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
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 (dv/dy) constant pressure temperature is shown below in the figure. In the figure, Bingham plastic is represented by the curve:
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) $1 \times 10^{-3}$ to $2 \times 10^{-3}$ kg/m.s
(B) $0.5 \times 10^{-3}$ to $1 \times 10^{-3}$ 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, \( f^{0.5} = 4 \log_e \left( \frac{\text{Re}}{\sqrt{f}} \right)^{0.4} \), 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, \( D_f = \text{Drag force on the float} \), \( B_f = \text{Buoyant force on the float} \), \( W_f = \text{Weight of the float} \)).
   (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
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 m³/s? The Fanning friction factor, \( f \) is 0.0062.

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/m².
(A) 98
(B) 147
(C) 196
(D) 49
Answer: Option A

44. In case of turbulent flow of fluid through a circular pipe, the
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) $f_p = (150 (1 - \epsilon)/N_{Re}) + 1.75$
   (C) $(-\Delta p/\rho - D_p^2 \epsilon^3/(L \cdot V_0)) = 150$
   (D) $(-\Delta p/\delta L (gc/V_0^2) (D_p^2 \epsilon^3/(1 - \epsilon)) = 1.75$
   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/cm².
   (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
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/cm². sec
(B) gm/cm. sec
(C) cm²/sec
(D) m²/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) d²
(C) d⁴
(D) d̅²
Answer: Option D

70. Drag is defined as the force exerted by the
(A) Fluid on the solid in a direction opposite to flow
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 '\(\Delta p\)' with average velocity '\(V_{avg}\)'?
   (A) \(D \Delta p/8L\)
   (B) \(D \Delta p/4L\)
   (C) \(8 V_{avg}/D\)
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
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) \( \Delta p/\rho = 4f (L/D) (V^2/gc) \)
   (B) \( f_p = [150 (1 - \varepsilon)/N_Re] + 1.75 \)
   (C) \( (-\Delta p/g_c D_p^2 \cdot x^3)/(L \cdot V_o \cdot \mu (1 - \varepsilon)^2) = 150 \)
   (D) \( (-\Delta p/\delta L) (g_c/V_o^2) (D_p \cdot \varepsilon^3/(1 - \varepsilon)) = 1.75 \)
   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) $32\mu LV/gcD^2$
   (C) $4f(L/D) (v^2/2g_c)\cdot \rho$
   (D) $f(L/D) (v^2/2g_c)\cdot \rho$
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) $pV = \text{constant}$
   (B) $pV' = \text{constant}$
   (C) $pV' = \text{constant}$, 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 NH₃)
   (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
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
   \((\Delta P/\rho u^2)\) proportional to
   (A) \((L/D_p)/\text{Re}\)
   (B) \(R_e/(D_p/L)\)
   (C) \((L/D_p)^2/\text{Re}\)
   (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 \( \text{Re} = 10^6 \) 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 \((\Delta P)^n\), where \( \Delta P \) 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, \( \mu = \) fluid viscosity)
   (A) \( 1/\mu \)
   (B) \( \mu \)
   (C) \( \mu^2 \)
   (D) \( 1/\mu^2 \)
   Answer: Option B
120. The ratio of actual discharge to theoretical discharge through an orifice is equal to
   (A) $C_c \cdot C_v$
   (B) $C_c \cdot C_d$
   (C) $C_v \cdot C_d$
   (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
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) \( \frac{V}{V_{\text{max}}} = (\frac{x}{r})^{\frac{1}{7}} \)
(B) \( \frac{V}{V_{\text{max}}} = (\frac{r}{x})^{\frac{1}{7}} \)
(C) \( \frac{V}{V_{\text{max}}} = (x.r)^{\frac{1}{7}} \)
(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) \( \infty \)
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
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
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/cm².
(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
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
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 B

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) $Q_2/Q_1$
   (B) $Q_1/Q_2$
   (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
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
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 $\Delta p$. For the same discharge, the pressure drop across globe valve is
   (A) $\Delta p$
   (B) $< \Delta p$
   (C) $> \Delta p$
   (D) $\Delta p^2$
   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,
   \[ f^{0.5} = -4 \log_e \left[ (c/D) + (1.26/N_R) \sqrt{F} \right] \]. It reduces to Nikuradse equation for a value of $(c/D)$ equal to
   (A) 0
   (B) 1
   (C) $\infty$
   (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
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) \( C_v \cdot V_s \)

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) \(> 2\)
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) \( C_D = 16/R_c \rho \)
   (B) \( C_D = 24/R_c \rho \)
   (C) \( C_D = 18.4/R_c \rho \)
   (D) \( C_D = 0.079/R_c^{0.25} \rho \)
   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:
   \[ \frac{\Delta P}{L} = 375 \times 10^3 \nu \text{OM} + 10.94 \times 10^6 \nu^2 \text{OM} \] (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) M²/sec
   (B) N/m² sec
   (C) Kg. sec/m
   (D) None of these
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 $2U_{mf}$ to $2.5U_{mf}$ 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 below diagram represents a/an
   ![Diagram](image)
   (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 \(\varepsilon\) 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/ft³
(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

249. Dimension of cohesive force is
- (A) $MLT^0$
- (B) $MLT^{-1}$
- (C) $ML^2T^{-1}$
- (D) $ML^2T^2$

250. Which of the following is a measure of the rate of viscous dissipation of mechanical energy?
- (A) Reynolds number
- (B) Froude number
- (C) Viscous dissipation
- (D) None of the above

251. The rate of viscous dissipation of mechanical energy is
- (A) $\frac{1}{2} \rho v^2$
- (B) $\frac{1}{2} \rho v^2 R$
- (C) $\frac{1}{2} \rho v^2 R^2$
- (D) $\frac{1}{2} \rho v^2 R^3$

252. The dimension of kinematic viscosity is
- (A) $ML^{-1}T^{-1}$
- (B) $ML^{-1}T^2$
- (C) $ML^2T^{-1}$
- (D) $ML^2T^2$

253. The dimension of pressure is
- (A) $ML^{-1}T^{-2}$
- (B) $ML^{-2}T^{-2}$
- (C) $ML^0T^{-2}$
- (D) $ML^2T^{-2}$

254. In a perfect fluid, the dimension of density is
- (A) $ML^{-3}$
- (B) $ML^1T^{-2}$
- (C) $ML^{-2}T^{-3}$
- (D) $ML^2T^{-3}$

255. The dimension of Reynolds number is
- (A) $ML^{-1}T^{-1}$
- (B) $ML^{-1}T^2$
- (C) $ML^2T^{-1}$
- (D) $ML^2T^2$
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. \( f = \frac{16}{N_{Re}} \) 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, \( V_{\text{avg}} \) = average fluid velocity)
   (A) \( V_{\text{avg}} \)
   (B) 1.2 \( V_{\text{avg}} \)
   (C) 1.5 \( V_{\text{avg}} \)
   (D) 1.8 \( V_{\text{avg}} \)
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)
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/m³
(B) 0 N/m²
(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
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 __________ ft³/sec.
   (A) 7.65
   (B) 32.36
   (C) 48.22
   (D) 125.6
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) \( \Delta p \) 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, \( \mu \) = fluid viscosity)
   (A) \( \mu \)
   (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
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
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.
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:
\[ \Delta P/L = 375 \times 10^3 V_{OM} + 10.94 \times 10^6 V_{OM}^2 \text{(SI units)} \]
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)
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 \(C_c \cdot C_v\); 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 \((\text{velocity})^2\)
(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, \(d = \text{distance from the leading edge.}\))
(A) \(\sqrt{d}\)
(B) \(d^{2/3}\)
(C) \(d^{5/5}\)
(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 \( V = -y^2 \cdot x \hat{i} + 2yx^2 \cdot j \). 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
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) \( V/D_p^3 \)

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-contrac?ta?
(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⁻¹T⁻¹
(B) ML⁻¹T¹
(C) ML⁻¹T
(D) ML
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
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 \( \mu = 10 \text{ Pa.s} \) and yield stress, \( \tau_0 = 10 \text{ KPa} \), is shared between flat parallel plates separated by a distance of \( 10^{-3} \text{ m} \). 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 \( f^{0.5} = 4.07 \log_e \left( N Re \sqrt{f} \right)^{0.6} \) 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, $M = \text{metacentre}$.)
   (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, $E + (p/p) + (V^2/2g) + gZ = \text{constant}$ ($E = \text{internal energy/mass}$), 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) $\partial/\partial s = \text{constant}$
   (D) $\partial/\partial t = \text{constant}$
   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
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^2T^{-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
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
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).
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 \( \frac{\delta}{x} \) varies as: (where, \( \delta \) 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) \( \frac{1}{R_e} \)
(D) \( R_e^{-\frac{1}{2}} \)
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 \( 10^{-6} \text{ m}^2/\text{s} \)).
(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) \( \frac{1}{\sqrt{M}} \)
(B) \( \sqrt{M} \)
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 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) \( H = 1840 D^{1.5}/N \)
   (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
430. Pump used for the transportation of molten sodium in a fast breeder 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 \( \text{Re} \ll 1 \)
   (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
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 ($\rho_p = 200$ kg/m$^3$, $D_p = 0.05$ 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) $\Delta p = 32 (\mu L V/gc. D^2)$  
(C) $\Delta p/L = 150 [(1 - \varepsilon)/\varepsilon^3]. (\mu V_0^2/g^2 c D)$  
(D) $\Delta p/L = 1.75 [(1 - \varepsilon)/\varepsilon^3]. (\rho V_0^2/gc D_p)$  
Answer: Option B

450. Capillary rise of mercury in a small diameter tube is proportional to (where, $d =$ diameter of the tube, $\sigma =$ surface tension of mercury)
(A) $d$  
(B) $1/d$  
(C) $\sigma$  
(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) Reynold 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
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) $1/D^3$
(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 accidentally 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 ($\varepsilon_0$) with age/time ($t$) (where, $\varepsilon = $ roughness of the surface after time $t$, $\alpha$ = 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
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
473. For a given Reynolds number as \( \frac{d}{D} \) 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
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) 2x/3
(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) \( F^{1/2} L \)
   (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
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) \( \frac{dq}{dx} = K \)
   (B) \( \frac{dq}{dx} = K \cdot q \)
   (C) \( \frac{dq}{dx} = K l q \)
   (D) \( \frac{dq}{dx} = K q^2 \)
   Answer: Option A

515. The dimension of kinematic viscosity is
   (A) \( \text{ML}^2\text{T}^{-1} \)
   (B) \( \text{L}^2\text{T}^{-1} \)
   (C) \( \text{ML}^2\text{T}^{-2} \)
   (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?
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. \( \frac{N^2_{Re}}{N_{Fr}} \) 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 occurring 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
526. For one dimensional flow of an incompressible fluid in unsteady state in x-direction, the continuity equation is given by
(A) $\frac{\partial u}{\partial x} = 0$
(B) $\frac{\partial (\rho u)}{\partial x} = 0$
(C) $\frac{\partial (\rho u)}{\partial t} = 0$
(D) $\frac{\partial p}{\partial t} = 0$
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, $T \cdot g \cdot c = k \cdot (du/dy)^n$ 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, $\eta_m =$ mechanical efficiency $\eta_v =$ volumetric efficiency $\eta_{ma} =$ manometric efficiency $\eta_o =$ 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) $\eta_v = \eta_{ma} \times \eta_{ma}$
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 $Q_1 : Q_2 : Q_3$. 

(B) Type of casing
(C) Impeller blade angle
(D) Number of blades in impeller
Answer: Option B
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 \( \mu/\rho = 0.01 \text{ cm}^2/\text{sec} \) 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, \( C_D \cdot \log N_{Re} \) 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
   
   \[ V_1 < V_2 < V_3 \]
(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 $\Delta p$. 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) $\Delta p$
(B) $2\Delta p$
(C) $\Delta p^2$
(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) $ML^{-1}T^{-2}$, $M^{-1}L^{-1}T^{-1}$
(B) $FLT$, $ML^{-1}T^{-1}$
(C) $ML^{-1}T^{-2}$, $F^{-1}L^{2}T$
(D) $F^{-1}L^{2}T^{-1}$, $ML^{-3}$
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
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) \( \frac{(V_1^2 - V_2^2)}{2gc} \)
   (B) \( \frac{(V_1 - V_2)^2}{2gc} \)
   (C) \( \frac{(V_1 - V_2)}{2gc} \)
   (D) \( \frac{(V_1^2 - V_2^2)}{gc} \)
   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
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
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 __________ \( C_x \)
(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 = \(2 \times 10^{-5}\) 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 \(3 \times 10^{-5}\) 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
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
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/m²
   (D) N/m³
   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) \( C \sqrt{2gh} \)
   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) \( MLT^{-2} \)
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/m² 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) \[ f = 0.079 \cdot N_Re^{-0.25} \]
(B) \[ f^{0.5} = 4.07 \log_e (N_Re) - 0.6 \]
(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
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, \( \frac{p}{\rho} + \frac{g}{g_c} \cdot Z + \frac{v^2}{2g_c} \) = 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 (\( \eta \)) through a circular pipe is given by \( \frac{h_t - h_f}{h_t} \), 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 column 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
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_i' then the Fanning friction factor is equal to
   (A) f_i/4
   (B) 4f_i
   (C) 2f_i
   (D) f_i/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
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) Smoothen 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 flowmeters, 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
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) $V_{\text{max}} = 2V_{\text{av}}$
(B) $V_{\text{max}} = V_{\text{av}}$
(C) $V_{\text{max}} = 1.5V_{\text{av}}$
(D) $V_{\text{max}} = 0.5V_{\text{av}}$
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 ($\rho = $ density, $\mu = $ viscosity) is flowing with velocity '$v$' in a tube of diameter '$D$'. Let $\Delta p$ be the pressure drop across the length '$L$'. For a laminar flow, $\Delta p$ is proportional to
   (A) $Lp^2/D$
   (B) $L\mu V/D^2$
   (C) $Dp^2/L$
   (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, $(P/\rho) + (V^2/2g\rho) + gz/g\rho$ 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-contraction. 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-Poiseuille equation predicts the volumetric flow rate to be proportional to
   (A) $R$
   (B) $R^2$
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) \( N^3D^{5/4}H^{1/3} \)
   (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
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 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
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

![Diagram of a venturi with heads](image)

(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 \( \frac{\Delta P}{\rho} = 4f \frac{(L/D)}{\left(\frac{v^2}{2g_c}\right)} \). 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
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
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.

\[
V_x = V_0 + \frac{q}{L} \left( \frac{x}{L} \right)^2
\]

(A) $V_x = V_0 + q \left( \frac{x^3}{L^2} \right)^2$
(B) $V_x = V_0 + \frac{q}{L^2} \left( \frac{x^2}{L^2} \right)$
(C) $V_x = V_0 + 2q \left( \frac{x^2}{LD} \right)$
(D) $V_x = V_0 + \frac{4}{3} q \left( \frac{x^3}{L^2} \right)$

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
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) $4f (L/D) (\nu^2/2g_c) \rho$
   (B) $32 (\mu LV/\mu D^2)$
   (C) $16/N_{Re}$
   (D) $(fLp/D) (\nu^2/2g_c)$
   Answer: Option B

747. The hydraulic diameter of an annulus of inner and outer radii $R_i$ and $R_o$ respectively is
   (A) $4(R_o - R_i)$
   (B) $\sqrt{(R_o - R_i)}$
   (C) $2(R_o - R_i)$
   (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
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