) Elastic
Answer: Option A

244. Which of the following is used for pumping crude oil from oil well?
(A) Single stage centrifugal pump
(B) Gear pump
(C) Screw pump
(D) Duplex/triplex reciprocating pump
Answer: Option D

245. In case of Couette flow, the fluid flow is between two large flat parallel plates with
(A) Top plate moving and the bottom plate fixed
(B) Bottom plate moving and the top plate fixed
(C) Both the plates fixed
(D) Both the plates moving
Answer: Option A

246. A stream line is
(A) Fixed in space in steady flow
(B) Always the path of particle
(C) Drawn normal to the velocity vector at every point
(D) A line connecting the mid points of flow cross-section
Answer: Option A

247. Dimension of kinematic viscosity is
(A) MLT^{-1}
(B) L^2T^{-1}
(C) L^2T
(D) L^2T^{-2}
Answer: Option B

248. Froude number is the ratio of
(A) Shear stress to gravitational stress
(B) Drag stress to shear stress

(C) Inertial stress to shear stress
(D) Inertial stress to gravitational stress
Answer: Option D

249. Multistage compressors are used in industry, because they
(A) Reduce the cost of compressor
(B) Reduce the size requirement
(C) Resemble closely to isothermal compression
(D) Are easy to control
Answer: Option C

250. Hydraulic diameter for non-circular ducts is equal to _____ times the area of flow divided by the perimeter.
(A) Two
(B) Three
(C) Four
(D) Eight
Answer: Option C

251. Hydraulic _____ works on the principle of Pascal's law of transmission of fluid pressure.
(A) Press
(B) Turbine
(C) Pump
(D) Coupling
Answer: Option A

252. Propeller type centrifugal pumps are most suitable for
(A) High capacity at high heads
(B) High capacity at low heads
(C) Low capacity at high heads
(D) Low capacity at low heads
Answer: Option B

253. The discharge through a semi-circular weir varies as (where, H = Head of liquid.)
(A) H
(B) H^2
(C) $H^{3/2}$
(D) $H^{1/2}$
Answer: Option B

254. Mach number is defined as the ratio of the local flow velocity to the sonic velocity in the fluid. For what value of Mach number, the gases are considered incompressible?
(A) < 0.3
(B) > 3
(C) 50
(D) 1
Answer: Option A

255. Which of the following exemplifies a three dimensional fluid flow?
(A) Fluid flow at the inlet to a nozzle
(B) Fluid flow between parallel plates
(C) Viscous fluid flow between converging plates
(D) None of these
Answer: Option A

256. A hydraulic press has a ram of 10 cms in diameter and a plunger of 1 cm in diameter. The force required on the plunger to raise a weight of 10 tons on the ram is _____ kg.
(A) 10
(B) 100
(C) 1000
(D) 10000
Answer: Option B

257. $f = 16/N_{Re}$, is valid for

(A) Turbulent flow
(B) Laminar flow through an open channel
(C) Steady flow
(D) None of these
Answer: Option D

258. Power number is the ratio of
(A) Drag stress to inertial stress
(B) Inertial stress to drag stress
(C) Inertial stress to gravitational stress
(D) Gravitational stress to drag stress
Answer: Option A

259. Which law is followed by the velocity distribution in the turbulent boundary layer?
(A) Parabolic law
(B) Linear law
(C) Logarithmic law
(D) None of these
Answer: Option C

260. A centrifugal pump has the following specifications:
Power = 4 H.P.; Speed = 800 rpm
Head = 8 metres
Flow = 1000 litres/minutes.
If its speed is halved, the power consumed now will be _____ hp.
(A) 0.5
(B) 2
(C) 4
(D) 1
Answer: Option A

261. In case of turbulent flow of a Newtonian fluid in a straight pipe, the maximum velocity is equal to (where, V_{avg} = average fluid velocity)
(A) V_{avg}
(B) 1.2 V_{avg}
(C) 1.5 V_{avg}
(D) 1.8 V_{avg}
Answer: Option B

262. A Newtonian fluid is that
(A) Which follows Newton's law of motion
(B) Which needs a minimum shear, before it starts deforming
(C) For which shear & deformation are related as $T = \mu\ (\partial u/\partial y)$
(D) None of these
Answer: Option C

263. Unsteady non-uniform flow is represented by flow through a/an
(A) Long pipe at constant rate
(B) Long pipe at decreasing rate
(C) Expanding tube at increasing rate
(D) Expanding tube at constant rate
Answer: Option C

264. Bernoulli's equation accounts for the
(A) Various momentums
(B) Various masses
(C) Different forms of mechanical energy
(D) None of these
Answer: Option C

265. Slugging occurs in a fluidised bed, if the bed is
(A) Narrow
(B) Deep
(C) Both (A) & (B)
(D) Neither (A) nor (B)

Answer: Option C

266. The line of action of the buoyant force acts through the

(A) Centroid of the displaced volume of fluid
(B) Centre of gravity of a submerged body
(C) Centroid of the volume of any floating body
(D) None of these
Answer: Option A

267. The curve of metacentre for a floating body _____ the curve of buoyancy.

(A) Is always below
(B) Is the evolute of
(C) Intersects at right angle
(D) Is tangential to
Answer: Option B

268. Pressure drop in a packed bed for laminar flow is given by the _____ equation.

(A) Kozeny-Carman
(B) Blake-Plummer
(C) Leva's
(D) Fanning friction factor
Answer: Option A

269. What is the ratio of total kinetic energy of fluid passing per second to the value obtained on the basis of average velocity (for laminar flow through a circular pipe)?

(A) 0.5
(B) 1
(C) 1.5
(D) 2
Answer: Option D

270. For an incompressible fluid, the bulk modulus of elasticity is

(A) 5 kg/m^3
(B) ∞ N/m^2
(C) 1 N
(D) 0 N/m
Answer: Option B

271. Pick out the correct statement.

(A) Human blood is a Newtonian fluid
(B) A Newtonian fluid obeys Newton's law of cooling
(C) For a non-Newtonian fluid, a straight line passes through the origin in a plot between shear stress and shear gradient
(D) Thin lubricating oil is an example of a non-Newtonian fluid
Answer: Option B

272. Steady non-uniform flow is exemplified by flow through a/an

(A) Long pipe at constant rate
(B) Long pipe at decreasing rate
(C) Expanding tube at increasing rate
(D) Expanding tube at constant rate
Answer: Option D

273. Erosion and pits formation on the impeller of a centrifugal pump may be due to

(A) Cavitation
(B) Low speed of impeller
(C) Its operation with delivery valve closed for considerable time after starting the pump
(D) Off centering of pump with motor
Answer: Option A

274. The frictional resistance in laminar flow does not depend on the

(A) Area of surface in contact
(B) Flow velocity
(C) Fluid temperature
(D) Pressure of flow

Answer: Option A

275. Cavitation occurs in a centrifugal pump when the suction pressure is
(A) Less than the vapour pressure of the liquid at that temperature
(B) Greater than the vapour pressure of the liquid at that temperature
(C) Equal to the vapour pressure
(D) Equal to the developed head
Answer: Option A

276. Pick out the wrong statement about a streamline.
(A) It is always parallel to the main direction of the fluid flow
(B) It is a line across which there is no flow and it is equivalent to a rigid boundary
(C) Streamlines intersect at isolated point of zero velocity and infinite velocity
(D) The fluid lying between any two streamlines can be considered to be in isolation and the streamline spacing varies inversely as the velocity
Answer: Option A

277. Propellers are
(A) Axial flow mixers
(B) Low speed impeller
(C) Used for mixing liquids of high viscosity
(D) Radial flow mixers
Answer: Option A

278. The momentum correction factor for the velocity distribution of laminar flow is
(A) 1.3
(B) 1.66
(C) 2.5
(D) None of these
Answer: Option D

279. The range of a particular Rotameter can be increased by
(A) Use of floats of different densities
(B) No means
(C) Increasing the diameter of the float
(D) Decreasing the diameter of the float
Answer: Option A

280. _____ pumps are a group of vacuum pumps.
(A) Hyster
(B) Sump
(C) Mono
(D) Submerged
Answer: Option A

281. The value of critical Reynolds number for pipe flow is
(A) 1,300
(B) 10,000
(C) 100,000
(D) None of these
Answer: Option A

282. Differential manometer measures the
(A) Absolute pressure
(B) Gauge pressure
(C) Pressure difference
(D) Pressure gradient
Answer: Option C

283. The contraction co-efficient for Borda's mouthpiece (for frictionless fluid) is
(A) 0.1
(B) 0.5
(C) 0.94
(D) 1
Answer: Option B

284. With decrease in particle size to be fluidised by a particular fluid, the operating range of fluidisation velocity

(A) Widens
(B) Squeezes
(C) Does not change
(D) Unpredictable from the data
Answer: Option C

285. In a stabilised soap bubble, pressure inside it compared to external pressure is

(A) More
(B) Less
(C) Same
(D) Unpredictable
Answer: Option A

286. The length of the tube necessary for the boundary layer to reach the centre of the tube and for fully developed flow to be established is called the _____ length.

(A) Equivalent
(B) Transition
(C) Prandtl mixing
(D) None of these
Answer: Option B

287. Volute of a centrifugal pump should be designed in a fashion, such that the

(A) Kinetic head gets converted into static head
(B) Moving stream gradually reduces velocity
(C) Mean velocity remains constant
(D) None of these
Answer: Option A

288. Diaphragm pumps are used to transport

(A) Solids
(B) Liquids
(C) Fluids
(D) Slurries
Answer: Option D

289. For a stable equilibrium of a submerged body (where, *G* and *B* are centres of gravity & buoyancy respectively).

(A) *G* is above *B*
(B) *B* is above *G*
(C) *B* & *G* coincide
(D) None of these
Answer: Option B

290. Rubber latex is an example of _____ fluid.

(A) Dilatants
(B) Newtonian
(C) Pseudo plastic
(D) Bingham plastic
Answer: Option C

291. Which of the following has the maximum compression ratio?

(A) Blower
(B) Compressor
(C) Vacuum pump
(D) Fan
Answer: Option C

292. Discharge from a 24 inch pipe of water at 10 ft/sec will be _____ ft^3/sec.

(A) 7.65
(B) 32.36
(C) 48.22
(D) 125.6

Answer: Option D

293. A mixed flow centrifugal pump

(A) Employs such an impeller, through which the flow is a combination of radial & axial flow
(B) Mixes the two fluids before pumping them
(C) Pumps the two fluids separately and then mixes them
(D) Employs impellers in both the radial & axial directions
Answer: Option A

294. For the same flow rate of a fluid, the pressure drop is the least for

(A) Venturimeter
(B) Orificemeter
(C) Flow-nozzle
(D) Δp is same for all
Answer: Option A

295. A compressor that takes suction at a pressure below atmospheric and discharge against atmospheric pressure is called a _____ pump.

(A) Sump
(B) Volute
(C) Vacuum
(D) Submerged
Answer: Option C

296. Momentum correction factor used in fluid flow problems accounts for the

(A) Change in direction of flow
(B) Change in total energy
(C) Change in pressure
(D) Non uniform direction of velocities at inlet & outlet sections
Answer: Option D

297. For laminar flow of Newtonian fluids through a circular pipe, for a given pressure drop and length & diameter of pipe, the velocity of fluid is proportional to (where, μ = fluid viscosity)

(A) μ
(B) $1/\mu$
(C) $\sqrt{\mu}$
(D) $1/\sqrt{\mu}$
Answer: Option B

298. Isothermal turbulent flow of a fluid results in decrease of its pressure, which depends on the

(A) Wall roughness
(B) Reynolds number
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

299. Pumping of a corrosive liquid is generally preferred to be done by a _____ pump, as it can be made of a variety of materials including plastics.

(A) Piston
(B) Gear
(C) Positive displacement
(D) Sump
Answer: Option B

300. Minimum porosity for fluidisation is

(A) That corresponding to static bed
(B) That corresponding to completely fluidised bed
(C) The porosity of the bed when true fluidisation begins
(D) Less than that of the' static bed
Answer: Option C

301. The line traced by a single fluid particle as it moves over a period of time is called _____ line.

(A) Stream

(B) Path
(C) Equipotential
(D) None of these
Answer: Option B

302. In area meter (e.g., Rotameter), with increase in the fluid flow rate, the
(A) Pressure drop increases linearly
(B) Pressure drop is almost constant
(C) Area through which fluid flows does not vary
(D) None of these
Answer: Option B

303. While starting an axial flow pump, its delivery valve should be kept
(A) Open
(B) Closed
(C) Either open or closed
(D) None of these
Answer: Option A

304. In case of a centrifugal pump, the theoretical head developed is dependent on the _____ the impeller.
(A) Speed of
(B) Diameter of
(C) Fluid velocity leaving
(D) All (A), (B) and (C)
Answer: Option D

305. Which of the following is not an advantage of fluidisation from transfer operation point of view?
(A) Intimate contact of the fluid with all parts of the solid particles
(B) Lower fluid pumping power requirement
(C) Minimisation of temperature variation
(D) Prevention of particle segregation
Answer: Option B

306. Terminal velocity is
(A) A constant velocity with no acceleration
(B) A fluctuating velocity
(C) Attained after moving one-half of total distance
(D) None of these
Answer: Option A

307. What is the speed of sound (m/sec) in ordinary water?
(A) 1500
(B) 330
(C) 1000
(D) 3000
Answer: Option A

308. Drag co-efficient for motion of spherical particles in a stationary fluid in the stoke's law range is
(A) $24/N_{Re,P}$
(B) $16/N_{Re,P}$
(C) $64/N_{Re,P}$
(D) $48/N_{Re,P}$
Answer: Option A

309. Fanning friction factor is equal to (where, f_B = Blasius friction factor).
(A) $f_B/4$
(B) $f_B/2$
(C) $4f_B$
(D) $2f_B$
Answer: Option A

310. In power law, $\zeta = [A\,(du/dy)^2 + B]$ then the fluid is

(A) Newtonian
(B) Dilatant
(C) Thixotropic
(D) Rheopectic
Answer: Option A

311. _____ forces do not act in case of fluid flow.
(A) Elastic
(B) Tensile
(C) Vibratory
(D) Centrifugal
Answer: Option B

312. The schedule number of a pipe is an indication of its
(A) Size
(B) Roughness
(C) Material density
(D) Wall thickness
Answer: Option D

313. With increase in the ratio of orifice diameter to pipe diameter in case of an orificemeter, the overall pressure loss
(A) Decreases
(B) Increases
(C) Remain constant
(D) Increases linearly
Answer: Option C

314. A fluid is a substance, that
(A) Has to be kept in a closed container
(B) Is almost incompressible
(C) Has zero shear stress
(D) Flows when even a small shear is applied to it
Answer: Option D

315. Out of the following flow measuring devices, which one incurs the maximum installation cost as well as pressure loss?
(A) Flow nozzle
(B) Venturimeter
(C) Rotameter
(D) Orificemeter
Answer: Option B

316. The continuity equation
(A) Relates mass flow rate along a stream tube
(B) Relates work and energy
(C) Stipulates that Newton's second law of motion must be satisfied at every point in the fluid
(D) None of these
Answer: Option A

317. One dimensional flow implies
(A) Flow in a straight line
(B) Steady uniform flow
(C) Unsteady uniform flow
(D) A flow which does not account for changes in transverse direction
Answer: Option D

318. The flow of gas along a pipe in the direction of decreasing pressure causes decrease in its
(A) Viscosity
(B) Specific volume
(C) Velocity
(D) None of these
Answer: Option B

319. Non-colloidal solution is an example of the _____ fluid.

(A) Non-Newtonian
(B) Newtonian
(C) Dilatent
(D) Pseudo-plastic
Answer: Option B

320. In case of supersonic flow of a fluid through pipeline, the 'Mach number' is
(A) 0
(B) 1
(C) < 1
(D) > 1
Answer: Option D

321. A bed of spherical particles (specific gravity 2.5) of uniform size 1500 μm is 0.5 m in diameter and 0.5 m high. In packed bed state, the porosity may be taken as 0.4. Ergun's equation for the above fluid-particle system (in SI units) is given below :
$\Delta P/L = 375 \times 10^3 V_{OM} + 10.94 \times 10^6 V^2_{OM}$ (SI units)
If water is to be used as the fluidising medium, the minimum fluidisation velocity, V_{OM} is
(A) 12 mm/s
(B) 16 mm/s
(C) 24 mm/s
(D) 28 mm/s
Answer: Option B

322. Gradually varied flow in open channel is a/an _____ flow.
(A) Steady uniform
(B) Steady non-uniform
(C) Unsteady uniform
(D) Unsteady non-uniform
Answer: Option B

323. For very low pressure and high discharge rate, the compressor used is a/an _____ compressor.
(A) Axial
(B) Reciprocating
(C) Rotary
(D) None of these
Answer: Option C

324. Stoke's law is valid, when $N_{Re, p}$ is less than
(A) 2
(B) 100
(C) 2100
(D) 700
Answer: Option A

325. The pressure head on sudden contraction in a horizontal pipe is converted into the _____ head.
(A) Elevation
(B) Velocity
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option B

326. Cavitation in a centrifugal pump can be avoided by keeping the
(A) Inlet pressure high
(B) Outlet pressure low
(C) Inlet pressure low
(D) Outlet pressure high
Answer: Option A

327. Rise of liquid in a capillary tube is due to
(A) Cohesion
(B) Adhesion
(C) Both (A) & (B)

(D) Neither (A) nor (B)
Answer: Option C

328. Momentum transfer in laminar flow of fluids results due to the
(A) Viscosity
(B) Density
(C) Velocity gradient
(D) None of these
Answer: Option C

329. The excess of the sum of pressure & velocity heads over the vapor pressure of the liquid at the suction is called the
(A) Static submergence
(B) Net positive suction head (NPSH)
(C) Cavitation sensitivity
(D) Priming
Answer: Option B

330. What is the ratio of fluid carrying capacity of two pipes having diameters d_1 and d_2 respectively?
(A) $(d_1/d_2)^{0.8}$
(B) $(d_1/d_2)^{0.5}$
(C) d_1/d_2
(D) $(d_1/d_2)^2$
Answer: Option B

331. Co-efficient of discharge (C_d) is defined as actual discharge/theoretical discharge and is equal to C_c . C_v; where C_c = Co-efficient of contraction and C_v = co-efficient of velocity. C_d of an orifice is usually about
(A) 0.42
(B) 0.62
(C) 0.82
(D) 0.98
Answer: Option B

332. Mach number is important in a fluid flow problem, when the inertia and _____ forces predominate.
(A) Elastic
(B) Viscous
(C) Gravity
(D) None of these
Answer: Option A

333. The head loss in turbulent flow in a pipe varies
(A) As velocity
(B) As (velocity)^2
(C) Inversely as the square of diameter
(D) Inversely as the velocity
Answer: Option B

334. Boundary layer thickness in turbulent flow over a flat plate increases as(where, d = distance from the leading edge.)
(A) $\sqrt{d}$
(B) $d^{2/3}$
(C) $d^{4/5}$
(D) $d^{1/3}$
Answer: Option C

335. The fluid property, due to which, mercury does not wet the glass is
(A) Surface tension
(B) Viscosity
(C) Cohesion
(D) Adhesion
Answer: Option A

336. The net positive suction head (NPSH) of a centrifugal pump is defined as the sum of the velocity head and the pressure head at the

(A) Discharge
(B) Suction
(C) Suction minus vapor pressure of the liquid at suction temperature
(D) Discharge minus vapor pressure of the liquid at the discharge temperature
Answer: Option C

337. The ratio of inertial forces to elastic forces is called the _____ number.

(A) Reynolds
(B) Mach
(C) Euler
(D) Weber
Answer: Option B

338. Select the correct statement.

(A) The discharge through a Venturimeter depends upon Δp only and is independent of orientation of the meter
(B) A Venturimeter with a given gage difference discharges at a greater rate, when the flow is vertically downward through it, than when the flow is vertically upward
(C) For a given pressure difference, the discharge of gas is greater through a Venturimeter, when compressibility is taken into account, than when it is neglected
(D) The overall pressure loss is the same in a given pipe line, whether a Venturimeter or a nozzle with the same throat dia is used
Answer: Option A

339. Centrifugal compressors compared to reciprocating compressors

(A) Require less space
(B) Have quieter operation
(C) Have lower operating costs
(D) All (A), (B) and (C)
Answer: Option D

340. Nominal size of the discharge pipe of a pump is usually _____ the nominal size of the inlet pipe.

(A) Smaller than
(B) Larger than
(C) Same as
(D) Twice
Answer: Option A

341. A fluid element has a velocity $V = -y^2 . xi + 2yx^2 . j$. The motion at $(x, y) = (1/\sqrt{2}, 1)$ is

(A) Rotational and incompressible
(B) Rotational and compressible
(C) Irrotational and compressible
(D) Irrotational and incompressible
Answer: Option B

342. Which of the following has the minimum compressibility?

(A) Water at room temperature
(B) Air at room temperature
(C) Oxygen at room temperature
(D) Nitrogen at room temperature
Answer: Option A

343. A stream tube is that, which has _____ cross-section entirely bounded by stream lines.

(A) A circular
(B) Any convenient
(C) A small
(D) A large
Answer: Option B

344. Power loss in an orificemeter is _____ that in a Venturimeter.

(A) Less than

(B) Same as
(C) More than
(D) Data insufficient, cannot be predicted
Answer: Option C

345. Applying a pressure drop across a capillary results in a volumetric flow rate 'Q' under laminar flow conditions. The flow rate for the same pressure drop, in a capillary of the same length but half the radius is

(A) $Q/2$
(B) $Q/4$
(C) $Q/8$
(D) $Q/16$
Answer: Option D

346. The unit of dynamic viscosity in SI unit is

(A) kg/m. sec
(B) N/m^2
(C) m^2 /sec
(D) m/N. sec
Answer: Option A

347. The head developed by a centrifugal pump is largely determined by the

(A) Power of the pump
(B) Nature of the liquid being pumped
(C) Angle of the vanes and the speed of the tip of the impeller
(D) Vapour pressure of the liquid
Answer: Option C

348. The pitot static tube does not measure the _____ pressure.

(A) Static
(B) Total
(C) Difference in static & dynamic
(D) All (A), (B) and (C)
Answer: Option D

349. Priming is needed in a _____ pump.

(A) Reciprocating
(B) Gear
(C) Centrifugal
(D) Diaphragm
Answer: Option C

350. Vena-contracta formed during flow of a liquid through an orificemeter has

(A) Minimum liquid cross-section
(B) More diameter compared to orifice diameter
(C) Minimum velocity of fluid stream
(D) None of these
Answer: Option A

351. The Mach number for hypersonic flow of compressible fluid is

(A) 1
(B) > 1
(C) > 4
(D) < 2
Answer: Option C

352. For Laminar flow through a packed bed, the pressure drop is proportional to (V_s is the superficial liquid velocity and D_p is the particle diameter)

(A) V_s/D_p^2
(B) V_s^2/D_p^2
(C) V_s^2/Dp^3
(D) V_s/D_p^3
Answer: Option A

353. Higher specific speed (200-500) of a centrifugal pump indicates that the pump is of _____ flow type.

(A) Axial
(B) Radial
(C) Mixed
(D) None of these
Answer: Option A

354. What is the co-efficient of contraction, if a fluid jet discharging from a 50 mm diameter orifice has a 40 mm diameter at its vena-contracta?

(A) 0.64
(B) 1.65
(C) 0.32
(D) 0.94
Answer: Option A

355. Which of the following properties of a fluid is responsible for offering resistance to shear?

(A) Surface tension
(B) Viscosity
(C) Specific gravity
(D) All (A), (B), and (C)
Answer: Option B

356. All pipes of a particular nominal size have the same

(A) Inside diameter
(B) Outside diameter
(C) Thickness
(D) None of these
Answer: Option B

357. An ideal fluid is

(A) Non-viscous
(B) Incompressible
(C) Both (A) & (B)
(D) Neither (A) & (B)
Answer: Option C

358. Purpose of hydraulic accumulator is to

(A) Ensure intermittent supply of hydraulic pressure
(B) Increase the pressure and store/ accumulate it
(C) Accumulate pressure to increase force
(D) Generate high pressure to operate hydraulic machines like cranes, lifts, presses etc
Answer: Option D

359. Power required for mixing Newtonian fluids is a function of the

(A) Speed of impeller, diameter of impeller & viscosity
(B) Density & viscosity of fluid only
(C) Density of fluid, viscosity of fluid & impeller dia only
(D) None of these
Answer: Option D

360. Dimension of absolute viscosity is

(A) $ML^{-1}T^{-1}$
(B) MLT^{-1}
(C) $ML^{-1}T$
(D) MLT
Answer: Option A

361. A mercury (specific gravity = 13.6) manometer connected across an orificemeter fitted in a pipe shows a manometer reading of 2 cms. If the manometer liquid is changed to carbon tetrachloride (specific gravity = 1.6), then for the same flow rate of water the new manometer reading will be _____ cms.

(A) 17
(B) 42
(C) 84

(D) 1.8
Answer: Option A

362. The Prandtl Pitot tube measures the
(A) Velocity at a point in the flow
(B) Pressure at a point
(C) Average flow velocity
(D) Pressure difference in pipe flow
Answer: Option A

363. In centrifugal pump operation, the cavitation can be eliminated by maintaining suction pressure _____ the vapor pressure of the liquid at the suction temperature.
(A) Lower than
(B) Higher than
(C) Equal to
(D) None of these
Answer: Option B

364. A Bingham fluid of viscosity μ = 10 Pa.s and yield stress, τ_0 = 10 KPa, is shared between flat parallel plates separated by a distance of 10^{-3} m. The top plate is moving with a velocity of 1 m/s. The shear stress on the plate is
(A) 10 KPa
(B) 20 KPa
(C) 30 KPa
(D) 40 KPa
Answer: Option B

365. A centrifugal pump is called a turbine pump, if it is having a
(A) Turbine type impeller
(B) Vaned diffusion casing
(C) Rotating vaned volute
(D) None of these
Answer: Option B

366. The equation $f^{-0.5} = 4.07 \log_e (N_{Re} \sqrt{f})^{-0.6}$ is called the _____.
(A) Colebrook formula
(B) Von-Karman equation
(C) Fanning equation
(D) None of these
Answer: Option B

367. The velocity profile exhibited by laminar flow of Newtonian fluids is such that the velocity distribution w.r.t. radius of the circular pipe is a/an _____ with the apex at the centre line of the pipe.
(A) Hyperbola
(B) Parabola
(C) Semi-circle
(D) Semi-ellipse
Answer: Option B

368. Laminar flow of a Newtonian fluid ceases to exist, when the Reynolds number exceeds
(A) 4000
(B) 2100
(C) 1500
(D) 3000
Answer: Option B

369. Pick out the wrong statement.
(A) The form drag is dependent upon the occurrence of a wake
(B) The shear stress at any given cross-section of a pipe for steady flow (either laminar or turbulent) varies linearly as the radial distance
(C) An ideal fluid is the one, which has negligible surface tension and obeys the Newton's law of viscosity
(D) Existence of the boundary layer in fluid flow is because of viscosity of the fluid
Answer: Option C

370. For an unstable equilibrium of a floating body (where, *M* = metacentre.)

(A) *M* is above *G*
(B) *M* is below *G*
(C) *M* & *G* coincide
(D) None of these
Answer: Option B

371. The hydrodynamic and thermal boundary layers will merge, when

(A) Prandtl number is one
(B) Schmidt number tends to infinity
(C) Nusselt number tends to infinity
(D) Archimedes number is greater than 10000
Answer: Option A

372. Schedule number of a pipe, which is a measure of its wall thickness, is given by

(A) 1000 P'/S
(B) 100 P'/S
(C) 1000 S/P'
(D) 10000 P'/S
Answer: Option A

373. The energy equation, $E + (p/\rho) + (V^2/2g) + gZ$ = constant (E = internal energy/mass), is applicable to

(A) Perfect gases only
(B) Isothermal flow of gases
(C) Adiabatic unsteady flow of gases
(D) All compressible fluids
Answer: Option D

374. Steady fluid flow occurs, when the derivative of flow variables satisfy the following condition.

(A) $\partial/\partial s = 0$
(B) $\partial/\partial t = 0$
(C) $\partial/\partial s$ = constant
(D) $\partial/\partial t$ = constant
Answer: Option B

375. A Rotameter works on the principle of _____ pressure drop.

(A) Constant
(B) Variable
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option A

376. When the momentum of one fluid is used for moving another fluid, such a device is called a/an

(A) Jet pump
(B) Blower
(C) Acid egg
(D) None of these
Answer: Option A

377. The equivalent diameter for flow through a rectangular duct of width *B* and height *H* is

(A) $HB/2\ (H + B)$
(B) $HB/(H + B)$
(C) $2HB/(H + B)$
(D) $4HB/(H + B)$
Answer: Option C

378. The velocity profile for a Bingham plastic fluid flowing (under laminar conditions) in a pipe is

(A) Parabolic
(B) Flat
(C) Flat near the wall and parabolic in the middle

(D) Parabolic near the wall and flat in the middle
Answer: Option D

379. Mass velocity in case of steady flow and through a constant cross-section conduit is independent of the
(A) Temperature
(B) Pressure
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

380. In case of hydraulically smooth pipe, the resistance to flow depends only on the Reynolds number, whereas for a hydraulically rough pipe, the resistance to flow is governed by the relative roughness. Two pipes are said to have the same hydraulic roughness, when they have equal values of
(A) Relative roughness
(B) Absolute roughness
(C) Friction co-efficient for flows at equal Reynold number
(D) All (A), (B) & (C)
Answer: Option C

381. Where does the maximum stress occur in case of laminar flow of incompressible fluid in a closed conduit of diameter '*d*'?
(A) At the centre
(B) At *d*/4 from the wall
(C) At the wall
(D) At *d*/8 from the wall
Answer: Option C

382. At a constant speed of the centrifugal pump, it's _____ the impeller diameter.
(A) Capacity varies directly with
(B) Head varies as the square of
(C) Horsepower varies as the cube of
(D) All (A), (B) and (C)
Answer: Option D

383. Upto what value of 'Mach number', a fluid may be considered as incompressible?
(A) 0.03
(B) 0.3
(C) 3
(D) 10
Answer: Option B

384. Foot valves provided in pumps are _____ valves.
(A) Relief
(B) Three/four way
(C) Pressure reducing
(D) Directional control
Answer: Option D

385. Velocity distribution for flow between two fixed parallel plates
(A) Varies parabolically across the section
(B) Is constant over the entire cross-section
(C) Is zero at the plates and increases linearly to the mid-plane
(D) None of these
Answer: Option A

386. Which of the following can be used for the direct measurement of volumetric flow rate of slurry?
(A) Venturimeter
(B) Orificemeter
(C) Rotameter
(D) Pitot tube
Answer: Option C

387. Pick out the wrong statement:

(A) Greater is the kinematic viscosity of the liquid, greater is the thickness of the boundary layer
(B) Blowers develop a maximum pressure of 2 atmospheres
(C) Friction losses in pipe fittings are generally expressed in terms of velocity heads
(D) Fanning friction factor in case of turbulent flow of liquids in pipe depends upon relative roughness & Reynolds number

Answer: Option C

388. The dimension of dynamic viscosity is

(A) $ML^{-1}T^{-1}$
(B) $L^{2}T^{-1}$
(C) LT^{-2}
(D) $ML^{-1}T^{-2}$

Answer: Option A

389. The variable required to be known in correlations used for estimating the horse power of a centrifugal gas compressor and hence its cost is

P. Inlet pressure
Q. Compressor rpm
R. Delivery pressure
S. Volumetric flow rate at inlet.

(A) P, Q and R
(B) P and R
(C) R and S
(D) P, Rand S

Answer: Option A

390. In case of centrifugal fan or blower, the gas capacity varies as

(A) Speed
(B) $(Speed)^{2}$
(C) $(Speed)^{3}$
(D) $(Speed)^{0.5}$

Answer: Option A

391. Differential manometer measures the

(A) Atmospheric pressure
(B) Sub-atmospheric pressure
(C) Pressure difference between two points
(D) None of these

Answer: Option C

392. The maximum delivery pressure of compressors can be upto _____ atmospheres.

(A) 10
(B) 100
(C) 250
(D) 1000

Answer: Option D

393. With increase in temperature, the vapor pressure of liquids

(A) Increases
(B) Increases linearly
(C) Decreases
(D) Remain constant

Answer: Option A

394. Dean number is concerned with the

(A) Fluid-particle interaction
(B) Fluid flow through helical pipes
(C) Power consumption in agitated vessels
(D) Psychrometry

Answer: Option B

395. Medium viscosity lubricating oil can be most ideally pumped by a _____ pump.

(A) Vane
(B) Piston

(C) Centrifugal
(D) Plunger
Answer: Option A

396. Pick out the wrong statement.
(A) Momentum transfer in laminar flow results from velocity gradient
(B) A fluid in equilibrium is not free from shear stress
(C) The viscosity of a non-Newtonian fluid is a function of temperature only
(D) Both (B) and (C)
Answer: Option D

397. Remote control valve is a _____ valve.
(A) Gate
(B) Butterfly
(C) Needle
(D) Globe
Answer: Option B

398. A pipe is defined as 'hydraulically smooth', if the friction factor
(A) Is not a function of Reynolds number
(B) For a given Reynolds number remains constant even on further smoothening of the pipe
(C) Is zero irrespective of the Reynolds number
(D) None of these
Answer: Option B

399. Most of the centrifugal pumps used in chemical plants are usually _____ driven.
(A) Steam
(B) Diesel engine
(C) Electric motor
(D) Gas turbine
Answer: Option C

400. Pick out the correct statement.
(A) A forced vortex occurs when fluid rotates as a solid about an axis
(B) In laminar flow, Newton's law of viscosity does not apply
(C) A free vortex occurs, when fluid rotates as a solid
(D) In turbulent flow, there are neither cross-currents nor eddies
Answer: Option A

401. The uniformity of a gas fluidised bed depends upon the _____ of the solid particles.
(A) Size
(B) Surface properties
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

402. Pick out the wrong statement.
(A) In a static mass of liquid, the pressure at a point is the same for all liquids
(B) Pressure decreases exponentially with elevation in an isothermal atmosphere
(C) Atmospheric pressure = absolute pressure – gage pressure
(D) As per Pascal's law, the pressure at a point in a static or uniformly moving fluid is equal in all directions
Answer: Option A

403. Permanent loss in a Venturimeter is about _____ percent of the pressure drop in the upstream cone.
(A) 1
(B) 10
(C) 40
(D) 70
Answer: Option B

404. The normal stress is the same in all directions at a point in a fluid, when the fluid is
(A) Non-viscous
(B) Incompressible

(C) Both (A) and (B)
(D) Having no motion of one fluid layer relative to the other
Answer: Option D

405. Mass velocity is independent of temperature & pressure, when the flow is
(A) Unsteady through unchanged cross-section
(B) Steady through changing cross-section
(C) Steady and the cross-section is unchanged
(D) Unsteady and the cross-section is changed
Answer: Option C

406. In case of a _____ the energy of flow is considerably decreased downstream of the machine.
(A) Blower
(B) Turbine
(C) Centrifugal pump
(D) Centrifugal fan
Answer: Option B

407. Pick out the correct statement pertaining to the flow through a converging-diverging tube.
(A) The value of Mach number is always unity at the throat
(B) No shock wave develops in the tube when the Mach number at exit is greater than unity
(C) Throughout the converging portion of the tube, the density increases in the downstream direction
(D) None of these
Answer: Option B

408. Water hammer in a pipeline results from the
(A) Bursting of pipelines due to closure by a valve
(B) Rapid pressure change due to a rapid change in the rate of flow
(C) Pressure increase due to closure of a valve resulting in decrease in rate of flow
(D) None of these
Answer: Option B

409. Acceleration head in a reciprocating pump
(A) Increases the work done during delivery stroke
(B) Decreases the work done during suction stroke
(C) Does not change the work requirement of the pump
(D) Increases the work done during suction stroke
Answer: Option C

410. Kinetic energy of fluid per unit weight represented by the velocity head is given by
(A) $2v^2/g_c$
(B) $v^2/2g_c$
(C) $\rho v^2/g_c$
(D) $\rho.v^2/2g_c$
Answer: Option B

411. With increase in the ratio of orifice diameter to pipe diameter, the fraction of the orifice pressure differential that is permanently lost
(A) Increases
(B) Decreases
(C) Remains unchanged
(D) Increases exponentially
Answer: Option B

412. If the discharge of a centrifugal pump is throttled, then its suction lift
(A) Increases
(B) Decreases
(C) Remains unchanged
(D) Data insufficient to predict
Answer: Option A

413. In case of isentropic flow, the speed of sound in an ideal gas is proportional to (where, T = absolute temperature).

(A) $1/\sqrt{T}$
(B) $1/T$
(C) $\sqrt{T}$
(D) T
Answer: Option C

414. With increase in the shear rate, the apparent viscosity of pseudo-plastic fluids
(A) Increases
(B) Decreases
(C) Remain same
(D) May increase or decrease; depends on the magnitude of shear rate
Answer: Option B

415. One horsepower is equal to
(A) 550 lbf.ft/second
(B) 550 kgf.m/second
(C) Both (A) and (B)
(D) 550 lbf.ft./hr
Answer: Option A

416. A particle A of diameter 10 microns settles in an oil of specific gravity 0.9 and viscosity 10 poise under Stoke's law. A particle B with diameter 20 microns settling in the same oil will have a settling velocity
(A) Same as that of A
(B) One fourth as that of A
(C) Twice as that of A
(D) Four times as that of A
Answer: Option B

417. An ideal nozzle design aims at
(A) Minimising wall friction
(B) Suppressing boundary layer separation
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

418. A piezometer opening measures the _____ fluid pressure.
(A) Static
(B) Undisturbed
(C) Total
(D) Dynamic
Answer: Option B

419. In the laminar boundary layer flow over a flat plate, the ratio (δ/x) varies as: (where, 'δ' is the boundary layer thickness and 'x' is the distance from the leading edge in the direction of flow).
(A) R_e
(B) $\sqrt{R_e}$
(C) $1/R_e$
(D) $R_e^{-1/2}$
Answer: Option D

420. The drag co-efficient for a bacterium moving in water at 1 mm/s, will be of the following order of magnitude (assume size of the bacterium to be 1 micron and kinematic viscosity of water to be $10^{-6}m^2/s$).
(A) 24000
(B) 24
(C) 0.24
(D) 0.44
Answer: Option D

421. In case of isentropic flow, the speed of sound in an ideal gas is proportional to (where M = molecular weight of the gas).
(A) $1/\sqrt{M}$
(B) $\sqrt{M}$

(C) 1/*M*
(D) *M*
Answer: Option A

422. For the same terminal conditions and valve size, the pressure drop in a fully opened globe valve as compared to that in a gate valve is
(A) More
(B) Less
(C) Equal
(D) Either (A) or (B); depends on the viscosity of the fluid
Answer: Option A

423. The bulk modulus of elasticity of a liquid
(A) Is zero for incompressible liquid
(B) Decreases with pressure
(C) Is independent of temperature & pressure
(D) Increases with pressure
Answer: Option D

424. Maximum theoretical suction lift for water at 15°C by a centrifugal pump is 34 ft. The same for water at 90°C will be _____ ft.
(A) 40
(B) 34
(C) 8
(D) 37
Answer: Option C

425. The most suitable flow measuring device for the fluid flow measurement in a very large diameter pipeline is a
(A) Weir
(B) Pitot tube
(C) Kennison nozzle
(D) V-notch
Answer: Option B

426. The terminal velocity of a particle moving through a fluid varies as d_p^n. The value of n is equal to _____ in Stoke's law regime.
(A) 1
(B) 0.5
(C) 2
(D) 1.5
Answer: Option C

427. The terminal velocity of a solid spherical particle falling through a stationary fluid mass in the Stoke's law range is proportional to the
(A) Inverse of fluid viscosity
(B) Square of particle size
(C) Difference in the densities of the particle & fluid
(D) All (A), (B) and (C)
Answer: Option D

428. Which is the correct relationship for a centrifugal pump? (Where, *D* = Impeller diameter, inches *H* = Head developed, ft of liquid pumped *N* = Speed of pump, rpm)
(A) $D = 1840\ H^{0.5}/N$
(B) $D = 1840\ N/H^{0.5}$
(C) $H = 1840\ D^{0.5}/N$
(D) $D = 1840\ H/N$
Answer: Option A

429. The resistance wire used in a hot wire anemometer for conducting electrical current is made of
(A) Copper
(B) Tungsten
(C) Chromium
(D) Aluminium

Answer: Option B

430. Pump used for the transportation of molten sodium in a fast breader reactor is a/an _____ pump.

(A) Reciprocating
(B) Plunger
(C) Electromagnetic
(D) Gear
Answer: Option C

431. As the velocity V and thus the Reynolds number of a flow past a sphere increases from very low value, the drag force for Re << 1

(A) Increases linearly with V
(B) Decreases linearly with V
(C) Decreases as V^2
(D) None of these
Answer: Option A

432. Head developed by a centrifugal pump depends on its

(A) Speed
(B) Impeller diameter
(C) Both (A) and (B)
(D) Neither (A) nor (B)
Answer: Option C

433. The centre of pressure is

(A) Always below the centroid of the area
(B) Always above the centroid of the area
(C) A point on the line of action of the resultant force
(D) At the centroid of the submerged area
Answer: Option C

434. Check valve provided in the discharge line of a centrifugal pump serves the purpose of controlling the

(A) Back flow of fluid in the event of stoppage of pump
(B) Discharge pressure
(C) Flow of liquid during operation of the pump
(D) All (A), (B) and (C)
Answer: Option A

435. The rate of shear versus the shear stress curves are time dependent for _____ fluid.

(A) Thixotropic
(B) Rheopectic
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

436. At high Reynolds number

(A) Inertial forces control and viscous forces are unimportant
(B) Viscous forces predominate
(C) Inertial forces are unimportant and viscous forces control
(D) None of these
Answer: Option A

437. Very small pressure difference (< 5 mm water column) can be most conveniently measured by a/an _____ manometer.

(A) U-tube water
(B) U-tube mercury
(C) Inclined tube mercury
(D) Inclined tube water
Answer: Option D

438. Sewage sludge is _____ type of non-Newtonian fluid.

(A) Dilatant
(B) Bingham plastic

(C) Pseudo plastic
(D) None of these
Answer: Option B

439. The flow of a liquid through tapering pipe at a constant rate is an example of _____ flow.
(A) Steady uniform
(B) Steady non uniform
(C) Unsteady uniform
(D) Unsteady non uniform
Answer: Option B

440. In fluid flow, cavitation is caused, if the
(A) Fluid velocity decreases to zero
(B) Total energy decreases
(C) Both (A) and (B)
(D) Flow pressure approaches its vapor pressure at the prevailing temperature
Answer: Option D

441. In case of a centrifugal pump, the ratio of total delivered pressure to pressure developed with the impeller is called the _____ efficiency.
(A) Manometric
(B) Mechanical
(C) Volumetric
(D) Overall
Answer: Option A

442. Cavitation can be prevented by
(A) Suitably designing the pump
(B) Maintaining the suction head sufficiently greater than the vapour pressure
(C) Maintaining suction head = developed head
(D) Maintaining suction head lower than the vapour pressure
Answer: Option B

443. A fluid whose apparent viscosity increases with shear rate is termed as the _____ fluid.
(A) Newtonian
(B) Viscous
(C) Dilatant
(D) Non-viscous
Answer: Option C

444. For the transfer of solution of thick slurry, the pump used is a _____ pump.
(A) Reciprocating
(B) Gear
(C) Diaphragm
(D) Centrifugal
Answer: Option C

445. C_d, C_c and C_v are related (for flow through an orifice) as (where, C_d = discharge co-efficient, C_c = co-efficient of contraction = (area of jet at vena-contracta/area of opening), C_v = co-efficient of velocity = (actual velocity at vena-contracta/theoretical velocity).
(A) $C_d = C_c/C_v$
(B) $C_d = C_c.C_v$
(C) $C_d = C_v/ C_c$
(D) None of these
Answer: Option B

446. Bed pressure drop in an air fluidised bed of catalyst particles (ρ_p = 200 kg/m3, D_p = 0.05 cm) of 60 cm bed depth and bed porosity of 0.5 expressed in cm of water (manometer) is
(A) 90
(B) 60
(C) 45
(D) 30
Answer: Option B

447. A pipe of I.D. 4 m is bifurcated into two pipes of I.D. 2 m each. If the average velocity of water flowing through the main pipe is 5 m/sec, the average velocity through the bifurcated pipes is

(A) 20 m/sec
(B) 10 m/sec
(C) 5 $\sqrt{2}$ m/sec
(D) 5 m/sec
Answer: Option B

448. Shear stress in a fluid flowing in a round pipe

(A) Varies parabolically across the cross-section
(B) Remains constant over the cross-section
(C) Is zero at the centre and varies linearly with the radius
(D) Is zero at the wall and increases linearly to the centre
Answer: Option C

449. Pick out the Hagen-Poiseuille's equation.

(A) $\Delta p/\rho = 4f\,(L/D)\,(V^2/2gc)$
(B) $\Delta p = 32\,(\mu LV/gc.\,D^2)$
(C) $\Delta p/L = 150\,[(1 - \varepsilon)/\varepsilon^3].\,(\mu.V_0^2/g^2cD)$
(D) $\Delta p/L = 1.75\,[(1 - \varepsilon)/\varepsilon^3].\,(\rho V_0^2/gcD_p)$
Answer: Option B

450. Capillary rise of mercury in a small diameter tube is proportional to (where, d = diameter of the tube, σ = surface tension of mercury)

(A) d
(B) $1/d$
(C) σ
(D) $1/\sigma$
Answer: Option C

451. The pressure head of a flow meter remains constant for

(A) Venturimeter
(B) Orificemeter
(C) Rotameter
(D) Pitot tube
Answer: Option C

452. Hydraulic mean depth (D_m) for a circular pipe of diameter *'D'* flowing full is 0.25 D. For a circular channel, at $D_m = 0.3\,D$, gives the condition for the maximum

(A) Flow rate
(B) Mean velocity
(C) Both 'a' & 'b'
(D) Neither 'a' nor 'b'
Answer: Option B

453. Which of the following quantities are computed by using the hydraulic radius for non-circular ducts?

(A) Velocity and relative roughness
(B) Head loss and velocity
(C) Reynold number, relative roughness and head loss
(D) Reynolds number and friction factor
Answer: Option C

454. A 0.5 m high bed made up of a 1 mm dia glass sphere (density 2500 kg/m^3) is to be fluidised by water (density 1000 kg/m^3). If at the point of incipient fluidisation, the bed voidage is 40%, the pressure drop across the bed is

(A) 4.4 KPa
(B) 2.94 KPa
(C) 3.7 KPa
(D) None of these
Answer: Option A

455. A pressure head of 320 metres of water in meters of CCl_4 (sp.gr = 1.6) will be

(A) 100
(B) 200
(C) 320
(D) 160
Answer: Option B

456. Which of the following denotes the effect of compressibility in fluid flow?
(A) Weber number
(B) Mach number
(C) Euler number
(D) Reynolds number
Answer: Option B

457. For pipe flows, head is proportional to _____ at constant capacity(where, *D* = pipe diameter).
(A) $1/D$
(B) $1/D^2$
(C) $1/D^5$
(D) D^2
Answer: Option C

458. Reynolds number for water flow through a tube of I.D. 5 cm is 1500. If a liquid of 5 centipoise viscosity and 0.8 specific gravity flows in the same pipe at the same velocity, then the pressure drop will
(A) Increase
(B) Decrease
(C) Remain same
(D) Data insufficient to predict pressure drop
Answer: Option A

459. A perfect gas
(A) Does not satisfy $PV = nRT$
(B) Is incompressible and has zero viscosity
(C) Has constant specific heat
(D) Can't develop shear stresses
Answer: Option C

460. The ratio of the depth of flow to the hydraulic radius for the most economical trapezoidal section, in open channel flow is
(A) 0.5
(B) 1
(C) 1.5
(D) 2
Answer: Option D

461. Check in a centrifugal pump is
(A) Provided in the discharge line
(B) Generally a globe valve
(C) Provided to prevent liquid from backing up through the pump when the pump is turned off or accidently stops running
(D) All (A), (B) and (C)
Answer: Option D

462. Which of the following equations as suggested by Colebrook and White gives the increase in roughness of a new surface (ε_0) with age/time (*t*) (where, ε = roughness of the surface after time'*t*'. α = a co-efficient to be experimentally determined)?
(A) $\varepsilon = \varepsilon_0 + \alpha.t$
(B) $\varepsilon = \varepsilon_0 + \alpha.t^2$
(C) $\varepsilon = \varepsilon_0 + \alpha.t^3$
(D) $\varepsilon = \varepsilon_0 + \alpha.t^4$
Answer: Option A

463. Reciprocating pumps are not able to compete with the centrifugal pump for industrial use, mainly because these pumps have
(A) Very low speeds

(B) Smaller discharge
(C) Higher capital &maintenance cost
(D) High vibrations
Answer: Option C

464. _____ pumps are axial flow pumps.
(A) Turbine
(B) Propeller
(C) Diffuser
(D) None of these
Answer: Option B

465. In an incompressible fluid, the density is
(A) Greatly affected by moderate changes in pressure
(B) Greatly affected only by moderate changes in temperature
(C) Not affected with moderate change in temperature & pressure
(D) Sensible to changes in both temperature & pressure
Answer: Option C

466. In a fully turbulent flow ($Re > 10^5$) in a pipe of diameter 'd', for a constant pressure gradient, the dependence of volumetric flow rate of an incompressible fluid is
(A) d
(B) d^2
(C) $d^{2.5}$
(D) d^4
Answer: Option C

467. Turbulent flow generally occurs for cases involving
(A) Highly viscous fluid
(B) Very narrow passages
(C) Very slow motion
(D) None of these
Answer: Option D

468. For a particle settling in water at its terminal settling velocity, which of the following is true?
(A) Buoyancy = weight + drag
(B) Weight = buoyancy + drag
(C) Drag = buoyancy + weight
(D) Drag = weight
Answer: Option B

469. The ratio of wall drag to total drag in the Stoke's law range is
(A) 0.5
(B) 1
(C) 1/3
(D) 2/3
Answer: Option D

470. Gear pump
(A) Is a positive displacement pump
(B) Is a centrifugal pump
(C) Is a non-positive displacement pump
(D) Can be started with delivery valve closed
Answer: Option A

471. A Venturimeter cannot be used for the direct measurement of
(A) Datum difference in the stretch of pipe-flow
(B) Pressure difference in the flow through pipeline
(C) Friction loss in pipe flow
(D) All (A), (B) and (C)
Answer: Option D

472. Most commonly used joint in the underground pipe lines is the
(A) Sleeve joint

(B) Coupling
(C) Flange
(D) Expansion joint
Answer: Option A

473. For a given Reynold number as d/D for an orifice increases, C_d will (where, d & D are orifice & pipe diameters respectively).
(A) Increase
(B) Decrease
(C) Remain constant
(D) Either (A) or (B); depends on other factors
Answer: Option A

474. Ratio of pressure and inertia force gives _____ number.
(A) Weber
(B) Mach
(C) Euler
(D) Froude
Answer: Option C

475. Speed of sound in an ideal gas depends on its
(A) Temperature
(B) Pressure
(C) Specific volume
(D) None of these
Answer: Option A

476. With increasing flow rate, the hydraulic efficiency of a centrifugal pump
(A) Monotonically decreases
(B) Decreases and then increases
(C) Remains constant
(D) Increases and then decreases
Answer: Option A

477. The temperature in isentropic flow
(A) Does not depend on Mach number
(B) Depends on Mach number only
(C) Cannot drop and then increase again downstream
(D) None of these
Answer: Option B

478. Steady uniform flow is represented by flow through a/an
(A) Long pipe at constant rate
(B) Long pipe at decreasing rate
(C) Expanding tube at constant rate
(D) None of these
Answer: Option A

479. Pipes having diameter 14 inches or more are designated by their
(A) Outside diameter
(B) Inside diameter
(C) Schedule number
(D) None of these
Answer: Option A

480. Which of the following is not a dimension-less parameter?
(A) Euler number
(B) Specific gravity
(C) Fanning friction factor
(D) None of these
Answer: Option D

481. Check valves are used
(A) At high pressure
(B) In bends

(C) For controlling water flow
(D) For unidirectional flow
Answer: Option D

482. A fluid is the one, which
(A) Cannot remain at rest under the action of shear force
(B) Continuously expands till it fills any container
(C) Is incompressible
(D) Permanently resists distortion
Answer: Option A

483. A double acting reciprocating pump compared to a single acting pump (of almost same size working under same pressure levels) would give almost double
(A) Head
(B) Discharge
(C) Efficiency
(D) None of these
Answer: Option B

484. Brownian movement is prominent in the particle size range of _____ microns in case of settling of a particle in a fluid.
(A) 2 to 3
(B) 0.01 to 0.10
(C) 200 to 300
(D) 100 to 1000
Answer: Option A

485. Boundary layer separation is caused by the
(A) Reduction of pressure to vapour pressure
(B) Boundary layer thickness reducing to zero
(C) Adverse pressure gradient
(D) Reduction of pressure gradient to zero
Answer: Option D

486. Select the wrong statement pertaining to flow of an incompressible fluid through a Venturimeter.
(A) For frictionless flow, the fluid pressure entering the venturi meter will be exactly equal to that leaving the Venturimeter
(B) Discharge of fluid through a Venturimeter depends upon the gage difference irrespective of the orientation of Venturimeter
(C) Venturimeter occupies less space than an orificemeter
(D) Venturimeter incurs less power loss compared to an equivalent orificemeter
Answer: Option C

487. If '*x*' is the depth of flow in an open channel of large width, then the hydraulic radius is equal to
(A) x
(B) $x/2$
(C) $x/3$
(D) $2x/3$
Answer: Option A

488. The velocity profile for turbulent flow through a closed conduit is
(A) Logarithmic
(B) Parabolic
(C) Hyperbolic
(D) Linear
Answer: Option A

489. A differential pressure cell is used for
(A) Measuring small pressure difference in gases
(B) Measuring small pressure difference in liquids
(C) Remote recording of pressure difference
(D) Measuring the difference of the impact & the static pressure
Answer: Option C

490. Nominal size of a pipe is an indication of its _____ diameter.

(A) Inner
(B) Outer
(C) Approximate
(D) None of these
Answer: Option C

491. Which of the following pipe bends will incur the largest head loss?

(A) U-bend
(B) 30° bend
(C) 45° bend
(D) 90° bend
Answer: Option A

492. The fluid in which the shearing stress within it is proportional to the velocity gradient across the sheared section, is called a _____ fluid.

(A) Bingham
(B) Newtonian
(C) Perfect
(D) None of these
Answer: Option B

493. Which of the fluid forces are not considered in the Reynold's equation of flow?

(A) Viscous forces
(B) Turbulent forces
(C) Pressure forces
(D) Compressibility forces
Answer: Option D

494. With increase in pump speed, its NPSH requirement

(A) Decreases
(B) Increases
(C) Remains unaltered
(D) Can either increase or decrease; depends on other factors
Answer: Option B

495. Bernoulli's equation does not apply to the functioning of a/an

(A) Venturimeter
(B) Orificemeter
(C) pitot tube
(D) None of these
Answer: Option D

496. Pressure drag does not depend upon the

(A) Roughness of surface of the body
(B) Pressure of main flow only
(C) Length of the body in flow direction
(D) All (A), (B) and (C)
Answer: Option D

497. Rotary vacuum pumps can reduce the absolute pressure to as low as _____ mm Hg.

(A) 1
(B) 0.1
(C) 0.01
(D) 0.001
Answer: Option C

498. The exit cone angle in case of a standard Venturimeter is _____ the entrance cone angle.

(A) Smaller than
(B) Greater than
(C) Equal to
(D) Either (A) or (B)
Answer: Option A

499. In fluid flow, the boundary layer separation cannot occur

(A) In case of boundaries experiencing form drag
(B) At points of abrupt changes in the flow directions
(C) In laminar flow
(D) None of these
Answer: Option D

500. Molten soap mass is transported by a _____ pump.

(A) Diaphragm
(B) Reciprocating
(C) Gear
(D) Centrifugal
Answer: Option D

501. If more than two branches of pipes are to be connected at the same point, then use a/an

(A) Elbow
(B) Union
(C) Tee
(D) None of these
Answer: Option C

502. Assuming flow to be laminar, if the diameter of the pipe is halved, then the pressure drop will

(A) Increase
(B) Decrease
(C) Remain same
(D) Be quadrupled
Answer: Option A

503. Water hammer is caused, when water flowing in a pipe is suddenly brought to rest by closing the valve. The extent of pressure thus produced due to water hammer depends on the

(A) Pipe length
(B) Fluid velocity in the pipe
(C) Time taken to close the valve
(D) All (A), (B) and (C)
Answer: Option D

504. Dimension of surface tension is (where, F = force, L = length)

(A) FL^{-1}
(B) $F^{-1}. L$
(C) $F.L^{-2}$
(D) $F^{-2}. L$
Answer: Option A

505. A mono pump is a _____ pump.

(A) Centrifugal
(B) Piston
(C) Positive acting rotary
(D) A group of vacuum
Answer: Option C

506. For pipes that must be broken at intervals for maintenance, the connector used should be a/an

(A) Union
(B) Tee
(C) Reducer
(D) Elbow
Answer: Option A

507. Which of the following assumptions enables the Euler's equation of motion to be integrated?

(A) The fluid is incompressible
(B) The fluid is non-viscous
(C) The continuity equation is satisfied

(D) The flow is rotational and incompressible
Answer: Option A

508. The terminal velocity of a small sphere settling in a viscous fluid varies as the
(A) First power of its diameter
(B) Inverse of the fluid viscosity
(C) Inverse square of the diameter
(D) Square of the difference in specific weights of solid & fluid
Answer: Option B

509. Fluid flow at increasing rate through a diverging pipe is an example of _____ flow.
(A) Steady uniform
(B) Non-steady uniform
(C) Steady non-uniform
(D) Non-steady non-uniform
Answer: Option D

510. A Rotameter through which air at room temperature and atmospheric pressure is flowing gives a certain reading for a flow rate of 100 cc/sec. If helium (molecular weight 4) is used and Rotameter shows the same reading, the flow rate (cc/sec) is
(A) 26
(B) 42
(C) 269
(D) 325
Answer: Option C

511. Pascal's law is valid, only when the fluid is
(A) Frictionless and at rest
(B) At rest
(C) At rest and when the frictionless fluid is in motion
(D) None of these
Answer: Option B

512. Co-efficient of velocity is _____ the coefficient of discharge.
(A) Less than
(B) More than
(C) Equal to
(D) Not related to
Answer: Option B

513. Theoretical head developed by a centrifugal pump does not depend upon the _____ the impeller.
(A) Radius of
(B) Speed of
(C) Fluid velocity leaving
(D) None of these
Answer: Option D

514. The inherent characteristic of an equal percentage valve relating flow rate 'q' with valve stem movement 'x' are described by the equation
(A) $dq/dx = K$
(B) $dq/dx = K.q$
(C) $dq/dx = K/q$
(D) $dq/dx = Kq^2$
Answer: Option A

515. The dimension of kinematic viscosity is
(A) $ML^{-2}T^{-1}$
(B) L^2T^{-1}
(C) $ML^{-2}T^{-2}$
(D) None of these
Answer: Option B

516. The terminal velocity of a particle moving through a fluid varies as d_p^n. What is the value of n' for Newton's law regime?

(A) 0.5
(B) 1
(C) 1.5
(D) 3
Answer: Option A

517. Drag force acting on a body does not depend upon the
(A) Density of the fluid
(B) Density of the body
(C) Velocity of the body
(D) Projected area of the body
Answer: Option B

518. Fluidised beds are formed, when the
(A) Fluid friction is zero
(B) Gravity force is less than the fluid friction
(C) Pressure forces equal gravity forces
(D) Sum of the fluid friction and pressure forces is equal and opposite to gravity forces
Answer: Option B

519. N^2_{Re}/N_{Fr} is called the _____ number.
(A) Brinkman
(B) Galileo
(C) Archimedes
(D) Euler
Answer: Option B

520. Which of the following is not concerned with the fluid-particle interaction?
(A) Drag co-efficient
(B) Froude number
(C) Galileo number
(D) Weber number
Answer: Option D

521. Centre of pressure in an immersed body is _____ the centre of gravity.
(A) Above
(B) Below
(C) At
(D) Either above or below; depends on the liquid density
Answer: Option B

522. The _____ is measured by a piezometric opening.
(A) Dynamic pressure
(B) Static pressure
(C) Total pressure
(D) Point velocity
Answer: Option C

523. The phenomenon occuring during pumping of a liquid solution containing dissolved gases, which may come out of the solution giving rise to gas pockets, is termed as
(A) Evaporation
(B) Cavitation
(C) Sublimation
(D) Stripping
Answer: Option B

524. What is the normal range of exit cone angle of a Venturimeter?
(A) 2 to 5
(B) 7 to 15
(C) 15 to 25
(D) >25
Answer: Option B

525. Centrifugal pump is normally classified on the basis of the
(A) rpm

(B) Type of casing
(C) Impeller blade angle
(D) Number of blades in impeller
Answer: Option B

526. For one dimensional flow of an incompressible fluid in unsteady state in x-direction, the continuity equation is given by
(A) $\partial u/\partial x = 0$
(B) $\partial(\rho u)/\partial x = 0$
(C) $(\partial u/\partial x) = -(\partial \rho/\partial t)$
(D) $\partial \rho/\partial t = 0$
Answer: Option A

527. The specific speed of a pump is defined as the speed of a unit of such a size, that it
(A) Delivers unit discharge at unit head
(B) Requires unit power for unit head
(C) Delivers unit discharge at unit power
(D) None of these
Answer: Option A

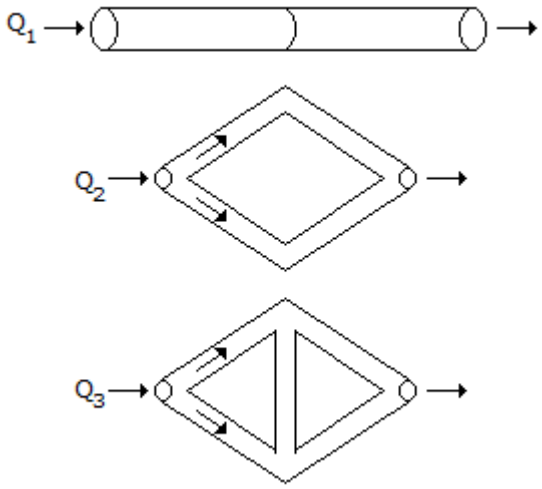
528. Pick out the wrong statement.
(A) The shear stress at the pipe (dia = D, length = L) wall in case of laminar flow of Newtonian fluids is $(D/4L).\ \Delta p$
(B) In the equation, $T.\ g_c = k.\ (du/dy)^n$ the value of 'n' for pseudoplastic and Dilatant fluid are < 1 and >1 respectively
(C) Shear stress for Newtonian fluid is proportional to the rate of shear in the direction perpendicular to motion
(D) With increase in the Mach number >0.6, the drag co-efficient decreases in case of compressible fluids
Answer: Option D

529. For ideally incompressible fluid, the Mach number will be
(A) 1.5
(B) 1
(C) 0
(D) 5
Answer: Option B

530. Absolute viscosity of a fluid is a function of the _____ of the fluid.
(A) Motion
(B) Pressure & temperature
(C) Shearing stress
(D) Both (B) & (C)
Answer: Option D

531. Various efficiencies of a centrifugal pump are related as (where, η_m = mechanical efficiency η_v = volumetric efficiency. η_{ma} = manometric efficiency η_o = overall efficiency)
(A) $\eta_{ma} \times \eta_m \times \eta_v = \eta_o$
(B) $\eta_m = \eta_v \cdot \eta_{ma}$
(C) $\eta_{ma} = \eta_m \times \eta_v$
(D) $\eta_v = \eta_m \times \eta_{ma}$
Answer: Option B

532. Three piping networks as shown in the figure are placed horizontally. They are made using identical pipe segments and are subjected to the same pressure drop across them. Assuming no pressure losses at junctions, the flow rates across the three networks are related as $Q_1 : Q_2 : Q_3$.



(A) 1 : √3 : 2
(B) 1 : 2 : 3
(C) 1 : 2 : 2
(D) 1 : √2 : √2
Answer: Option C

533. A pitched-blade turbine draws _____ a straight blade turbine.
(A) Less power than
(B) More power than
(C) Same power as
(D) Data insufficient to predict
Answer: Option A

534. For flow of fluids through packed bed, the superficial velocity is
(A) Less than the average velocity through channels
(B) More than the average velocity through channels
(C) Dependent on the pressure drop across the bed
(D) Same as the average velocity through channels
Answer: Option A

535. A fluid is pumped at the rate of 10 lb/sec to a height of 55 ft. The horse power required is _____ hp.
(A) 1
(B) 10/55
(C) 5.5
(D) 1/55
Answer: Option A

536. Unsteady uniform flow is represented by flow through a/an
(A) Long pipe at constant rate
(B) Long pipe at decreasing rate
(C) Expanding tube at increasing rate
(D) Expanding tube at constant rate
Answer: Option B

537. In turbulent flow, a rough pipe has the same friction factor as a smooth pipe
(A) In the zone of complete turbulence
(B) When the roughness projections are much smaller than the thickness of the laminar film
(C) Everywhere in the transition zone
(D) When the friction factor is independent of the Reynold's number
Answer: Option B

538. The speed of sound in an ideal gas varies as the
(A) Temperature
(B) Pressure
(C) Density
(D) None of these
Answer: Option A

539. What is the pipe called which lifts water from a reservoir to a greater height than the initial level in the supply reservoir?

(A) Penstock
(B) Siphon
(C) Tunnel
(D) Pressure pipeline
Answer: Option B

540. Velocity at a certain point in case of streamline flow is

(A) Constant
(B) Independent of time
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

541. Reciprocating pumps compared to centrifugal pumps

(A) Deliver liquid at uniform pressure
(B) Can handle slurries more efficiently
(C) Are not subject to air binding
(D) Can be operated with delivery valve closed
Answer: Option C

542. The discharge co-efficient for an orifice meter does not depend upon the

(A) Pipe length
(B) Ratio of pipe diameter to orifice diameter
(C) Type of orifice & the Reynolds number
(D) Pipe diameter
Answer: Option A

543. A fluid (μ/ρ) = 0.01 cm^2/sec is moving at critical flow condition (N_{Re} = 2100) through a pipe of dia 3 cms. Velocity of flow is _____ cm/sec.

(A) 7
(B) 700
(C) 7000
(D) 630
Answer: Option A

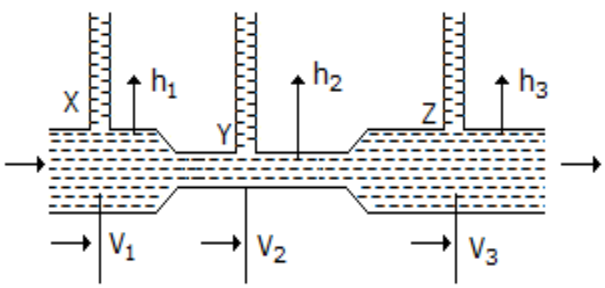
544. For a specific centrifugal air blower operating at constant speed & capacity, the power requirement and pressure vary

(A) Directly as square of gas density
(B) Directly as gas density
(C) Directly as square root of gas density
(D) Inversely as gas density
Answer: Option B

545. For the free settling of a spherical particle through a fluid, the slope of, C_D-log N_{Re}, plot is

(A) 1
(B) -1
(C) 0.5
(D) -0.5
Answer: Option B

546. For flow through a venturi at a particular discharge, the correct relationships among velocities at point *X*, *Y* and *Z* would be



(A) $V_1 < V_2 < V_3$

(B) $V_2 > V_1$ and $V_2 > V_3$
(C) $V_1 > V_2 > V_3$
(D) None of these
Answer: Option B

547. Pick out the wrong statement:
(A) The vacuum pressure is always the negative gauge pressure
(B) The pressure of the liquid measured by a piezometer tube is the gauge pressure
(C) Manometric liquid should have high surface tension
(D) The point at which the resultant pressure on an immersed surface acts, is known as the centre of gravity
Answer: Option D

548. The most important factor, which determines the maximum height to which water can be lifted by a pump at standard temperature is the
(A) Barometric pressure
(B) Speed of the impeller
(C) Diameter of the impeller
(D) Both (B) and (C)
Answer: Option A

549. Euler's equation of motion states, that at every point, the
(A) Fluid momentum is constant
(B) Force per unit mass equals acceleration
(C) Rate of mass outflow is equal to the rate of mass inflow
(D) None of these
Answer: Option B

550. Hydraulic radius is the ratio of
(A) Wetted perimeter to flow area
(B) Flow area to wetted perimeter
(C) Flow area to square of wetted perimeter
(D) Square root of flow area to wetted perimeter
Answer: Option B

551. Steady flow occurs, when the
(A) Conditions change steadily with time
(B) Conditions are the same at the adjacent points at any instant
(C) Conditions do not change with time at any point
(D) Rate of the velocity change is constant
Answer: Option C

552. Cocks are used to control
(A) Water
(B) Any liquid
(C) Solids
(D) None of these
Answer: Option B

553. Euler's equation of motion is a statement expressing
(A) Conservation of mass
(B) Conservation of energy
(C) Newton's first law of motion
(D) Newton's second law of motion
Answer: Option A

554. Experimental study of laminar fluid flow through a circular tube was conducted by
(A) Reynolds
(B) Hagen and Poiseuille
(C) Pascal
(D) Blake-Plummer
Answer: Option B

555. The pressure drop per unit length of pipe incurred by a fluid 'X' flowing through pipe is Δp. If another fluid 'Y' having both the specific gravity & density just double of that of fluid 'X',

flows through the same pipe at the same flow rate/average velocity, then the pressure drop in this case will be

(A) Δp
(B) $2\Delta p$
(C) Δp^2
(D) $\Delta p/2$
Answer: Option B

556. Which of the following factors does not contribute to the pressure drop in a pipeline?

(A) Velocity of fluid
(B) Size of pipe
(C) Length of pipe and number of bends
(D) None of these
Answer: Option D

557. Two dimensional stream function

(A) Relates velocity and pressure
(B) Is constant along a stream line
(C) Is constant along an equipotential surface
(D) None of these
Answer: Option B

558. What is the force required (in Newtons) to hold a spherical balloon stationary in water at a depth of *H* from the air-water interface? The balloon is of radius 0.1 m and is filled with air.

(A) $4\pi g/3$
(B) $0.01\ \pi gH/4$
(C) $0.01\ \pi gH/8$
(D) $0.04\ \pi gH/3$
Answer: Option A

559. Small pressure differences in liquids is measured using a/an

(A) U-tube manometer
(B) Inclined tube manometer
(C) Pitot tube
(D) None of these
Answer: Option B

560. C_d for the orifice plate varies from

(A) 0.58 to 0.8
(B) 0.93 to 0.98
(C) 0.2 to 0.3
(D) 0.02 to 0.03
Answer: Option A

561. Choose the correct set of dimensions of viscosity that are equivalent (where, F, M, L, T are dimensions for force, mass, length and time respectively).

(A) $FL^{-2}T$, $ML^{-1}T^{-1}$
(B) FLT, $ML^{-1}T^{-1}$
(C) $ML^{-1}T^{-3}$, $F^{-1}L^{2}T$
(D) $F^{-1}L^{2}T^{-1}$, MLT^{-3}
Answer: Option A

562. Reynolds number is the ratio of

(A) Viscous forces to gravity forces
(B) Inertial forces to viscous forces
(C) Viscous forces to inertial forces
(D) Inertial forces to gravity forces
Answer: Option B

563. Which of the following two quantities when same, makes one pipe system equivalent to another pipe system?

(A) Head & discharge
(B) Length & discharge
(C) Length & diameter
(D) Friction factor & diameter

Answer: Option A

564. Friction produced by the formation of wakes is called the _____ friction.
(A) Disk
(B) Skin
(C) Form
(D) None of these
Answer: Option C

565. Slugging in a fluidised bed can be avoided by using
(A) Tall narrow vessel
(B) Deep bed of solids
(C) Shallow beds of solids and proper choice of particle size
(D) Very large particles
Answer: Option C

566. The discharge through a Venturimeter depends upon
(A) Pressure drop only
(B) Its orientation
(C) Co-efficient of contraction only
(D) None of these
Answer: Option A

567. Fluid flow in a/an _____ is an example of pressure flow.
(A) Partially filled pipeline
(B) Pipe
(C) Open channel
(D) River
Answer: Option B

568. The head loss due to sudden expansion is
(A) $(V_1^2 - V_2^2)/2gc$
(B) $(V_1 - V_2)^2/2gc$
(C) $(V_1 - V_2)/2gc$
(D) $(V_1^2 - V_2^2)/gc$
Answer: Option B

569. Boundary layer separation is characterised by one of the conditions given below, where 'Re' is the Reynolds number for the flow. Select the appropriate conditions.
(A) Re << 1, accelerating flow
(B) Re >> 1, accelerating flow
(C) Re << 1, decelerating flow
(D) Re >>1, decelerating flow
Answer: Option D

570. The ratio of the wall drag to the form drag in the Stoke's law range (for motion of spherical particles in a stationary fluid) is
(A) 0.5
(B) 1
(C) 2
(D) 0.33
Answer: Option C

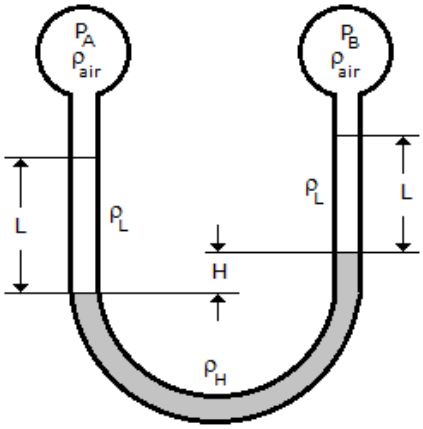
571. In the Newton's law range, the terminal velocity of a solid spherical particle falling through a stationary fluid mass is _____ the fluid viscosity.
(A) Directly proportional to
(B) Inversely proportional to
(C) Inversely proportional to the square root of
(D) Independent of
Answer: Option B

572. Pick out the wrong statement pertaining to fluid flow.
(A) The ratio of average velocity to the maximum velocity for turbulent flow of Newtonian fluid in circular pipes is 0.5
(B) The Newtonian fluid velocity in a circular pipe flow is maximum at the centre of the pipe

(C) Navier-Stokes equation is applicable to the analysis of viscous flows
(D) Hagen-Poiseuille equation is applicable to the laminar flow of Newtonian fluids
Answer: Option A

573. The capacity of an accumulator is the maximum
(A) Energy which it can store
(B) Discharge which it can deliver
(C) Liquid which it can store
(D) None of these
Answer: Option A

574. For the manometer set up shown in the figure, the pressure difference P_A - P_B is given by



(A) $(\rho H - \rho_{air})gH$
(B) $(\rho H - \rho L)gH$
(C) $(\rho H - \rho L)\ gH + (\rho L - \rho_{air})\ .\ g(L - H)$
(D) $(\rho H - \rho L)\ gL + (\rho L - \rho_{air})gH$
Answer: Option A

575. Priming of a centrifugal pump is done to
(A) Increase the mass flow rate of fluid
(B) Develop effective pressure rise by the pump
(C) Avoid chances of separation inside the impeller
(D) None of these
Answer: Option C

576. In case of a Rotameter, the density of the float material is _____ that of the liquid it replaces.
(A) More than
(B) Less than
(C) Equal to
(D) Either (A) or (B)
Answer: Option A

577. The fluid property which matters for falling rain drops to acquire spherical shape is its
(A) Pressure
(B) Height of descend
(C) Viscosity
(D) Surface tension
Answer: Option D

578. For turbulent flow in smooth circular pipe, the velocity distribution is a function of the distance '*d*' measured from the wall of the pipe and the friction velocity 'v', and it follows a _____ relationship.
(A) Logarithmic
(B) Linear
(C) Hyperbolic
(D) Parabolic
Answer: Option A

579. Venturimeters, orificemeters and nozzles are used to measure the fluid discharge from a pipeline. The average fluid velocity in a pipeline can be measured by a/an
(A) Weir

(B) Hot wire anemometer
(C) Cup and vane anemometer
(D) None of these
Answer: Option B

580. Cavitation in a pump creates so many undesirable effects. Out of the following, which is not an undesirable effect created by cavitation?
(A) Decrease in effect
(B) Increase in thrust
(C) Develops noise
(D) Develops high pressure
Answer: Option D

581. A centrifugal pump loses prime after starting. The reason of this trouble may be
(A) Incomplete priming
(B) Too high a suction lift
(C) Low available NPSH and air leaks in the suction pipe
(D) All (A), (B), and (C)
Answer: Option D

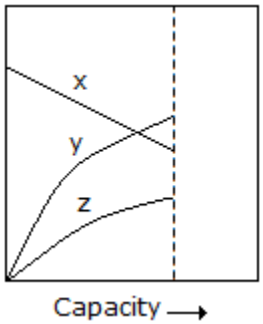
582. C_d is always _____ C_c
(A) Greater than
(B) Less than
(C) Equal to
(D) Either more or less than
Answer: Option A

583. The kinetic energy correction factor for velocity distribution of laminar flow is
(A) 0.5
(B) 1.66
(C) 1
(D) 2
Answer: Option B

584. A gas (density = 1.5 kg/m^3, viscosity = 2×10^{-5} kg/m.s) flowing through a packed bed (particle size = 0.5 cm, porosity = 0.5) at a superficial velocity of 2 m/s causes a pressure drop of 8400 Pa/m. The pressure drop for another gas, with density of 1.5 kg/m^{3}and viscosity of 3×10^{-5}kg/m.s flowing at 3 m/s will be
(A) 8400 Pa/m
(B) 12600 Pa/m
(C) 18900 Pa/m
(D) 16800 Pa/m
Answer: Option B

585. The co-efficient of drag and lift for an incompressible fluid depends on the
(A) Reynolds number
(B) Froude number
(C) Mach number
(D) All (A), (B) and (C)
Answer: Option A

586. Characteristic curves for a centrifugal pump plotted against its capacity is shown in the diagram. *x, y* and *z* denote respectively



(A) Efficiency, head and B.H.P.
(B) Head, efficiency and B.H.P.

(C) B.H.P., efficiency and head
(D) Efficiency, B.H.P. and head
Answer: Option B

587. The time taken for gravity flow of a fixed volume of liquid (as in Redwood viscometer) is directly proportional to its
(A) Absolute viscosity
(B) Ratio of absolute viscosity to density
(C) Density
(D) Reynolds number
Answer: Option B

588. If in a flow field, between any two points, then the flow must be
(A) Steady, incompressible, irrotational
(B) Steady, compressible, irrotational
(C) Steady, compressible and along a streamline
(D) Unsteady, incompressible, irrotational
Answer: Option A

589. Hydrometer measures the specific gravity of liquids based on the principles of buoyancy. Pycnometer is used to measure the specific gravity of
(A) Powder & granular solids
(B) Liquids
(C) Low melting point semi-solids
(D) All 'a', 'b' & 'c'
Answer: Option D

590. Which of the following options will facilitate the achievement of a very high head (say 30 metres) in case of a centrifugal pump?
(A) Increasing the impeller speed and the volute area
(B) Increasing the number of vanes in the impeller
(C) Mounting of two or more impellers in series on a single shaft
(D) Either of (A), (B) or (C)
Answer: Option C

591. Volume of liquid displaced by a floating body is equivalent to its
(A) Own weight
(B) Submerged weight
(C) Own volume
(D) Submerged volume
Answer: Option A

592. Working of a _____ pump characterises mixed flow.
(A) Turbine
(B) Piston
(C) Diaphragm
(D) None of these
Answer: Option A

593. What causes cavitation in centrifugal pump?
(A) High suction pressure
(B) Low barometric pressure
(C) Low suction pressure
(D) High suction velocity
Answer: Option C

594. Drag co-efficient in hindered settling is _____ that in free settling.
(A) Less than
(B) Equal to
(C) Not necessarily greater than
(D) Always greater than
Answer: Option D

595. For motion of spherical particles in a stationary fluid, the drag co-efficient in hindered settling compared to that in free settling is

(A) More
(B) Less
(C) Equal
(D) More or less, depending on the type of particle
Answer: Option A

596. In case of Venturimeter, friction losses are about _____ percent of maximum velocity head.
(A) 2
(B) 8
(C) 12
(D) 20
Answer: Option A

597. The pressure at a point in a fluid is not the same in all directions, when the fluid is viscous and
(A) Moving
(B) Static
(C) Cold
(D) Hot
Answer: Option A

598. The maximum head that can be developed by a single impeller is _____ ft.
(A) 25
(B) 100
(C) 250-300
(D) 1000
Answer: Option C

599. Pitot tube measures the _____ of a fluid.
(A) Pressure
(B) Average velocity
(C) Average flow rate
(D) Point velocity
Answer: Option D

600. Location of vena-contracta in an orificemeter does not depend upon the
(A) Type of orifice
(B) Density, viscosity & compressibility of the fluid
(C) Ratio of pipe diameter to orifice diameter
(D) Pipe roughness
Answer: Option A

601. Manometers measure the _____ pressure.
(A) Vacuum as well as the atmospheric
(B) Difference in
(C) Absolute
(D) Gage
Answer: Option B

602. Path followed by water jet issuing from the bottom of a water tank will be a
(A) Parabola (vertex being at the opening)
(B) Hyperbola
(C) Horizontal straight line
(D) Zig-zag path (which is geometrically undefined)
Answer: Option A

603. Centre of pressure of a plane surface of arbitrary shape immersed vertically in a static mass of fluid
(A) Lies above the centroid of the plane surface
(B) Is independent of the specific weight of the fluid
(C) Is different for different fluids
(D) Is at the centroid of the plane surface
Answer: Option B

604. For flow past a flat plate, if 'x' is the distance along the plate in the direction of flow, the boundary layer thickness is proportional to

(A) $\sqrt{x}$
(B) $1/\sqrt{x}$
(C) x
(D) $1/x$
Answer: Option A

605. Vena-contracta pressure tapping is at a distance _____ from the position of an orificemeter fitted in a pipe of internal diameter 'd'

(A) d
(B) $0.5\,d$
(C) $2d$
(D) $4d$
Answer: Option B

606. The unit of bulk modulus of elasticity for a liquid in S.I. unit is

(A) N
(B) N/m
(C) N/m^2
(D) N/m^3
Answer: Option C

607. A special type of liquid transporting device is the diffuser pump, in which _____ are minimised.

(A) Bearing losses
(B) Disk friction
(C) Shock losses
(D) Cavitation
Answer: Option C

608. It is possible to integrate an automatic flow controller to a

(A) Flow nozzle
(B) Venturimeter
(C) Rotameter
(D) None of these
Answer: Option C

609. For flow through an orifice from a reservoir, the actual velocity at the vena contracta is given by

(A) $\sqrt{(2gh)}$
(B) $C.V.\ \sqrt{(2gh)}$
(C) $C_d\ \sqrt{(2gh)}$
(D) $C_c\ \sqrt{(2gh)}$
Answer: Option B

610. Friction factor for a hydraulically smooth pipe at $N_{Re} = 2100$ is f_1. If the pipe is further smoothened (i.e., roughness is reduced), the friction factor at the same value of N_{Re}, will

(A) Increase
(B) Decrease
(C) Remain unchanged
(D) Increase or decrease depending on the pipe material
Answer: Option A

611. Specific speed of a centrifugal pump relates it with another pump having the

(A) Dynamic similarity
(B) Same efficiency
(C) Same speed
(D) Geometrical similarity
Answer: Option A

612. The dimension of surface tension is

(A) ML^{-2}
(B) MT^{-2}
(C) MLT^{-2}

(D) $ML^{-2}T$
Answer: Option B

613. Isotropic turbulence occurs
(A) Where there is no velocity gradient
(B) At higher temperatures
(C) Only in Newtonian fluids
(D) None of these
Answer: Option A

614. N. second/m^2 is
(A) The S.I. unit of dynamic viscosity
(B) The S.I. unit of kinematic viscosity
(C) Equivalent to one poise
(D) Equivalent to one stoke
Answer: Option A

615. A spherical particle is falling slow in a viscous liquid such that Reynolds number is less than 1. Which statement is correct for this situation?
(A) Inertial and drag forces are important
(B) Drag, gravitational and buoyancy forces are important
(C) Drag force and gravitational forces are important
(D) None of the above
Answer: Option B

616. Water flow rate in a pipe of 3.5 metres diameter can be most economically and conveniently measured by a/an
(A) Pitot tube
(B) Venturimeter
(C) Orificemeter
(D) Rotameter
Answer: Option A

617. Which of the following is the 'Blasius equation', relating friction factor to the Reynolds number?
(A) $f = 0.079.N_{Re}^{-0.25}$
(B) $f^{-0.5} = 4.07 \log_e (N_{Re}f)^{-0.6}$
(C) Both 'a' and 'b'
(D) None of these
Answer: Option A

618. Maintenance cost of a _____ pump for a particular duty is the least.
(A) Centrifugal
(B) Reciprocating
(C) Volute
(D) Gear
Answer: Option A

619. In which type of fluid flow, the velocity of flow of fluid changes from point to point in the fluid at any instant?
(A) Rotational
(B) Unsteady
(C) Turbulent
(D) Non-uniform
Answer: Option D

620. With a constant diameter impeller of a centrifugal pump
(A) Its capacity varies directly as the square of speed
(B) Head varies as the square of speed
(C) Horsepower input varies as the square of speed
(D) Head varies as the speed
Answer: Option B

621. Draining of shallow pits or sump is done by a sump pump, which is a _____ pump.
(A) Single stage vertical

(B) Centrifugal
(C) Plunger
(D) Diffuser
Answer: Option A

622. Which of the following is an undesirable property of a manometric liquid?
(A) Non-sticky & non-corrosive nature
(B) High vapour pressure
(C) Low viscosity & surface tension
(D) Low co-efficient of thermal expansion
Answer: Option B

623. Each term of the Bernoulli's equation written in the form, $(p/\rho) + (g/g_c)$. $Z + (v^2/2g_c)$ = constant, represents the total energy per unit
(A) Mass
(B) Volume
(C) Specific weight
(D) None of these
Answer: Option A

624. In Newton's law range, the terminal velocity of a solid spherical particle falling through a stationary fluid mass varies as the _____ of its diameter.
(A) Inverse
(B) Square root
(C) Second power
(D) First power
Answer: Option B

625. What causes convective acceleration in fluid flow?
(A) Steep slope in flow
(B) Unsteady nature of flow
(C) Non-uniformity of flow
(D) Turbulence in flow
Answer: Option C

626. The general relationship between speed N, head H, power P and discharge Q for a centrifugal pump is
(A) $Q \propto N : H \propto N^2 : P \propto N^3$
(B) $Q \propto N^2 : H \propto N^3 : P \propto N$
(C) $Q \propto N : H \propto N^3 : P \propto N^2$
(D) $Q \propto N^3 : H \propto N : P \propto N^2$
Answer: Option A

627. A streamline is
(A) The line connecting the mid-points of flow cross-sections
(B) Defined for uniform flow only
(C) Drawn normal to the velocity vector at every point
(D) Always the path of a particle
Answer: Option C

628. A bed consists of particles of density 2000 kg/m^3. If the height of the bed is 1.5 metres and its porosity 0.6, the pressure drop required to fluidise the bed by air is
(A) 25.61 kPa
(B) 11.77 kPa
(C) 14.86 kPa
(D) 21.13 kPa
Answer: Option B

629. With diminishing cross-sectional area in case of subsonic flow in a converging nozzle, the
(A) Velocity increases
(B) Pressure decreases
(C) Both (A) & (B)
(D) Neither (A) nor (B)
Answer: Option C

630. Efficiency of power transmission (η) through a circular pipe is given by $(h_t - h_f)/h_t$, which has a maximum value of _____ percent.

(A) 33:3
(B) 50
(C) 66.6
(D) 88.8
Answer: Option C

631. Deformation drag, which is caused by widespread deformation of fluid around the immersed body

(A) Occurs when N_{Re} is very small
(B) Is primarily a friction drag
(C) Is independent of body length
(D) Depends mainly on cross-sectional shape
Answer: Option A

632. For a reciprocating pump, the indicator diagram is the graph between the

(A) Discharge and overall efficiency
(B) Volume swept by piston for one complete revolution and the pressure in the cylinder
(C) Angle swept by the crank pin at any instant and the discharge
(D) None of these
Answer: Option B

633. The pump impeller and the turbine runner in a hydraulic torque converter

(A) Have the same diameter
(B) Have different diameters
(C) Are directly coupled
(D) None of these
Answer: Option B

634. Power requirement of fans having constant wheel diameter varies _____ fan speed.

(A) As square of
(B) Directly as
(C) As cube of
(D) None of these
Answer: Option C

635. Which is not a variable head meter?

(A) Venturimeter
(B) Pitot tube
(C) Rotameter
(D) None of these
Answer: Option C

636. Pick out the correct statement.

(A) Fanning friction factor is inversely proportional to Reynolds number always
(B) The property of a randomly packed bed (with raschig rings) is given by the ratio of the total volume to the volume of voids in the bed
(C) Mach number in an incompressible fluid is always unity
(D) Mach number is given by the ratio of the speed of the fluid to that of sound in the fluid under conditions of flow
Answer: Option D

637. Working principle of manometer comprises of balancing a coloumn of liquid against the pressure to be measured. Inclined tube manometer is especially used for the measurement of _____ pressure.

(A) Small differential
(B) Atmospheric
(C) Absolute
(D) Gage
Answer: Option A

638. Which of the following is a dimensionless parameter?

(A) Angular velocity
(B) Specific weight

(C) Kinematic viscosity
(D) None of these
Answer: Option D

639. Creeping flow around a sphere is defined, when particle Reynolds number is
(A) < 2100
(B) < 0.1
(C) > 2.5
(D) < 500
Answer: Option B

640. When the pipe Reynold's number is 6000, the flow is generally
(A) Viscous
(B) Laminar
(C) Turbulent
(D) Transition
Answer: Option C

641. During ageing of fluid carrying pipes, the
(A) Pipe becomes smoother with use
(B) Friction factor increases linearly with time
(C) Absolute roughness decreases with time
(D) Absolute roughness increases linearly with time
Answer: Option D

642. Consider a centrifugal pump having a specific impeller diameter, fixed impeller speed pumping a liquid of constant density at a particular discharge capacity. With decrease in the capacity of the pump, the _____ decreases.
(A) NPSH required
(B) BHP required by the pump
(C) Head of the liquid pumped
(D) All (A), (B) and (C)
Answer: Option D

643. In fluid flow, the stagnation point is defined as a point, where the _____ is zero.
(A) Flow velocity
(B) Pressure
(C) Total energy
(D) All (A), (B) and (C)
Answer: Option A

644. If Blasius or Darcy friction factor is 'f_1' then the Fanning friction factor is equal to
(A) $f_1/4$
(B) $4f_2$
(C) $2f_1$
(D) $f_1/2$
Answer: Option A

645. A hydraulic ram acts as a/an _____ pump.
(A) Centrifugal
(B) Reciprocating
(C) Impulse
(D) Parallel cylinder
Answer: Option C

646. Choking in case of pipe flow means that a
(A) Specified mass flow rate cannot be achieved
(B) Valve is closed in the line
(C) Restriction in flow cross-section area occurs
(D) None of these
Answer: Option A

647. Viscosity of water is about _____ times that of air at room temperature.
(A) 15
(B) 55

(C) 155
(D) 1050
Answer: Option B

648. Sewage sludge is an example of the _____ fluid.
(A) Bingham plastic
(B) Newtonian
(C) Pseudo plastic
(D) Dilatent
Answer: Option A

649. The ratio of width to depth for the most economical rectangular section in open channel flow is
(A) 0.5
(B) 1
(C) 1.5
(D) 2
Answer: Option D

650. The ratio of hydrodynamic boundary layer to thermal boundary layer thickness in case of liquid metals is
(A) < 1
(B) 1
(C) > 1
(D) 2
Answer: Option A

651. The pipe wall thickness is minimum for a pipe of given nominal size having schedule number
(A) 160
(B) 120
(C) 80
(D) 40
Answer: Option D

652. High specific speed of a pump implies that, it is a/an _____ pump.
(A) Centrifugal
(B) Mixed flow
(C) Axial flow
(D) None of these
Answer: Option C

653. Air vessel provided in a reciprocating pump
(A) Smoothens the flow by avoiding pulsations
(B) Increases the volumetric efficiency of the pump
(C) Saves the pump from the danger of cavitation
(D) None of these
Answer: Option D

654. Velocity of liquid hydrocarbon fuels in a pipeline cannot be measured by magnetic flow-meters, because their _____ is very low/small.
(A) Thermal conductivity
(B) Electrical conductivity
(C) Specific gravity
(D) Electrical resistivity
Answer: Option B

655. Volute type of casing is provided in a centrifugal pump to
(A) Convert velocity head to pressure head
(B) Convert pressure head to velocity head
(C) Reduce the discharge fluctuation
(D) Increase the discharge
Answer: Option D

656. The friction factor is

(A) Always inversely proportional to the Reynolds number
(B) Not dimensionless
(C) Not dependent on the roughness of the pipe
(D) None of these
Answer: Option D

657. The ratio of the hydraulic radius to the diameter of the channel, for maximum mean velocity of flow in a circular channel, in open channel flow is
(A) 0.3
(B) 0.9
(C) 0.03
(D) 0.66
Answer: Option A

658. What is the ratio of the velocity at the axis of the pipe to the mean velocity of flow in case of pipe flow under viscous condition?
(A) 0.5
(B) 0.67
(C) 1
(D) 2
Answer: Option D

659. Net positive suction head (NPSH) of a centrifugal pump must be
(A) Greater than the vapour pressure of the liquid
(B) Less than the vapour pressure of the liquid
(C) Equal to the vapour pressure of the liquid
(D) Less than barometric pressure
Answer: Option A

660. Turbine impeller
(A) Produces only radial current
(B) Produces only tangential current
(C) Is effective over wide range of viscosities
(D) Does not produce tangential current
Answer: Option C

661. Hydraulic intensifier is used for increasing the
(A) Rate of velocity of liquid supply
(B) Rate of flow through delivery pipeline of a pump
(C) Intensity of pressure of the liquid
(D) Momentum rate through delivery pipe
Answer: Option C

662. One dimensional fluid flow implies the
(A) Flow in straight lines only
(B) Uniform flow
(C) Steady uniform flow
(D) Flow in which transverse components are zero
Answer: Option D

663. The equivalent diameter for pressure drop calculation for a duct of square cross-section is given by (where, x = each side of the square duct).
(A) x
(B) $\sqrt{(\pi x)}$
(C) $\sqrt{(2x)}$
(D) $\sqrt{(x/2)}$
Answer: Option A

664. For laminar flow through a closed conduit
(A) $V_{max} = 2V_{av}$
(B) $V_{max} = V_{av}$
(C) $V_{max} = 1.5V_{av}$
(D) $V_{max} = 0.5V_{av}$
Answer: Option A

665. The ratio of average fluid velocity to the maximum velocity in case of laminar flow of a Newtonian fluid in a circular pipe is

(A) 0.5
(B) 1
(C) 2
(D) 0.66
Answer: Option A

666. Each term in Bernoulli's equation represents the _____ of the fluid.

(A) Energy per unit mass
(B) Energy per unit weight
(C) Force per unit mass
(D) None of these
Answer: Option B

667. Nature of fluid flow during the opening of a valve in a pipeline is

(A) Laminar
(B) Unsteady
(C) Steady
(D) Uniform
Answer: Option B

668. For liquid flow through a packed bed, the superficial velocity as compared to average velocity through the channel in the bed is

(A) More
(B) Less
(C) Equal
(D) Independent of porosity
Answer: Option B

669. Capacity of a hydraulic accumulator is defined in terms of maximum

(A) Amount of energy stored
(B) Flow rate through accumulator
(C) Rate of falling of ram
(D) Volume available in the cylinder
Answer: Option A

670. The nominal size of a hose pipe is specified by its

(A) I.D.
(B) O.D.
(C) Thickness
(D) None of these
Answer: Option A

671. The continuity equation in ideal fluid flow states that

(A) Net rate of inflow into any small volume must be zero
(B) Energy is not constant along a streamline
(C) Energy is constant along a streamline
(D) There exists a velocity potential
Answer: Option A

672. The equivalent diameter for pressure drop calculation for a fluid flowing through a rectangular cross-section channels having sides 'x' & 'y' is given by

(A) $2xy/(x + y)$
(B) $xy/(x + y)$
(C) $(x + y)/2xy$
(D) $(x + y)/xy$
Answer: Option A

673. With increase in the temperature, viscosity of a liquid

(A) Increases
(B) Decreases
(C) Remain constant
(D) May increase or decrease; depends on the liquid
Answer: Option B

674. An equipotential line is _____ to the velocity vector at every point.

(A) Normal
(B) Parallel
(C) Tangential
(D) None of these
Answer: Option A

675. The velocity distribution in direction normal to the direction of flow in plane Poiseuille flow is

(A) Hyperbolic
(B) Parabolic
(C) Linear
(D) None of these
Answer: Option B

676. A Newtonian liquid (ρ = density, μ = viscosity) is flowing with velocity 'v' in a tube of diameter 'D'. Let Δp be the pressure drop across the length 'L'. For a laminar flow, Δp is proportional to

(A) $L\rho v^2/D$
(B) $L\mu V/D^2$
(C) $D\rho v^2/L$
(D) $\mu V/L$
Answer: Option A

677. Surge tanks are provided in high pressure water pipelines to

(A) Store a definite quantity of water all the time
(B) Reduce the water hammer
(C) Facilitate easy dismantling of pipeline for cleaning and maintenance
(D) None of these
Answer: Option B

678. In frictional fluid flow, the quantity, $(P/\rho) + (V^2/2gc) + gz/gc)$ is

(A) Constant along a streamline
(B) Not constant along a streamline
(C) Increased in the direction of flow
(D) None of these
Answer: Option B

679. Mercury is an ideal barometric fluid mainly due to its

(A) High density
(B) Low compressibility
(C) Low capillary action
(D) Very low vapor pressure
Answer: Option D

680. The fluid jet discharging from a 2" diameter orifice has a diameter of 1.75" at its vena-contracta. The co-efficient of contraction is

(A) 1.3
(B) 0.766
(C) 0.87
(D) None of these
Answer: Option B

681. The line of action of the buoyant force passes through the centre of gravity of the

(A) Submerged body
(B) Displaced volume of the fluid
(C) Volume of fluid vertically above the body
(D) Horizontal projection of the body
Answer: Option B

682. For the laminar flow of a fluid in a circular pipe of radius R, the Hagen-Poisseule equation predicts the volumetric flow rate to be proportional to

(A) R
(B) R^2

(C) R^4
(D) $R^{0.5}$
Answer: Option C

683. Which of the following is not dimension-less?
(A) Froude number
(B) Kinematic viscosity
(C) Pressure co-efficient
(D) None of these
Answer: Option B

684. With increase in the schedule number of a pipe of a particular nominal size, the
(A) Wall thickness also increases
(B) I.D. of the pipe decreases
(C) O.D. of the pipe remains constant
(D) All (A), (B) and (C)
Answer: Option D

685. Which of the following may be termed as a variable orifice flow-meter?
(A) Rotameter
(B) Pitot tube
(C) V-notch
(D) All (A), (B) and (C)
Answer: Option A

686. Specific speed for a centrifugal pump is
(A) $N \sqrt{Q}/H^{3/4}$
(B) $N \sqrt{Q}/H^{2/3}$
(C) $N^3D^5/H^{1/3}$
(D) $N \sqrt{Q}/H$
Answer: Option A

687. Open channel liquid flow is most conveniently measured by a
(A) Hot wire anemometer
(B) Notch
(C) Rotameter
(D) Segmental orifice
Answer: Option B

688. Rubber latex is an example of a _____ fluid.
(A) Pseudo plastic
(B) Bingham plastic
(C) Dilatent
(D) Newtonian
Answer: Option A

689. The Navier-Stokes equation deals with the law of conservation of
(A) Mass
(B) Energy
(C) Both (A) & (B)
(D) Momentum
Answer: Option D

690. The continuity equation
(A) Is independent of the compressibility of the fluid
(B) Is dependent upon the viscosity of the fluid
(C) Represents the conservation of mass
(D) None of these
Answer: Option C

691. While starting a centrifugal pump, its delivery valve should be kept
(A) Opened
(B) Closed
(C) Either opened or closed; it does not make any difference
(D) Either opened or closed; depending on the fluid viscosity

Answer: Option B

692. The friction factor for turbulent flow in a hydraulically smooth pipe
(A) Depends only on Reynolds number
(B) Does not depend on Reynolds number
(C) Depends on the roughness
(D) None of these
Answer: Option A

693. Buoyant force
(A) For non-symmetrical bodies is not vertical
(B) Depends on the depth of the submergence of the floating body
(C) Depends on the weight of the floating body
(D) None of these
Answer: Option C

694. Nominal Pipe Size (NPS) of a pipe less than 12 inches in diameter indicates its
(A) Inner diameter
(B) Outer diameter
(C) Thickness
(D) Neither inner nor outer diameter
Answer: Option D

695. The ratio of inertial forces to gravity forces is called the _____ number.
(A) Mach
(B) Froude
(C) Euler
(D) Weber
Answer: Option B

696. Capillary tube method of viscosity measurement is based on the
(A) Hagen-Poiseuille's equation
(B) Stoke's law
(C) Navier-stokes equation
(D) None of these
Answer: Option A

697. Boundary layer separation occurs when the
(A) Pressure reaches a minimum
(B) Cross-section of the channel is reduced
(C) Valve is closed in a pipeline
(D) Velocity of sound is reached
Answer: Option B

698. In the low Reynolds number region, the drag force on a sphere is proportional to
(A) V
(B) V^2
(C) V^4
(D) $V^{0.5}$
Answer: Option A

699. Boiler feed water pump is usually a _____ pump.
(A) Reciprocating
(B) Gear
(C) Multistage centrifugal
(D) Diaphragm
Answer: Option C

700. A fluid which has a linear relationship between the magnitude of applied shear-stress and the resulting rate of deformation is called a/an _____ fluid.
(A) Newtonian
(B) Non-Newtonian
(C) Ideal
(D) Incompressible
Answer: Option A

701. The rate of change of moment of momentum represents the _____ by the fluid.

(A) Torque applied
(B) Force exerted
(C) Work done
(D) Power developed
Answer: Option A

702. Venturimeter and orificemeter measures the _____ of the fluid.

(A) Pressure
(B) Maximum velocity
(C) Average velocity
(D) Point velocity
Answer: Option C

703. Interstage coolers are provided in a multistage compressor to

(A) Save power in compressing a given volume to a given pressure
(B) Cool the delivered air
(C) Achieve the exact delivery pressure
(D) None of these
Answer: Option A

704. Which of the following valves will incur maximum pressure drop for the same discharge of water?

(A) Globe valve
(B) Gate valve
(C) Needle valve
(D) Butterfly valve
Answer: Option C

705. When a fluid flows over a solid surface, the

(A) Velocity is uniform at any cross-section
(B) Velocity gradient is zero at the solid surface
(C) Resistance between the surface & the fluid is lesser as compared to that between the fluid layers themselves
(D) Velocity is not zero at the solid surface
Answer: Option B

706. At low Reynolds number

(A) Viscous forces are unimportant
(B) Viscous forces control
(C) Viscous forces control and inertial forces are unimportant
(D) Gravity forces control
Answer: Option C

707. The Stoke's stream function applies to the

(A) Irrotational flow only
(B) Ideal/non i viscous fluids only
(C) Cases of axial symmetry
(D) None of these
Answer: Option C

708. Transition from laminar flow to turbulent flow is aided by the

(A) Surface roughness and curvature (i.e. sharp corners)
(B) Vibration
(C) Pressure gradient and the compressibility of the flowing medium
(D) All (A), (B) & (C)
Answer: Option D

709. When larger particles e.g., grains are subjected to fluidisation, the corresponding bed produced is termed as the _____ bed.

(A) Spouted
(B) Sluggish
(C) Boiling
(D) Teeter

Answer: Option A

710. Bernoulli's equation for fluid flow is derived following certain assumptions. Out of the assumptions listed below, which set of assumptions is used in derivation of Bernoulli's equation?

A. Fluid flow is frictionless & irrotational.
B. Fluid flow is steady.
C. Fluid flow is uniform & turbulent.
D. Fluid is compressible.
E. Fluid is incompressible.

(A) A, C, D
(B) B, D, E
(C) A, B, E
(D) A, D, E
Answer: Option C

711. The discharge through a V-notch weir varies as

(A) $H^{3/2}$
(B) $H^{1/2}$
(C) $H^{5/2}$
(D) $H^{2/3}$
Answer: Option C

712. The simple Pitot tube does not measure the

(A) Static pressure
(B) Dynamic pressure
(C) Velocity at the stagnation point
(D) All (A), (B) and (C)
Answer: Option D

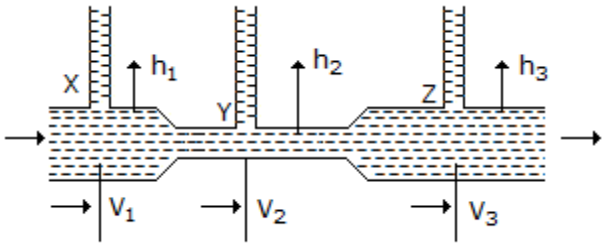
713. _____ forces act on a particle moving through a stationary fluid.

(A) Gravity
(B) Drag
(C) Buoyant
(D) All (A), (B), & (C)
Answer: Option D

714. Specific speed of a centrifugal pump depends upon the _____ head.

(A) Suction
(B) Delivery
(C) Manometric
(D) None of these
Answer: Option D

715. For flow through a venturi at a particular discharge, the correct relationships among heads at points *X*, *Y*, and *Z* are



(A) $h_1 > h_2 < h_3$
(B) $h_1 > h_2 > h_3$
(C) $h_2 < h_1 < h_3$
(D) $h_1 < h_2 < h_3$
Answer: Option A

716. Multistage centrifugal pumps are generally used for

(A) High head
(B) Low head but high discharge
(C) Highly viscous liquid
(D) Slurries of high solid concentration
Answer: Option A

717. The simple Pitot tube measures the _____ pressure.

(A) static
(B) Dynamic
(C) Total
(D) None of these
Answer: Option C

718. Liquid delivery by centrifugal pump starts, only when the head developed by it is equal to the _____ head.

(A) Manometric
(B) Total
(C) Static
(D) Friction
Answer: Option A

719. Two liquids manometer is used for measuring small pressure differences in

(A) Liquids
(B) Gases
(C) Mixture of hydrocarbons
(D) None of these
Answer: Option B

720. Air vessel provided in a reciprocating pump is for

(A) Increasing the acceleration head
(B) Making the friction in pipe uniform
(C) Decreasing the acceleration head
(D) None of these
Answer: Option B

721. Fanning equation is given by $(\Delta P/\rho) = 4f\,(L/D)\,(v^2/2g_c)$. It is applicable to _____ region flow.

(A) Transition
(B) Laminar
(C) Turbulent
(D) Both (B) and (C)
Answer: Option D

722. The head loss in turbulent flow in a pipe varies

(A) Directly as the velocity
(B) Inversely as the square of the velocity
(C) Approximately as the square of the velocity
(D) Inversely as the square of the diameter
Answer: Option C

723. If the head over the triangular notch is doubled, the discharge will increase by _____ times.

(A) 2
(B) 2.828
(C) 5.657
(D) 4
Answer: Option C

724. Pressure difference between two points in vessels, pipelines or in two different pipelines can be measured by a differential manometer. The pressure difference measured as the mm of water column in case of mercury-water, differential manometer is equal to (where, H = difference in height of mercury column in mm).

(A) H
(B) 12.6 H
(C) 13.6 H
(D) 14.6 H
Answer: Option B

725. In open channel flow in a rectangular channel, the ratio between the critical depth and the initial depth, when a hydraulic jump occurs is

(A) 0.5
(B) 0.84
(C) 1.84
(D) 1.25
Answer: Option C

726. For water, when the pressure increases, the viscosity
(A) Also increases
(B) Decreases
(C) Remain constant
(D) First decreases, and then increases
Answer: Option D

727. Which of the following fluid forces are not considered in the Navier-Stoke's equation?
(A) Gravity forces
(B) Viscous forces
(C) Pressure forces
(D) Turbulent forces
Answer: Option D

728. Foot valve provided in the pump is a _____ valve.
(A) Direction control
(B) Back pressure
(C) Relief
(D) Pressure reduction
Answer: Option B

729. For the production of very high vacuum, a _____ pump is normally used.
(A) Diffusion
(B) Centrifugal
(C) Jet ejector
(D) Piston
Answer: Option A

730. The equivalent diameter for fluid flow through square cross section channel of side 'x', for pressure drop calculation purpose is given by
(A) $4x$
(B) $2x$
(C) x
(D) $\sqrt{x}$
Answer: Option C

731. Bernoulli's equation is dependent on the
(A) First law of thermodynamics
(B) Third law of thermodynamics
(C) Law of conservation of momentum
(D) None of these
Answer: Option D

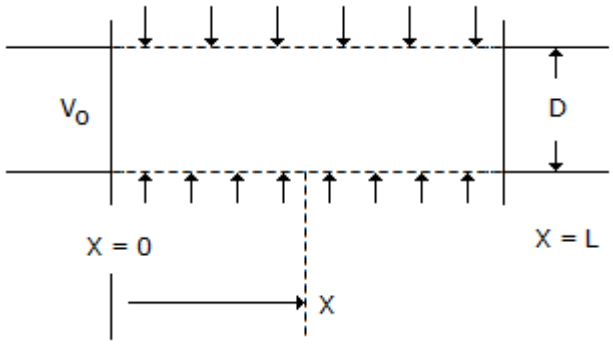
732. Which of the following produces maximum pressure difference for transportation of gases?
(A) Vacuum pumps
(B) Blowers
(C) Fans
(D) Compressors
Answer: Option D

733. Navier-Stokes equation is useful in the analysis of _____ fluid flow problems.
(A) Non-viscous
(B) Viscous
(C) Turbulent
(D) Rotational
Answer: Option B

734. The most economical flow control valve for use with large diameter pipes is a
(A) Butterfly valve

(B) Globe valve
(C) Needle valve
(D) None of these
Answer: Option A

735. A pipe has a porous section of length L as shown in the figure. Velocity at the start of this section of V_0. If fluid leaks into the pipe through the porous section at a volumetric rate per unit area $q(x/L)^2$, what will be axial velocity in the pipe at any 'x'? Assume incompressible one dimensional flow i.e., no gradients in the radial direction.



(A) $V_X = V_0 + q\,(x^3/L^2D)$
(B) $V_X = V_0 + \frac{1}{3}q\,(x^3/L^2)$
(C) $V_X = V_0 + 2q\,(x^2/LD)$
(D) $V_X = V_0 + (4/3)\,q\,(x^3/L^2D)$
Answer: Option D

736. The lift of a balloon is
(A) Increased, as it rises to a higher altitude
(B) Due to the weight of the atmospheric air, that it displaces
(C) Not dependent on the temperature of the atmosphere
(D) None of these
Answer: Option B

737. A globe valve is the most suitable for applications, in which
(A) Fluid flow control is required
(B) Fluid contains dispersed solid particles
(C) Valve is required to be either fully open or fully closed
(D) One way flow is required
Answer: Option A

738. Unit of mass velocity is
(A) kg/hr
(B) kg/m^2. hr
(C) kg/m^2
(D) kg/m^3. hr
Answer: Option B

739. Buckingham-π theorem states that in any physical problem including 'n' quantities having 'm' dimensions, the quantities can be arranged into _____ independent dimensionless parameters.
(A) m
(B) n
(C) n-m
(D) n/m
Answer: Option C

740. Minimum fluidisation velocity for a specific system depends upon the
(A) Particle size
(B) Fluid viscosity
(C) Density of both the particle & the fluid
(D) All (A), (B) and (C)
Answer: Option D

741. For an ideal fluid flow, Reynolds number is
(A) 2100

(B) 100
(C) 0
(D) ∞
Answer: Option D

742. When the head pumped against is less than the head of the fluid used for pumping, the usual device is a/an
(A) Ejector
(B) Blower
(C) Injector
(D) Airlift
Answer: Option D

743. Permanent pressure loss in a well designed Venturimeter is about _____ percent of the venturi differential.
(A) 1
(B) 10
(C) 30
(D) 50
Answer: Option B

744. In case of a pipe of constant cross-sectional area, the maximum fluid velocity obtainable is
(A) The velocity of sound
(B) Dependent on its cross-sectional area
(C) Dependent on fluid viscosity
(D) Dependent on fluid density
Answer: Option A

745. The hydraulic radius for flow in a rectangular duct of cross-sectional dimension *H, W* is
(A) $\sqrt{(HW/\pi)}$
(B) $HW/2\ (H + W)^2$
(C) $HW/4\ (H + W)^2$
(D) $2HW/(H + W)$
Answer: Option B

746. Pressure drop for laminar fluid flow through a circular pipe is given by
(A) $4f\ (L/D)\ (v^2/2g_c)\ \rho$
(B) $32\ (\mu LV/g_c\ D^2)$
(C) $16/N_{Re}$
(D) $(fL\rho/D)\ (v^2/2g_c)$
Answer: Option B

747. The hydraulic diameter of an annulus of inner and outer radii R_i and R_o respectively is
(A) $4(R_o\text{-}R_i)$
(B) $\sqrt{(R_o\text{-}R_i)}$
(C) $2(R_o\text{-}R_i)$
(D) $R_o + R_i$
Answer: Option C

748. What is the value of co-efficient of discharge for square edged circular orifice (for $\beta = 0.3$ to 0.5)?
(A) 0.61 - 0.63
(B) 0.5 - 0.75
(C) 0.75 - 0.90
(D) 0.35 - 0.55
Answer: Option A

749. Flow measurement in an open channel is done by a/an
(A) Venturimeter
(B) Orificemeter
(C) Weir
(D) Rotameter
Answer: Option C

750. Major loss in sudden contraction in pipe flow is due to

(A) Boundary friction
(B) Flow contraction
(C) Expansion of flow after sudden contraction
(D) None of these
Answer: Option B

751. Baffles in mixing tanks are provided to
(A) Reduce swirling and vortex formation
(B) Increase the structural strength of the tank
(C) Aid in rotational flow
(D) None of these
Answer: Option A

752. Bernoulli's equation describes the
(A) Mechanical energy balance in potential flow
(B) Kinetic energy balance in laminar flow
(C) Mechanical energy balance in turbulent flow
(D) Mechanical energy balance in boundary layer
Answer: Option A

753. _____ is used for measuring the static pressure exerted on the wall by a fluid flowing parallel to the wall in a pipeline.
(A) Venturimeter
(B) Pressure gauge
(C) Pitot tube
(D) Orificemeter
Answer: Option C

754. A lubricant 100 times more viscous than water would have a viscosity (in Pa.s)
(A) 0.01
(B) 0.1
(C) 1
(D) 10
Answer: Option B

755. In case of laminar flow of fluid through a circular pipe, the
(A) Shear stress over the cross-section is proportional to the distance from the surface of the pipe
(B) Surface of velocity distribution is a paraboloid of revolution, whose volume equals half the volume of circumscribing cylinder
(C) Velocity profile varies hyperbolically and the shear stress remains constant over the cross-section
(D) Average flow occurs at a radial distance of 0.5 r from the centre of the pipe (r = pipe radius)
Answer: Option B

756. C_p/C_v is termed as
(A) Adiabatic constant
(B) Mach number
(C) Weber number
(D) Prandtl number
Answer: Option A

757. Pick out the wrong statement about cavitation.
(A) Sudden reduction of pressure in a fluid flow system caused by flow separation, vortex formation or abrupt closing of valve leads to cavitation
(B) Cavitation may be caused due to boiling of liquid by decreasing the pressure resulting in formation & collapse of vapor cavities
(C) Cavitation begins at higher static pressure and lower velocity in larger diameter pipelines resulting in audible noise
(D) Large scale cavitation cannot damage pipeline, restrict fluid flow and damage steam turbine blades
Answer: Option D

758. For pumping slurry, one can use a _____ pump.
(A) Reciprocating
(B) Diaphragm