OBJECTIVE TYPE QUESTIONS

Tick mark (√) the most appropriate statement of the multiple choice answers :

1. An ideal fluid is defined as the fluid which
   (*a*) is compressible
   (*b*) is incompressible
   (*c*) is incompressible and non-viscous (inviscid)
   (*d*) has negligible surface tension.
2. Newton's law of viscosity states that
   (*a*) shear stress is directly proportional to the velocity
   (*b*) shear stress is directly proportional to velocity gradient
   (*c*) shear stress is directly proportional to shear strain
   (*d*) shear stress is directly proportional to the viscosity.
3. A Newtonian fluid is defined as the fluid which
   (*a*) is incompressible and non-viscous
   (*b*) obeys Newton's law of viscosity
   (*c*) is highly viscous
   (*d*) is compressible and non-viscous.
4. Kinematic viscosity is defined as equal to
   (*a*) dynamic viscosity × density
   (*b*) dynamic viscosity/density
   (*c*) dynamic viscosity × pressure
   (*d*) pressure × density.
5. Dynamic viscosity (μ) has the dimensions as
   (*a*) MLT^{-2} (*b*) $ML^{-1}T^{-1}$
   (*c*) $ML^{-1}T^{-2}$ (*d*) $M^{-1}L^{-1}T^{-1}$
6. Poise is the unit of
   (*a*) mass density
   (*b*) kinematic viscosity
   (*c*) viscosity
   (*d*) velocity gradient.
7. The increase of temperature
   (*a*) increases the viscosity of a liquid
   (*b*) decreases the viscosity of a liquid
   (*c*) decreases the viscosity of a gas
   (*d*) increases the viscosity of a gas.
8. Stoke is the unit of
   (*a*) surface tension
   (*b*) viscosity
   (*c*) kinematic viscosity
   (*d*) none of the above.
9. The dividing factor for converting one poise into MKS unit of dynamic viscosity is
   (*a*) 9.81 (*b*) 98.1
   (*c*) 981 (*d*) 0.981.
10. Surface tension has the units of
    (*a*) force per unit area
    (*b*) force per unit length
    (*c*) force per unit volume
    (*d*) none of the above.
11. The gases are considered incompressible when Mach number
    (*a*) is equal to 1.0 (*b*) is equal to 0.50
    (*c*) is more than 0.3 (*d*) is less than 0.2.
12. Pascal's law states that pressure at a point is equal in all directions
    (*a*) in a liquid at rest
    (*b*) in a fluid at rest
    (*c*) in a laminar flow
    (*d*) in a turbulent flow.
13. The hydrostatic law states that rate of increase of pressure in a vertical direction is equal to
    (*a*) density of the fluid
    (*b*) specific weight of the fluid
    (*c*) weight of the fluid
    (*d*) none of the above.
14. Fluid statics deals with
    (*a*) viscous and pressure forces
    (*b*) viscous and gravity forces
    (*c*) gravity and pressure forces
    (*d*) surface tension and gravity forces.
15. Gauge pressure at a point is equal to
    (*a*) absolute pressure plus atmospheric pressure
    (*b*) absolute pressure minus atmospheric pressure
    (*c*) vacuum pressure plus absolute pressure
    (*d*) none of the above.
16. Atmospheric pressure held in terms of water column is
    (*a*) 7.5 m (*b*) 8.5 m
    (*c*) 9.81 m (*d*) 10.30 m.
17. The hydrostatic pressure on a plane surface is equal to
    (*a*) $wA\bar{h}$ (*b*) $wA\bar{h}\sin^2\theta$.
    (*c*) $\frac{1}{2}wA\bar{h}$ (*d*) $wA\bar{h}\sin\theta$.

    where A = Area of plane surface, and
    h = Depth of centroid of the plane area below the liquid-free surface.

18. Centre of pressure of a plane surface immersed in a liquid is
(*a*) above the centre of gravity of the plane surface
(*b*) at the centre of gravity of the plane surface
(*c*) below the centre of gravity of the plane surface
(*d*) none of the above.

19. The resultant hydrostatic force acts through a point known as
(*a*) centre of gravity
(*b*) centre of buoyancy
(*c*) centre of pressure
(*d*) none of the above.

20. For a submerged curved surface, the vertical component of the hydrostatic force is
(*a*) mass of the liquid supported by the curved surface
(*b*) weight of the liquid supported by the curved surface
(*c*) the force on the projected area of the curved surface on vertical plane
(*d*) none of the above.

21. For a floating body, the buoyant force passes through the
(*a*) centre of gravity of the body
(*b*) centre of gravity of the submerged part of the body
(*c*) metacentre of the body
(*d*) centroid of the liquid displaced by the body.

22. The condition of stable equilibrium for a floating body is
(*a*) the metacentre M coincides with the centre of gravity G
(*b*) the metacentre M is below centre of gravity G
(*c*) the metacentre M is above centre of gravity G
(*d*) the centre of buoyancy B is above centre of gravity G.

23. A submerged body will be in stable equilibrium if
(*a*) the centre of buoyancy B is below the centre of gravity G
(*b*) the centre of buoyancy B coincides with G
(*c*) the centre of buoyancy B is above the metacentre M
(*d*) the centre of buoyancy B is above G.

24. The metacentric height of a floating body is
(*a*) the distance between metacentre and centre of buoyancy
(*b*) the distance between the centre of buoyancy and centre of gravity
(*c*) the distance between metacentre and centre of gravity
(*d*) none of the above.

25. The necessary condition for the flow to be steady is that
(*a*) the velocity does not change from place to place
(*b*) the velocity is constant at a point with respect to time
(*c*) the velocity changes at a point with respect to time
(*d*) none of the above.

26. The necessary condition for the flow to be uniform is that
(*a*) the velocity is constant at a point with respect to time
(*b*) the velocity is constant in the flow field with respect to space
(*c*) the velocity changes at a point with respect to time
(*d*) none of the above.

27. The flow in pipe is laminar if
(*a*) Reynolds number is equal to 2500
(*b*) Reynolds number is equal to 4000
(*c*) Reynolds number is more than 2500
(*d*) none of the above.

28. A stream line is a line
(*a*) which is along the path of a particle
(*b*) which is always parallel to the main direction of flow
(*c*) across which there is no flow
(*d*) on which tangent drawn at any point gives the direction of velocity.

29. Continuity equation can take the form
(*a*) $A_1 V_1 = A_2 V_2$
(*b*) $\rho_1 A_1 = \rho_2 A_2$
(*c*) $\rho_1 A_1 V_1 = \rho_2 A_2 V_2$
(*d*) $p_1 A_1 V_1 = p_2 A_2 V_2$.

30. Pitot-tube is used for measurement of
(*a*) pressure
(*b*) flow
(*c*) velocity at a point
(*d*) discharge.

31. Bernoulli's theorem deals with the law of conservation of
(*a*) mass (*b*) momentum
(*c*) energy (*d*) none of the above.

32. Continuity equation deals with the law of conservation of
(a) mass (b) momentum
(c) energy (d) none of the above.

33. Irrotational flow means
(a) the fluid does not rotated while moving
(b) the fluid moves in straight lines
(c) the net rotation of fluid particles about their mass centre is zero
(d) none of the above.

34. The velocity components in x and y directions in terms of velocity potential (ϕ) are
(a) $u = -\frac{\partial \phi}{\partial x}, v = \frac{\partial \phi}{\partial y}$
(b) $u = \frac{\partial \phi}{\partial y}, v = \frac{\partial \phi}{\partial x}$
(c) $u = -\frac{\partial \phi}{\partial x}, v = -\frac{\partial \phi}{\partial y}$
(d) $u = -\frac{\partial \phi}{\partial x}, v = -\frac{\partial \phi}{\partial y}$.

35. The velocity components in x and y directions in terms of stream function (ψ) are
(a) $u = \frac{\partial \psi}{\partial x}, v = \frac{\partial \psi}{\partial y}$
(b) $u = -\frac{\partial \psi}{\partial x}, v = \frac{\partial \psi}{\partial y}$
(c) $u = \frac{\partial \psi}{\partial y}, v = \frac{\partial \psi}{\partial x}$
(d) $u = -\frac{\partial \psi}{\partial y}, v = \frac{\partial \psi}{\partial x}$.

36. The relation between tangential velocity (V) and radius (r) is given by
(a) $V \times r$ = Constant for forced vortex
(b) V/r = Constant for forced vortex
(c) $V \times r$ = Constant for free vortex
(d) V/r = Constant for free vortex.

37. The pressure variation along the radial direction for vortex flow along a horizontal plane is given as
(a) $\frac{\partial p}{\partial r} = -\rho \frac{V^2}{r}$ (b) $\frac{\partial p}{\partial r} = \rho \frac{V}{r^2}$
(c) $\frac{\partial p}{\partial r} = \rho \frac{V^2}{r}$ (d) none of the above.

38. For a forced vortex flow, the height of paraboloid formed is equal to
(a) $\frac{p}{\rho g} + \frac{V^2}{2g}$ (b) $\frac{V^2}{2g}$
(c) $\frac{V^2}{r^2 \times 2g}$ (d) $\frac{\omega r^2}{2g}$.

39. Bernoulli's equation is derived making assumptions that
(a) the flow is uniform and incompressible
(b) the flow is non-viscous, uniform and steady
(c) the flow is steady, non-viscous, incompressible and irrotational
(d) none of the above.

40. The Bernoulli's equation can take the form
(a) $\frac{p_1}{\rho_1} + \frac{V_1^2}{2g} + Z_1 = \frac{p_2}{\rho_2} + \frac{V_2^2}{2g} + Z_2$
(b) $\frac{p_1}{\rho_1 g} + \frac{V_1^2}{2} + Z_1 = \frac{p_2}{\rho_2 g} + \frac{V_2^2}{2} + Z_2$
(c) $\frac{p_1}{\rho_1 g} + \frac{V_1^2}{2g} + gZ_1 = \frac{p_2}{\rho_2 g} + \frac{V_2^2}{2g} + gZ_2$
(d) $\frac{p_1}{\rho_1 g} + \frac{V_1^2}{2g} + Z_1 = \frac{p_2}{\rho_2 g} + \frac{V_2^2}{2g} + Z_2$.

41. The flow rate through a circular pipe is measured by
(a) Pitot-tube (b) Venturimeter
(c) Orifice-meter (d) None of the above.

42. The range for co-efficient of discharge (C_d) for a venturimeter is
(a) 0.6 to 0.7 (b) 0.7 to 0.8
(c) 0.8 to 0.9 (d) 0.95 to 0.99.

43. The co-efficient of velocity (C_v) for an orifice is
(a) $C_v = \sqrt{\frac{4x^2}{yH}}$ (b) $C_v = \frac{2x}{\sqrt{4yH}}$
(c) $C_v = \sqrt{\frac{x^2}{4yH}}$ (d) none of the above.

44. The co-efficient of discharge (C_d) in terms of C_v and C_c is
(a) $C_d = \frac{C_v}{C_c}$ (b) $C_d = C_v \times C_c$
(c) $C_d = \frac{C_c}{C_v}$ (d) none of the above.

45. An orifice is known as large orifice when the head of liquid from the centre of orifice is

(*a*) more than 10 times the depth of orifice
(*b*) less than 10 times the depth of orifice
(*c*) less than 5 times the depth of orifice
(*d*) none of the above.

46. Which mouthpiece is having maximum co-efficient of discharge
(*a*) external mouthpiece
(*b*) convergent-divergent mouthpiece
(*c*) internal mouthpiece
(*d*) none of the above.

47. The co-efficient of discharge (C_d)
(*a*) for an orifice is more than that for a mouthpiece
(*b*) for internal mouthpiece is more than that for external mouthpiece
(*c*) for a mouthpiece is more than that for an orifice
(*d*) none of the above.

48. A flow is said to be laminar when
(*a*) the fluid particles moves in a zig-zag way
(*b*) the Reynolds number is high
(*c*) the fluid particles move in layers parallel to the boundary
(*d*) none of the above.

49. For the laminar flow through a circular pipe
(*a*) the maximum velocity = 1.5 times the average velocity
(*b*) the maximum velocity = 2.0 times the average velocity
(*c*) the maximum velocity = 2.5 times the average velocity
(*d*) none of the above.

50. The loss of pressure head for the laminar flow through pipes varies
(*a*) as the square of velocity
(*b*) directly as the velocity
(*c*) as the inverse of the velocity
(*d*) none of the above.

51. For the laminar flow through a pipe, the shear stress over the cross-section
(*a*) varies inversely as the distance from the centre of the pipe
(*b*) varies directly as the distance from the surface of the pipe
(*c*) varies directly as the distance from the centre of the pipe
(*d*) remains constant over the cross-section.

52. For the laminar flow between two parallel plates
(*a*) the maximum velocity = 2.0 times the average velocity
(*b*) the maximum velocity = 2.5 times the average velocity
(*c*) the maximum velocity = 1.33 times the average velocity
(*d*) none of the above.

53. The value of the kinetic energy correction factor (α) of the viscous flow through a circular pipe is
(*a*) 1.33 (*b*) 1.50
(*c*) 2.0 (*d*) 1.25.

54. The value of the momentum correction factor (β) for the viscous flow through a circular pipe is
(*a*) 1.33 (*b*) 1.50
(*c*) 2.0 (*d*) 1.25.

55. The pressure drop per unit length of a pipe for laminar flow is
(*a*) equal to $\dfrac{12\mu\bar{U}L}{\rho g D^2}$ (*b*) equal to $\dfrac{12\mu\bar{U}}{\rho g D^2}$
(*c*) equal to $\dfrac{32\mu\bar{U}L}{\rho g D^2}$ (*d*) none of the above.

56. For viscous flow between two parallel plates, the pressure drop per unit length is equal to
(*a*) $\dfrac{12\mu\bar{U}L}{\rho g D^2}$ (*b*) $\dfrac{12\mu\bar{U}L}{D^2}$
(*c*) $\dfrac{32\mu\bar{U}L}{D^2}$ (*d*) $\dfrac{12\mu\bar{U}}{D^2}$.

57. The velocity distribution in laminar flow through a circular pipe follow the
(*a*) parabolic law (*b*) linear law
(*c*) logarithmic law (*d*) none of the above.

58. A boundary is known as hydrodynamically smooth if
(*a*) $\dfrac{k}{\delta'} = 0.3$ (*b*) $\dfrac{k}{\delta'} > 0.3$
(*c*) $\dfrac{k}{\delta'} < 0.25$ (*d*) $\dfrac{k}{\delta'} = 6.0$
where k = Average height of the irregularities from the boundary
and δ' = Thickness of laminar sub-layer.

59. The co-efficient of friction for laminar flow through a circular pipe is given by
(*a*) $f = \dfrac{0.0791}{(R_e)^{1/4}}$ (*b*) $f = \dfrac{16}{R_e}$
(*c*) $f = \dfrac{64}{R_e}$ (*d*) none of the above.

60. The loss of head due to sudden expansion of a pipe is given by

(a) $h_L = \dfrac{V_1^2 - V_2^2}{2g}$ (b) $h_L = \dfrac{0.5\,V_1^2}{2g}$

(c) $h_L = \dfrac{(V_1 - V_2)^2}{2g}$ (d) none of the above.

61. The loss of head due to sudden contraction of a pipe is equal to

(a) $\left(\dfrac{1}{C_c} - 1\right)^2 \dfrac{V_2}{2g}$ (b) $\left(1 - \dfrac{1}{C_c}\right)^2 \dfrac{V_2}{2g}$

(c) $\dfrac{1}{C_c}\left(1 - \dfrac{V_2^2}{2g}\right)$ (d) none of the above.

62. Hydraulic gradient line (H.G.L.) represents the sum of
(a) pressure head and kinetic head
(b) kinetic head and datum head
(c) pressure head, kinetic head and datum head
(d) pressure head and datum head.

63. Total energy line (T.E.L.) represents the sum of
(a) pressure head and kinetic head
(b) kinetic head and datum head
(c) pressure head and datum head
(d) pressure head, kinetic head and datum head.

64. When the pipes are connected in series, the total rate of flow
(a) is equal to the sum of the rate of flow in each pipe
(b) is equal to the reciprocal of the sum of the rate of flow in each pipe
(c) is the same as flowing through each pipe
(d) none of the above.

65. Power transmitted through pipes, will be maximum when
(a) head lost due to friction = $\dfrac{1}{2}$ total head at inlet of the pipe
(b) head lost due to friction = $\dfrac{1}{4}$ total head at inlet of the pipe
(c) head lost due to friction = total head at the inlet of the pipe
(d) head lost due to friction = $\dfrac{1}{3}$ total head at the inlet of the pipe.

66. The valve closure is said to be gradual if the time required to close the valve

(a) $t = \dfrac{2L}{C}$ (b) $t \le \dfrac{2L}{C}$

(c) $t < \dfrac{4L}{C}$ (d) $t > \dfrac{2L}{C}$

where L = Length of pipe, C = Velocity of pressure wave.

67. The velocity of pressure wave in terms of bulk modulus (K) and density (ρ) is given by

(a) $C = \sqrt{\dfrac{\rho}{K}}$ (b) $C = \sqrt{K\rho}$

(c) $C = \sqrt{\dfrac{K}{\rho}}$ (d) none of the above.

68. Reynold's number is defined as the
(a) ratio of inertia force to gravity force
(b) ratio of viscous force to gravity force
(c) ratio of viscous force to elastic force
(d) ratio of inertia force to viscous force.

69. Froude's number is defined as the ratio of
(a) inertia force to viscous force
(b) inertia force to gravity force
(c) inertia force to elastic force
(d) inertia force to pressure force.

70. Mach number is defined as the ratio of
(a) inertia force to viscous force
(b) viscous force to surface tension force
(c) viscous force to elastic force
(d) inertia force to elastic force.

71. Euler's number is the ratio of
(a) inertia force to pressure force
(b) inertia force to elastic force
(c) inertia force to gravity force
(d) none of the above.

72. Models are known undistorted model if
(a) the prototype and model are having different scale ratios
(b) the prototype and model are having same scale ratio
(c) model and prototype are kinematically similar
(d) none of the above.

73. Geometric similarity between model and prototype means
(a) the similarity discharge
(b) the similarity of linear dimensions
(c) the similarity of motion
(d) the similarity of forces.

74. Kinematic similarity between model and prototype means
(*a*) the similarity of forces
(*b*) the similarity of shape
(*c*) the similarity of motion
(*d*) the similarity of discharge.

75. Dynamic similarity between model and prototype means
(*a*) the similarity of forces
(*b*) the similarity of motion
(*c*) the similarity of shape
(*d*) none of the above.

76. Reynolds number is expressed as
(*a*) $R_e = \frac{\rho\mu L}{V}$ (*b*) $R_e = \frac{V\mu L}{\rho}$
(*c*) $R_e = \frac{\rho VL}{\mu}$ (*d*) $R_e = \frac{V \times d}{\nu}$.

77. Froude's number (F_e) is given by
(*a*) $F_e = V\sqrt{\frac{L}{g}}$ (*b*) $F_e = V\sqrt{\frac{g}{L}}$
(*c*) $F_e = \frac{V}{\sqrt{Lg}}$ (*d*) none of the above.

78. Mach number (M) is given by
(*a*) $M = \frac{C}{V}$ (*b*) $M = V \times C$
(*c*) $M = \frac{V}{C}$ (*d*) none of the above.

79. Boundary layer on a flat plate is called laminar boundary layer if
(*a*) Reynold number is less than 2000
(*b*) Reynold number is less than 4000
(*c*) Reynold number is less than 5×10^5
(*d*) None of the above.

80. Boundary layer thickness (δ) is the distance from the surface of the solid body in the direction perpendicular to flow, where the velocity of fluid is equal to
(*a*) free-stream velocity
(*b*) 0.9 times the free-stream velocity
(*c*) 0.99 times the free-stream velocity
(*d*) none of the above.

81. Displacement thickness (δ*) is given by
(*a*) $\delta^* = \int_0^\delta \left(1 - \frac{U}{u}\right) dy$
(*b*) $\delta^* = \int_0^\delta \frac{u}{U}\left(1 - \frac{u}{U}\right) dy$
(*c*) $\delta^* = \int_0^\delta \frac{u}{U}\left(1 - \frac{u^2}{U^2}\right) dy$
(*d*) none of the above.

82. Momentum thickness (θ) is given by
(*a*) $\theta = \int_0^\delta \frac{u}{U}\left(1 - \frac{u}{U}\right) dy$
(*b*) $\theta = \int_0^\delta \left(1 - \frac{u}{U}\right) dy$
(*c*) $\theta = \int_0^\delta \frac{u}{U}\left(1 - \frac{u^2}{U^2}\right) dy$
(*d*) none of the above.

83. Energy thickness (δ**) is equal to
(*a*) $\int_0^\delta \frac{u}{U}\left[1 - \frac{u}{U}\right]$
(*b*) $\int_0^\delta \frac{u}{U}\left(1 - \frac{u^2}{U^2}\right) dy$
(*c*) $\int_0^\delta \frac{u}{U}\left(1 - \frac{u}{U}\right)^2$
(*d*) none of the above.

84. Von-Karman momentum integral equation is given as
(*a*) $\frac{\tau_0}{\frac{1}{2}\rho U^2} = \frac{\partial\theta}{\partial x}$ (*b*) $\frac{\tau_0}{\rho U^2} = \frac{\partial\theta}{\partial x}$
(*c*) $\frac{\tau_0}{2\rho U^2} = \frac{\partial\theta}{\partial x}$ (*d*) none of the above.

85. The boundary layer separation takes place if
(*a*) pressure gradient is zero
(*b*) pressure gradient is positive
(*c*) pressure gradient is negative
(*d*) none of the above.

86. The condition for boundary layer separation is
(*a*) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = +\text{ve}$ (*b*) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = -\text{ve}$
(*c*) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = 0$ (*d*) none of the above.

87. The boundary layer flow will be attached to the surface if
(*a*) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = 0$ (*b*) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = +\text{ve}$

(c) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = -\text{ve}$ (d) none of the above.

88. The condition for detached flow is

(a) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = 0$ (b) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = +\text{ve}$

(c) $\left(\frac{\partial u}{\partial y}\right)_{y=0} = -\text{ve}$ (d) none of the above.

89. Drag is defined as the force exerted by a flowing fluid on a solid body
(a) in the direction of flow
(b) perpendicular to the direction of flow
(c) in the direction which is at an angle of 45° to the direction of flow
(d) none of the above.

90. Lift force is defined as the force exerted by a flowing fluid on a solid body
(a) in the direction of flow
(b) perpendicular to the direction of flow
(c) at an angle of 45° to the direction of flow
(d) none of the above.

91. Drag force is expressed mathematically, as

(a) $F_D = \frac{1}{2}\rho U^2 \times C_D \times A$

(b) $F_D = \rho U^2 \times C_D \times A$

(c) $F_D = 2\rho U^2 \times C_D \times A$

(d) none of the above.

92. Lift force (F_L) is expressed mathematically, as

(a) $F_L = \frac{1}{2}\rho U^2 \times C_L$

(b) $F_L = \frac{1}{2}\rho U^2 \times C_L \times A$

(c) $F_L = 2\rho U^2 \times C_L \times A$

(d) $F_L = \rho U^2 \times C_L \times A$.

93. Total drag on a body is the sum of
(a) pressure drag and velocity drag
(b) pressure drag and friction drag
(c) friction drag and velocity drag
(d) none of the above.

94. A body is called stream lined body when it is placed in a flow and the surface of the body
(a) coincides with streamlines
(b) does not coincide with the streamlines
(c) is perpendicular to the streamlines
(d) none of the above.

95. A body is called bluff body if the surface of the body
(a) coincides with the streamlines
(b) does not coincide with the streamlines
(c) is very smooth
(d) none of the above.

96. The drag on a sphere (F_D) for Reynold's number less than 0.2 is given by
(a) $F_D = 5\pi\mu DU$ (b) $F_D = 3\pi\mu DU$
(c) $F_D = 2\,\pi\mu DU$ (d) $F_D = \pi\mu DU$.

97. The skin friction drag on a sphere (for Reynold's number less than 0.2) is equal to
(a) one-third of the total drag
(b) half of the total drag
(c) two-third of the total drag
(d) none of the above.

98. The pressure drag on a sphere (for Reynold's number less than 0.2) is equal to
(a) one-third of the total drag
(b) half of the total drag
(c) two-third of the total drag
(d) none of the above.

99. Terminal velocity of a falling body is equal to
(a) a maximum velocity with which body will fall
(b) the maximum constant velocity with which body will fall
(c) half of the maximum velocity
(d) none of the above.

100. When a falling body has attained terminal velocity, the weight of the body is equal to
(a) drag force minus buoyant force
(b) buoyant force minus drag force
(c) drag force plus the buoyant force
(d) none of the above.

101. The tangential velocity of ideal fluid at any point on the surface of the cylinder is given by

(a) $u_\theta = \frac{1}{2} U \sin\theta$ (b) $u_\theta = U \sin\theta$

(c) $u_\theta = 2U \sin\theta$ (d) none of the above.

102. The lift force (F_L) produced on a rotating circular cylinder in a uniform flow is given by

(a) $F_L = \frac{LU\Gamma}{\rho}$ (b) $F_L = \rho LU\Gamma$

(c) $F_L = \frac{\rho U\Gamma}{\rho}$ (d) $F_L = \frac{\rho LU}{\Gamma}$

where L = Length of the cylinder, U = Free-stream velocity, Γ = Circulation.

103. The lift co-efficient (C_L) for a rotating cylinder in a uniform flow is given by

(a) $C_L = \frac{\Gamma U}{R}$ (b) $C_L = \frac{\Gamma R}{U}$

(c) $C_L = \frac{\Gamma}{RU}$ (d) $C_L = \frac{RU}{\Gamma}$.

104. Kinematic viscosity (ν) is equal to

(a) $\mu \times \rho$ (b) $\frac{\mu}{\rho}$

(c) $\frac{\rho}{\mu}$ (d) none of the above.

105. Compressibility is equal to

(a) $\frac{\left(\frac{dV}{V}\right)}{dp}$ (b) $\frac{dp}{-\left(\frac{dV}{V}\right)}$

(c) $\frac{dp}{d\rho}$ (d) $\sqrt{\frac{dp}{d\rho}}$.

106. Hydrostatic law of pressure is given as

(a) $\frac{\partial p}{\partial z} = \rho g$ (b) $\frac{\partial p}{\partial z} = 0$

(c) $\frac{\partial p}{\partial z} = z$ (d) $\frac{\partial p}{\partial z}$ = constant.

107. Four curves are shown in Fig. 1 with velocity gradient $\left(\frac{\partial u}{\partial y}\right)$ along x-axis and viscous shear stress (τ) along y-axis. Curve A corresponds to
(a) ideal fluid
(b) newtonian fluid
(c) non-newtonian fluid
(d) ideal solid.

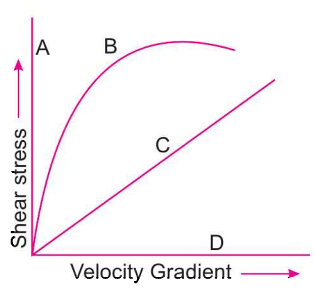

Fig. 1

108. Curve B in Fig.1 corresponds to
(a) ideal fluid
(b) newtonian fluid
(c) non-newtonian fluid
(d) ideal solid.

109. Curve C in Fig. 1 corresponds to
(a) ideal fluid
(b) newtonian fluid
(c) non-newtonian fluid
(d) ideal solid.

110. Curve D in Fig. 1 corresponds to
(a) ideal fluid
(b) newtonian fluid
(c) non-newtonian fluid
(d) ideal solid.

111. The relation between surface tension (σ) and difference of pressure (Δp) between the inside and outside of a liquid droplet is given as

(a) $\Delta p = \frac{\sigma}{4d}$ (b) $\Delta p = \frac{\sigma}{2d}$

(c) $\Delta p = \frac{4\sigma}{d}$ (d) $\Delta p = \frac{\sigma}{d}$.

112. For a soap bubble, the surface tension (σ) and difference of pressure (Δp) are related as

(a) $\Delta p = \frac{\sigma}{4d}$ (b) $\Delta p = \frac{\sigma}{2d}$

(c) $\Delta p = \frac{4\sigma}{d}$ (d) $\Delta p = \frac{8\sigma}{d}$.

113. For a liquid jet, the surface tension (σ) and difference of pressure (Δp) are related as

(a) $\Delta p = \frac{\sigma}{4d}$ (b) $\Delta p = \frac{\sigma}{2d}$

(c) $\Delta p = \frac{4\sigma}{d}$ (d) $\Delta p = \frac{2\sigma}{d}$.

114. The capillary rise or fall of a liquid is given by

(a) $h = \frac{\sigma \cos\theta}{4\rho g d}$ (b) $h = \frac{4\sigma \cos\theta}{\rho g d}$

(c) $h = \frac{8\sigma \cos\theta}{\rho g d}$ (d) none of the above.

115. Manometer is a device used for measuring
(a) velocity at a point in fluid
(b) pressure at a point in a fluid
(c) discharge of a fluid
(d) none of the above.

116. Differential manometers are used for measuring
(a) velocity at a point in a fluid
(b) pressure at a point in a fluid
(c) difference of pressure between two points
(d) none of the above.

117. The pressure at a height Z in a static compressible fluid undergoing isothermal compression is given by

(a) $p = p_0 e^{-\frac{gR}{ZT}}$ (b) $p = p_0 e^{-\frac{gT}{RZ}}$

(c) $p = p_0 e^{-\frac{RT}{gZ}}$ (d) $p = p_0 e^{-\frac{gT}{RT}}$

where p_0 = Pressure at ground level, R = Gas constant, T = Absolute temperature.

118. The pressure at a height Z in a static compressible fluid undergoing adiabatic compression is given by

(a) $p = p_0\left[1 - \frac{\gamma - 1}{\gamma}\frac{RT_0}{gZ}\right]^{\frac{\gamma}{\gamma-1}}$

(b) $p = p_0\left[1 - \frac{\gamma}{\gamma - 1}\frac{RT_0}{gZ}\right]^{\frac{\gamma}{\gamma-1}}$

(c) $p = p_0\left[1 - \frac{\gamma - 1}{\gamma}\frac{gZ}{RT_0}\right]^{\frac{\gamma}{\gamma-1}}$

(d) none of the above.

119. The temperature at a height Z in a static compressible fluid undergoing adiabatic compression is given as

(a) $T = T_0\left[1 - \frac{\gamma - 1}{\gamma}\frac{RT_0}{gZ}\right]$

(b) $T = T_0\left[1 - \frac{\gamma - 1}{\gamma}\frac{gZ}{RT_0}\right]$

(c) $T = T_0\left[1 - \frac{\gamma}{\gamma - 1}\frac{RT_0}{gZ}\right]$

(d) none of the above.

120. Temperature lapse-rate is given by

(a) $L = -\frac{R}{g}\left[\frac{\gamma - 1}{\gamma}\right]$ (b) $L = -\frac{R}{g}\left[\frac{\gamma}{\gamma - 1}\right]$

(c) $L = -\frac{g}{R}\left[\frac{\gamma - 1}{\gamma}\right]$ (d) none of the above.

121. When the fluid is at rest, the shear stress is

(a) maximum (b) zero

(c) unpredictable (d) none of the above.

122. The depth of centre of pressure of an inclined immersed surface from free surface of liquid is equal to

(a) $\frac{I_G}{A\bar{h}} + \bar{h}$ (b) $\frac{I_G A \sin^2 \theta}{\bar{h}} + \bar{h}$

(c) $\frac{I_G \sin^2 \theta}{A\bar{h}} + \bar{h}$ (d) $\frac{I_G \bar{h}}{A \sin^2 \theta} + \bar{h}$.

123. The depth of centre of pressure of a vertical immersed surface from free surface of liquid is equal to

(a) $\frac{I_G}{A\bar{h}} + \bar{h}$ (b) $\frac{I_G A}{\bar{h}} + \bar{h}$

(c) $\frac{I_G \bar{h}}{\bar{h}} + \bar{h}$ (d) $\frac{A\bar{h}}{I_G} + \bar{h}$.

124. The centre of pressure for a plane vertical surface lies at a depth of

(a) half the height of the immersed surface

(b) one-third the height of the immersed surface

(c) two-third the height of the immersed surface

(d) none of the above.

125. The inlet length of a venturimeter

(a) is equal to the outlet length

(b) is more than the outlet length

(c) is less than the outlet length

(d) none of the above.

126. Flow of a fluid in a pipe takes place from

(a) higher level to lower level

(b) higher pressure to lower pressure

(c) higher energy to lower energy

(d) none of the above.

127. The point, through which the buoyant force is acting, is called

(a) centre of pressure

(b) centre of gravity

(c) centre of buoyancy

(d) none of the above.

128. The point, through which the weight is acting, is called

(a) centre of pressure

(b) centre of gravity

(c) centre of buoyancy

(d) none of the above.

129. The point, about which a floating body starts oscillating when the body is tilted, is called

(a) centre of pressure

(b) centre of buoyancy

(c) centre of gravity

(d) metacentre.

130. The metacentric height (GM) is given by

(a) $GM = BG - \frac{I}{V}$ (b) $GM = \frac{V}{I} - BG$

(c) $GM = \frac{I}{V} - BG$ (d) none of the above.

131. For a floating body, if the metacentre is above the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

132. For a floating body, if the metacentre is below the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

133. For a floating body, if the metacentre coincides with the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

134. For a floating body, if centre of buoyancy is above the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

135. For a sub-merged body, if the centre of buoyancy is above the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

136. For a sub-merged body, if the centre of buoyancy is below the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

137. For a sub-merged body, if the centre of buoyancy coincides with the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

138. For a sub-merged body, if the metacentre is below the centre of gravity, the equilibrium is called

(a) stable (b) unstable
(c) neutral (d) none of the above.

139. The metacentric height (GM) experimentally is given as

(a) $GM = \frac{W \tan \theta}{wx}$ (b) $GM = \frac{w \tan \theta}{W \times x}$

(c) $GM = \frac{wx}{W \tan \theta}$ (d) $GM = \frac{Wx}{w \tan \theta}$

where w = Movable weight, W = Weight of floating body including w, θ = Angle of tilt.

140. The time period of oscillation of a floating body is given by

(a) $T = 2\pi\sqrt{\frac{GM \times g}{k^2}}$ (b) $T = 2\pi\sqrt{\frac{k^2}{GM \times g}}$

(c) $T = 2\pi\sqrt{\frac{GM}{gk^2}}$ (d) $T = 2\pi\sqrt{\frac{gk^2}{GM}}$.

where k = Radius of gyration, GM = Metacentric height, and T = Time period.

141. If the velocity, pressure, density etc., do not change at a point with respect to time, flow is called

(a) uniform (b) incompressible
(c) non-uniform (d) steady.

142. If the velocity, pressure, density, etc., change at a point with respect to time, the flow is called

(a) uniform (b) compressible
(c) unsteady (d) incompressible.

143. If the velocity in a fluid flow does not change with respect to length of direction of flow, it is called

(a) steady flow
(b) uniform flow
(c) incompressible flow
(d) rotational flow.

144. If the velocity in a fluid flow changes with respect to length of direction of flow, it is called

(a) unsteady flow
(b) compressible flow
(c) irrotational flow
(d) none of the above.

145. If the density of a fluid is constant from point to point in a flow region, it is called

(a) steady flow
(b) incompressible flow
(c) uniform flow
(d) rotational flow.

146. If the density of a fluid changes from point to point in a flow region, it is called

(a) steady flow (b) unsteady flow
(c) non-uniform flow(d) compressible flow.

147. If the fluid particles move in straight lines and all the lines are parallel to the surface, the flow is called

(a) steady (b) uniform
(c) compressible (d) laminar.

148. If the fluid particles move in a zig-zag way, the flow is called

(a) unsteady (b) non-uniform
(c) turbulent (d) incompressible.

149. The acceleration of a fluid particle in the direction of x is given by

(*a*) $A_x = u\frac{\partial u}{\partial x} + v\frac{\partial v}{\partial y} + w\frac{\partial w}{\partial z} + \frac{\partial u}{\partial t}$

(*b*) $A_x = u\frac{\partial u}{\partial x} + u\frac{\partial v}{\partial y} + u\frac{\partial w}{\partial z} + \frac{\partial u}{\partial t}$

(*c*) $A_x = u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} + w\frac{\partial u}{\partial z} + \frac{\partial u}{\partial t}$

(*d*) none of the above.

150. The local acceleration in the direction of x is given by

(*a*) $u\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t}$ (*b*) $\frac{\partial u}{\partial t}$

(*c*) $u\frac{\partial u}{\partial x}$ (*d*) none of the above.

151. The convective acceleration in the direction of x is given by

(*a*) $u\frac{\partial u}{\partial y} + v\frac{\partial v}{\partial y} + w\frac{\partial w}{\partial z}$

(*b*) $u\frac{\partial u}{\partial x} + u\frac{\partial u}{\partial y} + u\frac{\partial u}{\partial z}$

(*c*) $u\frac{\partial u}{\partial x} + u\frac{\partial v}{\partial y} + u\frac{\partial w}{\partial z}$

(*d*) $u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} + w\frac{\partial u}{\partial z}$.

152. Shear strain rate is given by

(*a*) $\frac{1}{2}\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right)$ (*b*) $\frac{1}{2}\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}$

(*c*) $\frac{1}{2}\left(\frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}\right)$ (*d*) $\frac{1}{2}\frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}$.

153. For a two-dimensional fluid element in x-y plane, the rotational component is given as

(*a*) $\omega_z = \frac{1}{2}\left(\frac{\partial v}{\partial x} + \frac{\partial u}{\partial y}\right)$

(*b*) $\omega_z = \frac{1}{2}\left(\frac{\partial u}{\partial x} - \frac{\partial v}{\partial y}\right)$

(*c*) $\omega_z = \frac{1}{2}\left(\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y}\right)$

(*d*) $\omega_z = \frac{1}{2}\left(\frac{\partial v}{\partial x} - \frac{\partial u}{\partial y}\right)$.

154. Vorticity is given by

(*a*) two times the rotation
(*b*) 1.5 times the rotation
(*c*) three times the rotation
(*d*) equal to the rotation.

155. Study of fluid motion with the forces causing the flow is known as

(*a*) kinematics of fluid flow
(*b*) dynamics of fluid flow
(*c*) statics of fluid flow
(*d*) none of the above.

156. Study of fluid motion without considering the forces, causing the flow, is known as

(*a*) kinematics of fluid flow
(*b*) dynamics of fluid flow
(*c*) statics of fluid flow
(*d*) none of the above.

157. Study of fluid at rest is known as

(*a*) kinematics (*b*) dynamics
(*c*) statics (*d*) none of the above.

158. The term $V^2/2g$ is known as

(*a*) kinetic energy
(*b*) pressure energy
(*c*) kinetic energy per unit weight
(*d*) none of the above.

159. The terms $p/\rho g$ is known as

(*a*) kinetic energy per unit weight
(*b*) pressure energy
(*c*) pressure energy per unit weight
(*d*) none of the above.

160. The term Z is known as

(*a*) potential energy
(*b*) pressure energy
(*c*) potential energy per unit weight
(*d*) none of the above.

161. The discharge through a venturimeter is given as

(*a*) $Q = \frac{A_1^2 A_2^2}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh}$

(*b*) $Q = \frac{A_1 A_2}{\sqrt{2A_1^2 - A_2^2}} \times \sqrt{2gh}$

(*c*) $Q = \frac{A_1 A_2}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh}$

(*d*) none of the above.

162. The difference of pressure head (h) measured by mercury-oil differential manometer is given as

(a) $h = x\left[1 - \frac{S_g}{S_o}\right]$ (b) $h = x\left[S_g - S_o\right]$

(c) $h = x\left[S_o - S_g\right]$ (d) $h = x\left[\frac{S_g}{S_o} - 1\right]$

where x = Difference of mercury level, S_g = Specific gravity of mercury and S_o = Specific gravity of oil.

163. The difference of pressure head (h) measured by a differential manometer containing lighter liquid is

(a) $h = x\left[1 - \frac{S_l}{S_o}\right]$ (b) $h = x\left[\frac{S_l}{S_o} - 1\right]$

(c) $h = x\left[S_o - S_l\right]$ (d) none of the above.

where S_l = Specific gravity of lighter liquid in manometer.

S_o = Specific gravity of fluid flowing

x = Difference of lighter liquid levels in differential manometer.

164. Pitot-tube is used to measure
(a) discharge
(b) average velocity
(c) velocity at a point
(d) pressure at a point.

165. Venturimeter is used to measure
(a) discharge
(b) average velocity
(c) velocity at a point
(d) pressure at a point.

166. Orifice-meter is used to measure
(a) discharge
(b) average velocity
(c) velocity at a point
(d) pressure at a point.

167. For a sub-merged curved surface, the horizontal component of force due to static liquid is equal to
(a) weight of liquid supported by the curved surface
(b) force on a projection of the curved surface on a vertical plane
(c) area of curved surface × pressure at the centroid of the submerged area
(d) none of the above.

168. For a sub-merged curved surface, the vertical component of force due to static liquid is equal to
(a) weight of the liquid supported by curved surface
(b) force on a projection of the curved surface on a vertical plane
(c) area of curved surface × pressure at the centroid of the sub-merged area
(d) none of the above.

169. An oil of specific gravity 0.7 and pressure 0.14 kgf/cm^2 will have the height of oil as
(a) 70 cm of oil (b) 2 m of oil
(c) 20 cm of oil (d) 80 cm of oil.

170. The difference in pressure head, measured by a mercury water differential manometer for a 20 cm difference of mercury level will be
(a) 2.72 m (b) 2.52 m
(c) 2.0 m (d) 0.2 m.

171. The difference in pressure head, measured by a mercury-oil differential manometer for a 20 cm difference of mercury level will be (sp. gravity of oil = 0.8)
(a) 2.72 m of oil (b) 2.52 m of oil
(c) 3.20 m of oil (d) 2.0 m of oil.

172. The rate of flow through a venturimeter varies as
(a) H (b) $\sqrt{H}$
(c) $H^{3/2}$ (d) $H^{5/2}$.

173. The rate of flow through a V-notch varies as
(a) H (b) $\sqrt{H}$
(c) $H^{3/2}$ (d) $H^{5/2}$.

174. Orifices are used to measure
(a) velocity (b) pressure
(c) rate of flow (d) none of the above.

175. Mouthpieces are used to measure
(a) velocity (b) pressure
(c) viscosity (d) rate of flow.

176. The ratio of actual velocity of a jet of water at vena-contracta to the theoretical velocity, is known as
(a) co-efficient of discharge
(b) co-efficient of velocity
(c) co-efficient of contraction
(d) co-efficient of viscosity.

177. The ratio of actual discharge of a jet of water to its theoretical discharge is known as
(a) co-efficient of discharge
(b) co-efficient of velocity
(c) co-efficient of contraction
(d) co-efficient of viscosity.

178. The ratio of the area of the jet of water at vena-contracta to the area of orifice, is known as
(*a*) co-efficient of discharge
(*b*) co-efficient of velocity
(*c*) co-efficient of contraction
(*d*) co-efficient of viscosity.

179. The discharge through a large rectangular orifice is
(*a*) $\frac{2}{3}C_d \times b \times \sqrt{2g}(\sqrt{H_2} - \sqrt{H_1})$
(*b*) $\frac{8}{15}C_d \times b \times \sqrt{2g}(H_2^{3/2} - H_1^{3/2})$
(*c*) $\frac{2}{3}C_d \times b \times \sqrt{2g}(H_2^{3/2} - H_1^{3/2})$
(*d*) none of the above.
where b = Width of orifice, H_1 = Height of liquid above top edge of the orifice,
H_2 = Height of liquid above bottom edge of orifice.

180. The discharge through fully sub-merged orifice is
(*a*) $C_d \times b \times (H_2 - H_1) \times \sqrt{2g} \times H^{3/2}$
(*b*) $C_d \times b \times (H_2 - H_1) \times \sqrt{2gH}$
(*c*) $C_d \times b \times (H_2^{3/2} - H_1^{3/2}) \times \sqrt{2gH}$
(*d*) none of the above
where H = Difference of liquid level on both sides of the orifice,
H_1 = Height of liquid above top edge orifice on upstream side,
H_2 = Height of liquid above bottom edge of orifice on upstream side.

181. Notch is a device used for measuring
(*a*) rate of flow through pipes
(*b*) rate of flow through a small channel
(*c*) velocity through a pipe
(*d*) velocity through a small channel.

182. The discharge through a rectangular notch is given by
(*a*) $Q = \frac{2}{3}C_d \times L \times H^{5/2}$
(*b*) $Q = \frac{2}{3}C_d \times L \times H^{3/2}$
(*c*) $Q = \frac{8}{15}C_d \times L \times H^{5/2}$
(*d*) $\frac{8}{15}Q = \frac{8}{15}C_d \times L \times H^{3/2}$.

183. The discharge through a triangular notch is given by
(*a*) $Q = \frac{2}{3}C_d \times \tan\frac{\theta}{2} \times \sqrt{2gH}$
(*b*) $Q = \frac{2}{3}C_d \times \tan\frac{\theta}{2} \times \sqrt{2g} \times H^{3/2}$
(*c*) $Q = \frac{2}{15}C_d \times \tan\frac{\theta}{2} \times \sqrt{2g}\, H^{5/2}$
(*d*) none of the above.
where θ = Total angle of triangular notch,
H = Head over notch.

184. The discharge through a trapezoidal notch is given as
(*a*) $Q = \frac{2}{3}C_{d_1} \times L \times H^{3/2} + \frac{8}{15} \times C_{d_2} \times \tan\theta/2 \times \sqrt{2g} \times H^{3/2}$
(*b*) $Q = \frac{2}{3}C_{d_1} \times L \times H^{5/2} + \frac{8}{15} \times C_{d_2} \times \tan\theta/2 \times \sqrt{2g}H^{3/2}$
(*c*) $Q = \frac{2}{3}C_{d_1} \times L \times H^{3/2} + \frac{8}{15} \times C_{d_2} \times \tan\theta/2 \times \sqrt{2g}H^{5/2}$
(*d*) none of the above
where $\theta/2$ = Slope of the side of the trapezoidal notch.

185. The error in discharge due to the error in the measurement of head over a rectangular notch is given by
(*a*) $\frac{dQ}{Q} = \frac{5}{2}\frac{dH}{H}$ (*b*) $\frac{dQ}{Q} = \frac{3}{2}\frac{dH}{H}$
(*c*) $\frac{dQ}{Q} = \frac{7}{2}\frac{dH}{H}$ (*d*) $\frac{dQ}{Q} = \frac{1}{2}\frac{dH}{H}$.

186. The error in discharge due to the error in the measurement of head over a triangular notch is given by
(*a*) $\frac{dQ}{Q} = \frac{5}{2}\frac{dH}{H}$ (*b*) $\frac{dQ}{Q} = \frac{3}{2}\frac{dH}{H}$
(*c*) $\frac{dQ}{Q} = \frac{7}{2}\frac{dH}{H}$ (*d*) $\frac{dQ}{Q} = \frac{1}{2}\frac{dH}{H}$.

187. The velocity with which the water approaches a notch is called
(*a*) velocity of flow
(*b*) velocity of approach
(*c*) velocity of whirl
(*d*) none of the above.

188. The discharge over a rectangular notch considering velocity of approach is given as
(*a*) $Q = \frac{2}{3} C_d L \sqrt{2g} (H^{3/2} - h_a^{3/2})$
(*b*) $Q = \frac{2}{3} C_d L \sqrt{2g} (H - h_a)^{3/2}$
(*c*) $Q = \frac{2}{3} C_d L \sqrt{2g} [(H + h_a)^{3/2} - h_a^{3/2}]$
(*d*) none of the above.
where H = Head over notch, and h_a = Head due to velocity of approach.

189. The velocity of approach (V_a) is given by
(*a*) $V_a = \frac{\text{Discharge over notch}}{\text{Area of notch}}$
(*b*) $V_a = \frac{\text{Discharge over notch}}{\text{Area of channel}}$
(*c*) $V_a = \frac{\text{Discharge over notch}}{\text{Head over notch} \times \text{Width of channel}}$
(*d*) none of the above.

190. Francis's formula for a rectangular weir with end contraction suppressed is given as
(*a*) $Q = 1.84\, L\, H^{5/2}$ (*b*) $Q = \frac{2}{3} L \times H^{3/2}$
(*c*) $Q = 1.84\, L\, H^{3/2}$ (*d*) $Q = \frac{2}{3} L \times H^{5/2}$.

191. Francis's formula for a rectangular weir for two end contractions is given by
(*a*) $Q = 1.84[L - 0.2H] H^{5/2}$
(*b*) $Q = 1.84[L - 0.2\,H] H^{3/2}$
(*c*) $Q = 1.84[L - 0.2H] H^{5/2}$
(*d*) none of the above.

192. Bazin's formula for discharge over a rectangular weir without velocity of approach is given by
(*a*) $Q = mL \times \sqrt{2g}\, H^{5/2}$
(*b*) $Q = mL \times \sqrt{2g} \times H^{3/2}$
(*c*) $Q = m \times L \times \sqrt{2gH}$
(*d*) none of the above.
where $m = 0.405 + \frac{0.003}{H}$ and H = Head over weir.

193. Cipolletti weir is a trapezoidal weir having side slope of
(*a*) 1 horizontal to 2 vertical
(*b*) 4 horizontal to 1 vertical
(*c*) 1 horizontal to 4 vertical
(*d*) 1 horizontal to 3 vertical.

194. The co-efficient of friction in terms of shear stress is given by
(*a*) $f = \frac{2\rho V^2}{\tau_0}$ (*b*) $f = \frac{2\tau_0}{\rho V^2}$
(*c*) $f = \frac{\tau_0}{2\rho V^2}$ (*d*) $f = \frac{\rho V^2}{2\tau_0}$

195. When the pipes are connected in parallel, the total loss of head
(*a*) is equal to the sum of the loss of head in each pipe
(*b*) is same as in each pipe
(*c*) is equal to the reciprocal of the sum of loss of head in each pipe
(*d*) none of the above.

196. L_1, L_2, L_3 and the length of three pipes, connected in series. If d_1, d_2 and d_3 are their diameters, then the equivalent size of the pipe is given by
(*a*) $\frac{L}{d^5} = \frac{L_1}{d_1^5} + \frac{L_2}{d_2^5} + \frac{L_3}{d_3^5}$
(*b*) $\frac{d^5}{L} = \frac{d_1^5}{L_1} + \frac{d_2^5}{L_2} + \frac{d_3^5}{L_3}$
(*c*) $Ld^5 = L_1 d_2^5 + L_2 d_2^5 + L_3 d_3^5$
(*d*) none of the above.

197. The power transmitted through pipe is given by
(*a*) $\frac{\rho g \times Q \times H}{1000}$
(*b*) $\frac{\rho g \times Q \times h_f}{1000}$
(*c*) $\frac{\rho g \times Q \times (H - h_f)}{4500}$
(*d*) $\frac{\rho g \times Q \times (H - h_f)}{1000}$
where H = Total head at the inlet of pipe, h_f = Head lost due to friction in pipe and Q = discharge per second.

198. Efficiency of power transmission through pipe is given by

(*a*) $\frac{H - h_f}{H}$ (*b*) $\frac{H}{H + h_f}$

(*c*) $\frac{H - h_f}{H + h_f}$ (*d*) none of the above

where H = Total head at inlet, h_f = Head lost due to friction.

199. Maximum efficiency of power transmission through pipe is

(*a*) 50% (*b*) 66.67%

(*c*) 75% (*d*) 100%.

200. For a viscous flow through circular pipes, certain curves are shown in Fig. 2, curve *A* is for

(*a*) shear stress distribution

(*b*) velocity distribution

(*c*) pressure distribution

(*d*) none of the above.

201. Curve *B* in Fig. 2 is for

(*a*) shear stress distribution

(*b*) velocity distribution

(*c*) pressure distribution

(*d*) none of the above.

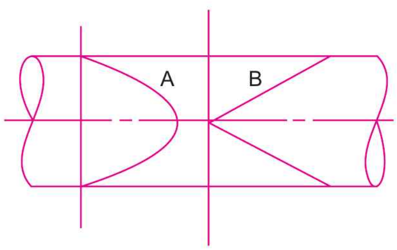

Fig. 2

202. Fig. 3 shows four curves for velocity distribution across a section for Reynolds number equal to 1000, 4000, 6000 and 10000. Curve *A* corresponds to Reynolds number equal to

(*a*) 1000 (*b*) 4000

(*c*) 6000 (*d*) 10000.

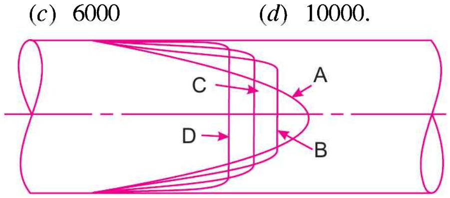

Fig. 3

203. Curve *B* in Fig. 3 corresponds to Reynolds number

(*a*) 1000 (*b*) 4000

(*c*) 6000 (*d*) 10000.

204. Curve *C* in Fig. 3 corresponds to the Reynolds number

(*a*) 1000 (*b*) 4000

(*c*) 6000 (*d*) 10000.

205. Curve *D* in Fig. 3 corresponds to the Reynold number

(*a*) 1000 (*b*) 4000

(*c*) 6000 (*d*) 10000.

206. The shear stress distribution across a section of a circular pipe, having viscous flow is given by

(*a*) $\tau = \frac{\partial p}{\partial x} r^2$ (*b*) $\tau = \frac{\partial p}{\partial x} \frac{r}{2}$

(*c*) $\tau = -\frac{\partial p}{\partial x} \frac{r}{2}$ (*d*) $\tau = -\frac{\partial p}{\partial x} \times 2r$.

207. The velocity distribution across a section of a circular pipe having viscous flow is given by

(*a*) $u = U_{max}\left[1 - \left(\frac{r}{R}\right)^2\right]$

(*b*) $u = U_{max}\,[R^2 - r^2]$

(*c*) $u = U_{max}\left[1 - \frac{r}{R}\right]^2$

(*d*) none of the above.

208. The velocity distribution across a section of two fixed parallel plates having viscous flow is given by

(*a*) $u = \frac{1}{2\mu}\left(-\frac{\partial p}{\partial x}\right)(t^2 - y^2)$

(*b*) $u = \frac{1}{2\mu}\frac{\partial p}{\partial x}\left[t_y - y^2\right]$

(*c*) $u = \frac{1}{2\mu}\frac{\partial p}{\partial x}\,[y - ty]$

(*d*) $u = -\frac{1}{2\mu}\frac{\partial p}{\partial x}[t - y^2]$

where t = Distance between two plates and y is measured from the lower plate.

209. The shear stress distribution across a section of two fixed parallel plates having viscous flow is given by

(*a*) $\tau = -\frac{1}{2}\frac{\partial p}{\partial x}[t^2 - y^2]$

(*b*) $\tau = -\frac{1}{2}\frac{\partial p}{\partial x}[t - 2y]$

(c) $\tau = -\frac{1}{2}\frac{\partial p}{\partial x}[ty - y^2]$

(d) $\tau = \frac{1}{2}\frac{\partial p}{\partial x}[y - ty]$

where t = Distance between two parallel plates and y is measured from the plate.

210. The ratio of inertia force to viscous force is known as
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

211. The square root of the ratio of inertia force to gravity force is called
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

212. The square root of the ratio of inertia force to force due to compressibility is known as
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

213. The square root of the ratio of inertia force to pressure force is known as
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler's number.

214. Model analysis of pipes flow are based on
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

215. Model analysis of free surface flows are based on
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

216. Model analysis of aeroplanes and projectile moving at supersonic speed based on
(a) Reynolds number (b) Froude number
(c) Mach number (d) Euler number.

217. The boundary-layer takes place
(a) for ideal fluids
(b) for pipe-flow only
(c) for real fluids
(d) for flow over flat plate only.

218. The boundary layer is called turbulent boundary layer if
(a) Reynolds number is more than 2000
(b) Reynolds number is more than 4000
(c) Reynolds number is more than 5×10^5
(d) none of the above.

219. Laminar sub-layer exists in
(a) laminar boundary layer region
(b) turbulent boundary layer region
(c) transition zone
(d) none of the above.

220. The thickness of laminar boundary layer at a distance x from the leading edge over a flat plate varies as
(a) $x^{4/5}$ (b) $x^{1/2}$
(c) $x^{1/5}$ (d) $x^{3/5}$.

221. The thickness of turbulent boundary layer at a distance x from the leading edge over a flat plate varies as
(a) $x^{4/5}$ (b) $x^{1/2}$
(c) $x^{1/5}$ (d) $x^{3/5}$.

222. The separation of boundary layer takes place in case of
(a) negative pressure gradient
(b) positive pressure gradient
(c) zero pressure gradient
(d) none of the above.

223. The velocity profile for turbulent boundary layer is

(a) $\frac{u}{U} = \sin\left(\frac{\pi}{2}\frac{y}{\delta}\right)$

(b) $\frac{u}{U} = \left(\frac{y}{\delta}\right)^{4/7}$

(c) $\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$

(d) $\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^3$.

224. The drag force exerted by a fluid on a body immersed in the fluid is due to
(a) pressure and viscous force
(b) pressure and gravity force
(c) pressure and turbulence force
(d) none of the above.

225. For supersonic flow, if the area of flow increases then
(a) velocity decreases
(b) velocity increases
(c) velocity is constant
(d) none of the above.

226. The area velocity relationship for compressible fluids is

(a) $\frac{dA}{A} = \frac{dV}{A}[1 - M^2]$ (b) $\frac{dA}{A} = \frac{dV}{V}[M^2 - 1]$

(c) $\frac{dA}{A} = \frac{dV}{V}[1 - V^2]$ (d) $\frac{dA}{A} = \frac{dV}{V}[C^2 - 1]$.

227. The flow in open channel is laminar if the Reynolds number is
(*a*) 2000 (*b*) less than 2000
(*c*) less than 500 (*d*) none of the above.

228. The flow in open channel is turbulent if the Reynolds number is
(*a*) 2000 (*b*) more than 2000
(*c*) more than 4000 (*d*) 4000.

229. If the Froude number in open channel flow is less than 1.0, the flow is called
(*a*) critical flow
(*b*) super-critical flow
(*c*) sub-critical flow
(*d*) none of the above.

230. If the Froude number in open channel flow is equal to 1.0, the flow is called
(*a*) critical flow (*b*) streaming flow
(*c*) shooting (*d*) none of the above.

231. If the Froude number in open channel flow is more than 1.0, the flow is called
(*a*) critical flow (*b*) streaming flow
(*c*) shooting flow (*d*) none of the above.

232. Chezy's formula is given as
(*a*) $V = i\sqrt{mC}$ (*b*) $V = C\sqrt{mi}$
(*c*) $V = m\sqrt{Ci}$ (*d*) none of the above.

233. The discharge through a rectangular channel is maximum when
(*a*) $m = \frac{d}{3}$ (*b*) $m = \frac{d}{2}$
(*c*) $m = 2d$ (*d*) $m = \frac{3d}{2}$
where m = Hydraulic mean depth, d = Depth of flow.

234. The discharge through a trapezoidal channel is maximum when
(*a*) half of top width = sloping side
(*b*) top width = half of sloping side
(*c*) top width = 1.5 × sloping side
(*d*) none of the above.

235. The maximum velocity through a circular channel takes place when depth of flow is equal to
(*a*) 0.95 times the diameter
(*b*) 0.5 times the diameter
(*c*) 0.81 times the diameter
(*d*) 0.5 times the diameter.

236. The maximum discharge through a circular channel takes place when depth of flow is equal to
(*a*) 0.95 times the diameter
(*b*) 0.3 times the diameter
(*c*) 0.81 times the diameter
(*d*) 0.5 times the diameter.

237. Specific energy of a flowing fluid per unit weight is equal to
(*a*) $\frac{p}{w} + \frac{V^2}{2g}$ (*b*) $\frac{p}{w} + h$
(*c*) $\frac{V^2}{2g} + h$ (*d*) $\frac{p}{w} + \frac{V^2}{2g} + h$.

238. The depth of flow after hydraulic jump is
(*a*) $d_2 = \frac{d_1}{2}[\sqrt{1 + 8(F_e)_1^2} - 1]$
(*b*) $d_2 = \frac{d_1}{2}[1 + \sqrt{8(F_e)_1^2} - 1]$
(*c*) $d_2 = \frac{d_1}{2} + \sqrt{\frac{d_1^2}{4} + 8(F_e)_1}$
(*d*) none of the above.

239. The depth of flow at which specific energy is minimum is called
(*a*) normal depth (*b*) critical depth
(*c*) alternate depth (*d*) none of the above.

240. The critical depth (h_c) is given by
(*a*) $\left(\frac{q^2}{g}\right)^{1/2}$ (*b*) $\left(\frac{q}{g}\right)^{1/3}$
(*c*) $\left(\frac{q^2}{g}\right)^{1/3}$ (*d*) $\left(\frac{q^2}{g}\right)^{2/3}$
where q = Rate of flow per unit width of channel.

241. For a circular channel, the wetted perimeter is given by
(*a*) $\frac{R\theta}{2}$ (*b*) $3R\theta$
(*c*) $2R\theta$ (*d*) $R\theta$
where R = Radius of circular channel and θ = half the angle subtended by the water surface at the centre.

242. For a circular channel the area of flow is given by
(*a*) $R^2\left(2\theta - \frac{\sin 2\theta}{2}\right)$ (*b*) $R^2\left(\theta - \frac{\sin 2\theta}{2}\right)$
(*c*) $R^2(\theta - \sin 2\theta)$ (*d*) none of the above
where θ = Half the angle subtended by water surface at the centre, and R = Radius of circular channel.

243. The hydraulic mean depth is given by

(a) $\frac{P}{A}$ (b) $\frac{P^2}{A}$

(c) $\frac{A}{P}$ (d) $\sqrt{\frac{A}{P}}$

where A = Area , and P = Wetted perimeter.

244. A most economical section is one which for a given cross-sectional area, slope of bed (i) and co-efficient of resistance has
(a) maximum wetted perimeter
(b) maximum discharge
(c) maximum depth of flow
(d) none of the above.

245. Specific speed of a turbine is defined as the speed of the turbine which
(a) produces unit power at unit head
(b) produces unit horse power at unit discharge
(c) delivers unit discharge at unit head
(d) delivers unit discharge at unit power.

246. A pump is defined as a device which converts
(a) Hydraulic energy into mechanical energy
(b) Mechanical energy into hydraulic energy
(c) Kinetic energy into mechanical energy
(d) None of the above.

247. A turbine is a device which converts
(a) Hydraulic energy into mechanical energy
(b) Mechanical energy into hydraulic energy
(c) Kinetic energy into mechanical energy
(d) Electrical energy into mechanical energy.

248. The force exerted by a jet of water on a stationary vertical plate in the direction of jet is given by
(a) $F_x = \rho AV^2 \sin^2 \theta$
(b) $F_x = \rho AV^2 [1 + \cos \theta]$
(c) $F_x = \rho AV^2$
(d) none of the above.

249. The force exerted by a jet of water on a stationary inclined plate in the direction of jet is given by
(a) $F_x = \rho AV^2$
(b) $F_x = \rho AV^2 \sin^2 \theta$
(c) $F_x = \rho AV^2 [1 + \cos \theta]$
(d) $F_x = \rho AV^2 [1 + \sin \theta]$.

250. The force exerted by a jet of water on a stationary curved plate in the direction of jet is equal to
(a) ρAV^2
(b) $\rho AV^2 \sin^2 \theta$
(c) $\rho AV^2 (1 + \cos \theta)$
(d) $\rho AV^2 [1 + \sin \theta]$.

251. The force exerted by a jet of water having velocity V on a vertical plate, moving with a velocity u is given by
(a) $F_x = \rho A(V - u)^2 \sin^2 \theta$
(b) $F_x = \rho A(V - u)^2$
(c) $F_x = \rho A(V - u)^2 [1 + \cos \theta]$
(d) None of the above.

252. The force exerted by a jet of water having velocity V on a series of vertical plates moving with velocity u is given by
(a) $F_x = \rho AV^2$ (b) $F_x = \rho A (V - u)^2$
(c) $F_x = \rho AVu$ (d) None of the above.

253. Efficiency of the jet of water having velocity V striking a series of vertical plates moving with a velocity u is given by

(a) $\eta = \frac{2V(V - u)}{u^2}$ (b) $\eta = \frac{2u(V - u)}{V^2}$

(c) $\eta = \frac{u^2}{V^2 (V - u)}$ (d) None of the above.

254. Efficiency, of the jet of water having velocity V and striking a series of vertical plates moving with a velocity u, is maximum when

(a) $u = 2V$ (b) $u = \frac{V}{2}$

(c) $u = \frac{3V}{2}$ (d) $u = \frac{4V}{3}$.

255. Maximum efficiency of a series of vertical plates is
(a) 66.67% (b) 33.33%
(c) 50% (d) 80%.

256. For a series of curved radial vanes, the work done per second per unit weight is equal to

(a) $\frac{1}{g} V_{W_1} u_1 + V_{W_2} u_2$ (b) $\frac{1}{g}[V_1 u_1 + V_2 u_2]$

(c) $\frac{1}{g}[V_{W_1} u_1 \pm V_{W_2} u_2]$ (d) none of the above.

257. The net head (H) on the turbine is given by
(a) H = Gross Head + Head lost due to friction
(b) H = Gross Head – Head lost due to friction

(c) H = Gross Head + $\frac{V^2}{2g}$ – Head lost due to friction.

258. Hydraulic efficiency of a turbine is defined as the ratio of
(a) Power available at the inlet of turbine to power given by water to the runner
(b) Power at the shaft of the turbine to power given by water to the runner
(c) Power at the shaft of the turbine to the power at the inlet of turbine
(d) None of the above.

259. Mechanical efficiency of a turbine is the ratio of
(a) Power at the inlet to the power at the shaft of turbine
(b) Power at the shaft to the power given to the runner
(c) Power at the shaft to the power at the inlet of turbine
(d) None of the above.

260. The overall efficiency of a turbine is the ratio of
(a) Power at the inlet of turbine to the power at the shaft
(b) Power at the shaft to the power given to the runner
(c) Power at the shaft to the power at the inlet of turbine
(d) None of the above.

261. The relation between hydraulic efficiency (η_h), mechanical efficiency (η_m) and overall efficiency (η_o) is
(a) $\eta_h = \eta_o \times \eta_m$ (b) $\eta_o = \eta_h \times \eta_m$
(c) $\eta_o = \frac{\eta_m}{\eta_h}$ (d) none of the above.

262. A turbine is called impulse if at the inlet of the turbine
(a) total energy is only kinetic energy
(b) total energy is only pressure energy
(c) total energy is the sum of kinetic energy and pressure energy
(d) none of the above.

263. A turbine is called reaction turbine if at the inlet of the turbine the total energy is
(a) kinematic energy only
(b) kinetic energy and pressure energy
(c) pressure energy only
(d) none of the above.

264. Which of the following statement is correct?
(a) Pelton wheel is a reaction turbine
(b) Pelton wheel is a radial flow turbine
(c) Pelton wheel is an impulse turbine
(d) None of the above.

265. Francis turbine is
(a) an impulse turbine
(b) a radial flow impulse turbine
(c) an axial flow turbine
(d) a reaction radial flow turbine.

266. Kaplan turbine is
(a) an impulse turbine
(b) a radial flow impulse turbine
(c) an axial flow reaction turbine
(d) a radial flow reaction turbine.

267. Jet ratio (m) is defined as the ratio of
(a) diameter of jet of water to diameter of Pelton wheel
(b) velocity of vane to the velocity of jet of water
(c) velocity of flow to the velocity of jet of water
(d) diameter of Pelton wheel to diameter of the jet of water.

268. Flow ratio is defined as the ratio of
(a) Velocity of flow at inlet to the velocity given by $\sqrt{2gH}$
(b) Velocity of runner at inlet to the velocity of flow at inlet
(c) Velocity of runner to the velocity given by $\sqrt{2gH}$
(d) None of the above.

269. Speed ratio is given by
(a) $\frac{u}{\sqrt{2gH}}$ (b) $\frac{V_f}{\sqrt{2gH}}$
(c) $\frac{\sqrt{2gH}}{V_f}$ (d) $\frac{V_w}{\sqrt{2gH}}$.

270. The speed ratio for Pelton wheel varies from
(a) 0.45 to 0.50 (b) 0.6 to 0.7
(c) 0.3 to 0.4 (d) 0.8 to 0.9.

271. The discharge through Pelton Turbine is given by
(a) $Q = \pi DB\, V_f$
(b) $Q = \frac{\pi}{4} d^2 \times \sqrt{2gH}$
(c) $Q = \frac{\pi}{4}\left[D_o^2 - D_b^2\right] \times V_f$
(d) None of the above.

272. The discharge through Francis Turbine is given by
(a) $Q = \pi DB\, V_f$
(b) $Q = \frac{\pi}{4} d^2 \times \sqrt{2gH}$
(c) $Q = \frac{\pi}{4}\left[D_o^2 - D_b^2\right]$
(d) None of the above.

273. The discharge through Kaplan turbine is given by
(a) $Q = \pi DB\, V_f$ (b) $Q = \frac{\pi}{4} d^2 \times \sqrt{2gH}$
(c) $Q = \frac{\pi}{4}\left[D_o^2 - D_b^2\right]$ (d) $Q = 0.9\, \pi DB\, V_f$.

274. Draft tube is used for discharging water from the exit of
(a) an impulse turbine (b) a Francis turbine
(c) a Kaplan turbine (d) a Pelton wheel.

275. Specific speed of a turbine is defined as the speed at which the turbine runs when
(a) working under unit head and discharging one litre per second
(b) working under unit head and develops unit horse power
(c) develops unit horse power and discharges one litre per second
(d) none of the above.

276. The specific speed (N_s) of a turbine is given by
(a) $N_s = \frac{N\sqrt{P}}{H^{3/4}}$ (b) $N_s = \frac{N\sqrt{Q}}{H^{3/4}}$
(c) $N_s = \frac{N\sqrt{P}}{H^{5/4}}$ (d) $N_s = \frac{NP^{5/4}}{\sqrt{H}}$.

277. Unit speed is the speed of a turbine when it is working
(a) under unit head and develops unit power
(b) under unit head and discharge one m^3/sec
(c) under unit head
(d) none of the above.

278. Unit discharge is the discharge of a turbine when
(a) the head on turbine is unity and it develops unit power
(b) the head on turbine is unity and it moves at unit speed
(c) the head on the turbine is unity
(d) none of the above.

279. Unit power is the power developed by a turbine when
(a) head on turbine is unity and discharge is also unity
(b) head = one metre and speed is unity
(c) head on turbine is unity
(d) none of the above.

280. The unit speed (N_u) is given by the expression
(a) $N_u = \frac{N}{H^{3/2}}$ (b) $N_u = \frac{N}{H^{3/4}}$
(c) $N_u = \frac{N}{\sqrt{H}}$ (d) $N_u = \frac{N}{H^{5/4}}$.

281. The unit discharge (Q_u) is given by the expression
(a) $Q_u = \frac{Q}{\sqrt{H}}$ (b) $Q_u = \frac{Q}{H^{3/2}}$
(c) $Q_u = \frac{Q}{H^{3/4}}$ (d) $Q_u = \frac{Q}{H^{5/4}}$.

282. Unit power (P_u) is given by the expression
(a) $P_u = \frac{P}{\sqrt{H}}$ (b) $P_u = \frac{P}{H^{3/2}}$
(c) $P_u = \frac{P}{H^{3/4}}$ (d) $P_u = \frac{P}{H^{5/4}}$.

283. The unit discharge (Q_u) and unit speed (N_u) curves for different turbines are shown in Fig. 4. Curve A is for
(a) Francis Turbine
(b) Kaplan Turbine
(c) Pelton Turbine
(d) Propeller Turbine.

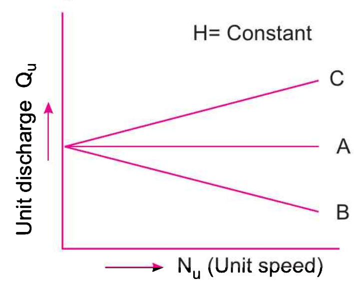

Fig. 4

284. Curve B in Fig. 4 is for
(a) Francis Turbine
(b) Kaplan Turbine
(c) Pelton Turbine
(d) Propeller Turbine.

285. Curve D in Fig. 4 is for
(a) Francis Turbine
(b) Kaplan Turbine
(c) Pelton Turbine
(d) Propeller Turbine.

286. Tick mark the correct statement
(*a*) curves at constant speed are called main characteristic curves
(*b*) curves at constant head are called main characteristic curves
(*c*) curves at constant efficiency are called operating characteristic curves
(*d*) curves at constant efficiency are called main characteristic curves.

287. Main characteristic curves of a turbine means
(*a*) curves at constant speed
(*b*) curves at constant efficiency
(*c*) curves at constant head
(*d*) none of the above.

288. Operating characteristic curves of a turbine means
(*a*) curves drawn at constant speed
(*b*) curves drawn at constant efficiency
(*c*) curves drawn at constant head
(*d*) none of the above.

289. Muschel curves means
(*a*) curves at constant head
(*b*) curves at constant speed
(*c*) curves at constant efficiency
(*d*) none of the above.

290. Governing of a turbine means
(*a*) the head is kept constant under all condition of working
(*b*) the speed is kept constant under all conditions
(*c*) the discharge is kept constant under all conditions
(*d*) none of the above.

291. The work done by impeller of a centrifugal pump on water per second per unit weight of water is given by
(*a*) $\frac{1}{g}V_{W_1}u_1$ (*b*) $\frac{1}{g}V_{W_2}u_2$
(*c*) $\frac{1}{g}(V_{W_2}u_2 - V_{W_1}u_1)$ (*d*) none of the above.

292. The manometer head (H_m) of a centrifugal pump is given by
(*a*) Pressure head at outlet of pump – pressure head at inlet
(*b*) Total head at inlet – total head at outlet
(*c*) Total head at outlet – total head at inlet
(*d*) None of the above.

293. The manometric efficiency (η_{man}) of a centrifugal pump is given by
(*a*) $\frac{H_m}{gV_{W_2}u_2}$ (*b*) $\frac{gH_m}{V_{W_2}u_2}$
(*c*) $\frac{V_{W_2}u_2}{gH_m}$ (*d*) $\frac{g \times V_{W_2}u_2}{H_m}$.

294. Mechanical efficiency (η_{mech}) of a centrifugal pump is given by
(*a*) (Power at the impeller)/S.H.P.
(*b*) S.H.P./Power at the impeller
(*c*) Power possessed by water/power at the impeller
(*d*) Power possessed by water/S.H.P.

295. To produce a high head by multistage centrifugal pumps, the impellers are connected
(*a*) in parallel
(*b*) in series
(*c*) in parallel and in series both
(*d*) none of the above.

296. To discharge a large quantity of liquid by multi-stage centrifugal pump, the impellers are connected
(*a*) in parallel
(*b*) in series
(*c*) in parallel and in series
(*d*) none of the above.

297. Specific speed of a pump is the speed at which a pump runs when
(*a*) head developed is unity and discharge is one cubic metre
(*b*) head developed is unity and shaft horse power is also unity
(*c*) discharge is one cubic metre and shaft horse power is unity
(*d*) none of the above.

298. The specific speed (N_s) of a pump is given by the expression
(*a*) $N_s = \frac{N\sqrt{Q}}{H_m^{5/4}}$ (*b*) $N_s = \frac{N\sqrt{P}}{H_m^{3/4}}$
(*c*) $N_s = \frac{N\sqrt{Q}}{H_m^{3/4}}$ (*d*) $N_s = \frac{N\sqrt{P}}{H_m^{5/4}}$.

299. The operating characteristic curves of a centrifugal pump are shown in Fig. 5, curve *A* is for
(*a*) Head (*b*) Efficiency
(*c*) Power (*d*) None of the above.

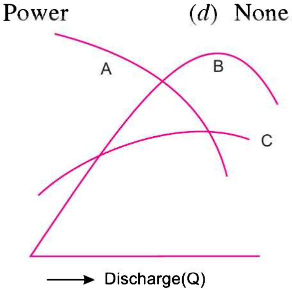

Fig. 5

300. Curve B in Fig. 5 is for
(*a*) Head (*b*) Efficiency
(*c*) Power (*d*) None of the above.

301. Curve C in Fig. 5 is for
(*a*) Head (*b*) Efficiency
(*c*) Power (*d*) None of the above.

302. Cavitation will take place if the pressure of the flowing fluid at any point is
(*a*) more than vapour pressure of the fluid
(*b*) equal to vapour pressure of the fluid
(*c*) is less than vapour pressure of the fluid
(*d*) none of the above.

303. Cavitation can take place in case of
(*a*) Pelton Wheel
(*b*) Francis Turbine
(*c*) Reciprocating pump
(*d*) Centrifugal pump.

304. Which of the following statement is correct?
(*a*) Centrifugal pump convert mechanical energy into hydraulic energy by sucking liquid into chamber
(*b*) Reciprocating pumps convert mechanical energy into hydraulic energy by means of centrifugal force.
(*c*) Centrifugal pumps convert mechanical energy into hydraulic energy by means of centrifugal force
(*d*) Reciprocating pumps convert hydraulic energy into mechanical energy.

305. The discharge through a single-acting reciprocating pump is
(*a*) $Q = \frac{ALN}{60}$ (*b*) $Q = \frac{2ALN}{60}$
(*c*) $Q = ALN$ (*d*) $Q = 2ALN$.

306. The pressure head due to acceleration (h_a) in reciprocating pump is given by
(*a*) $h_a = \frac{l}{g} \times \frac{a}{A} \times \omega^2 r \sin\theta$
(*b*) $h_a = \frac{l}{g} \times \frac{A}{a} \times \omega^2 r \sin\theta$
(*c*) $h_a = \frac{l}{g} \times \frac{A}{a} \omega^2 r \cos\theta$
(*d*) $h_a = \frac{A}{a} \omega^2 r \sin\theta$

where A = Area of cylinder, a = Area of pipe and r = radius of crank.

307. Indicator diagram shows for one complete revolution of crank the
(*a*) Variation of kinetic head in the cylinder
(*b*) Variation of pressure head in the cylinder
(*c*) Variation of kinetic and pressure head in the cylinder
(*d*) None of the above.

308. Air vessel in a reciprocating pump is used
(*a*) to obtain a continuous supply of water at uniform rate
(*b*) to reduce suction head
(*c*) to increase the delivery head
(*d*) none of the above.

309. The work saved by fitting an air vessel to a single-acting reciprocating pump is
(*a*) 39.2% (*b*) 84.4%
(*c*) 48.8% (*d*) 92.3%.

310. The work saved by fitting an air vessel to a double acting reciprocating pump is
(*a*) 39.2% (*b*) 84.8%
(*c*) 48.8% (*d*) 92.3%.

311. The pressure, at which separation takes place, is known as separation pressure or separation pressure head. For water, the limiting value of separation pressure head is
(*a*) 2.5 m (abs.) (*b*) 7.5 m (abs.)
(*c*) 10.3 m (abs.) (*d*) 5 m (abs.)

312. During suction stroke of a reciprocating pump, the separation may take place
(*a*) at the end of suction stroke
(*b*) in the middle of suction stroke
(*c*) in the beginning of suction stroke
(*d*) none of the above.

313. During delivery stroke of a reciprocating pump, the separation may take place
(*a*) at the end of delivery stroke
(*b*) in the middle of delivery stroke
(*c*) in the beginning of the delivery stroke
(*d*) none of the above.

314. Hydraulic accumulator is a device used for
(*a*) lifting heavy weights
(*b*) storing the energy of a fluid in the form of pressure energy
(*c*) increasing the pressure intensity of a fluid
(*d*) none of the above.

315. Hydraulic intensifier is a device used for
(*a*) storing energy of a fluid in the form of pressure energy
(*b*) increasing pressure intensity of a liquid
(*c*) transmitting power from one shaft to another
(*d*) none of the above.

316. Hydraulic ram is pump which works
(*a*) on the principle of water-hammer
(*b*) on the principle of centrifugal action
(*c*) on the principle of reciprocating action
(*d*) none of the above.

317. Hydraulic coupling is a device used for
(*a*) transmitting same torque to the driven shaft
(*b*) transmitting increased torque to the driven shaft
(*c*) transmitting decreased torque to the driven shaft
(*d*) none of the above.

318. Torque converter is a device used for
(*a*) transmitting same torque to the driven shaft
(*b*) transmitting increased torque to the driven shaft
(*c*) transmitting decreased torque to the driven shaft
(*d*) transmitting increased or decreased torque to the driven shaft.

319. Capacity of a hydraulic accumulator is given as equal to
(*a*) pressure of water supplied by pump × volume of accumulator
(*b*) pressure of water × area of accumulator
(*c*) pressure of water × stroke of the ram of accumulator
(*d*) none of the above.

320. Kaplan turbine is a propeller turbine in which the vanes fixed on the hub are
(*a*) non-adjustable (*b*) adjustable
(*c*) fixed (*d*) none of the above.

321. If the head on the turbine is more than 300 m, the type of turbine used should be
(*a*) Kaplan (*b*) Francis
(*c*) Pelton (*d*) Propeller.

322. If the specific speed of a turbine is more than 300, the type of turbine is
(*a*) Pelton
(*b*) Kaplan
(*c*) Francis
(*d*) Pelton with more jets.

323. Run-away speed of a Pelton wheel means
(*a*) Full load speed
(*b*) No load speed
(*c*) No load speed with no governor mechanism
(*d*) None of the above.

324. Spouting velocity means
(*a*) actual velocity of jet
(*b*) ideal velocity of jet
(*c*) half of ideal velocity of jet
(*d*) none of the above.

325. Surge tank in a pipe line is used to
(*a*) reduce the loss of head due to friction in pipe
(*b*) make the flow uniform in pipe
(*c*) relieve the pressure due to water hammer
(*d*) none of the above.

326. Hydraulic ram is a device used for
(*a*) storing energy of a water in the form of pressure energy
(*b*) increasing pressure intensity of water
(*c*) lifting small quantity of water to a greater height by means of large quantity of water falling through small height
(*d*) none of the above.

327. For low head and high discharge, the suitable turbine is
(*a*) Pelton (*b*) Francis
(*c*) Kaplan (*d*) None of the above.

328. For high head and low discharge, the suitable turbine is
(*a*) Pelton (*b*) Francis
(*c*) Kaplan (*d*) None of the above.

329. The flow of water, leaving the impeller, in a centrifugal pump casing is
(*a*) Forced vortex flow
(*b*) Free vortex flow
(*c*) Centrifugal flow
(*d*) None of the above.

330. Rotameter is used for measuring
(*a*) density of fluids
(*b*) velocity of fluids in pipes
(*c*) discharge of fluids
(*d*) viscosity of fluids.

331. A current meter is a device used for measuring
(*a*) velocity (*b*) viscosity
(*c*) current (*d*) pressure.

332. A hot wire anemometer is a device used for measuring
(*a*) viscosity (*b*) velocity of gases
(*c*) pressure of gases (*d*) none of the above.

ANSWERS

1. (*c*) **2.** (*b*) **3.** (*b*) **4.** (*b*) **5.** (*b*) **6.** (*c*) **7.** (*b*), (*d*) **8.** (*c*) **9.** (*b*) **10.** (*b*)
11. (*d*) **12.** (*b*) **13.** (*b*) **14.** (*c*) **15.** (*b*) **16.** (*d*) **17.** (*a*) **18.** (*c*) **19.** (*c*) **20.** (*b*)
21. (*d*) **22.** (*c*) **23.** (*d*) **24.** (*c*) **25.** (*b*) **26.** (*b*) **27.** (*d*) **28.** (*c*) **29.** (*c*) **30.** (*c*)
31. (*c*) **32.** (*a*) **33.** (*c*) **34.** (*d*) **35.** (*d*) **36.** (*b*),(*c*) **37.** (*c*) **38.** (*b*) **39.** (*c*) **40.** (*d*)
41. (*b*),(*c*) **42.** (*d*) **43.** (*c*) **44.** (*b*) **45.** (*c*) **46.** (*b*) **47.** (*c*) **48.** (*c*) **49.** (*b*) **50.** (*b*)
51. (*c*) **52.** (*d*) **53.** (*c*) **54.** (*a*) **55.** (*d*) **56.** (*d*) **57.** (*a*) **58.** (*c*) **59.** (*b*) **60.** (*c*)
61. (*d*) **62.** (*d*) **63.** (*d*) **64.** (*c*) **65.** (*d*) **66.** (*d*) **67.** (*c*) **68.** (*d*) **69.** (*b*) **70.** (*d*)
71. (*a*) **72.** (*b*) **73.** (*b*) **74.** (*c*) **75.** (*a*) **76.** (*c*) **77.** (*c*) **78.** (*c*) **79.** (*c*) **80.** (*c*)
81. (*d*) **82.** (*a*) **83.** (*b*) **84.** (*b*) **85.** (*b*) **86.** (*c*) **87.** (*b*) **88.** (*c*) **89.** (*a*) **90.** (*b*)
91. (*a*) **92.** (*b*) **93.** (*b*) **94.** (*a*) **95.** (*b*) **96.** (*b*) **97.** (*c*) **98.** (*a*) **99.** (*b*) **100.** (*c*)
101. (*c*) **102.** (*b*) **103.** (*c*) **104.** (*b*) **105.** (*a*) **106.** (*a*) **107.** (*d*) **108.** (*c*) **109.** (*b*) **110.** (*a*)
111. (*c*) **112.** (*d*) **113.** (*d*) **114.** (*b*) **115.** (*b*) **116.** (*c*) **117.** (*d*) **118.** (*c*) **119.** (*b*) **120.** (*c*)
121. (*b*) **122.** (*c*) **123.** (*a*) **124.** (*c*) **125.** (*c*) **126.** (*c*) **127.** (*c*) **128.** (*b*) **129.** (*d*) **130.** (*c*)
131. (*a*) **132.** (*b*) **133.** (*c*) **134.** (*d*) **135.** (*a*) **136.** (*b*) **137.** (*c*) **138.** (*d*) **139.** (*c*) **140.** (*b*)
141. (*d*) **142.** (*c*) **143.** (*b*) **144.** (*d*) **145.** (*b*) **146.** (*d*) **147.** (*d*) **148.** (*c*) **149.** (*c*) **150.** (*b*)
151. (*d*) **152.** (*c*) **153.** (*d*) **154.** (*a*) **155.** (*a*) **156.** (*a*) **157.** (*c*) **158.** (*c*) **159.** (*c*) **160.** (*c*)
161. (*c*) **162.** (*d*) **163.** (*a*) **164.** (*c*) **165.** (*a*) **166.** (*a*) **167.** (*b*) **168.** (*a*) **169.** (*b*) **170.** (*b*)
171. (*c*) **172.** (*b*) **173.** (*d*) **174.** (*c*) **175.** (*d*) **176.** (*b*) **177.** (*a*) **178.** (*c*) **179.** (*c*) **180.** (*b*)
181. (*b*) **182.** (*b*) **183.** (*c*) **184.** (*c*) **185.** (*b*) **186.** (*a*) **187.** (*b*) **188.** (*c*) **189.** (*b*) **190.** (*c*)
191. (*b*) **192.** (*b*) **193.** (*c*) **194.** (*b*) **195.** (*b*) **196.** (*a*) **197.** (*d*) **198.** (*a*) **199.** (*b*) **200.** (*b*)
201. (*a*) **202.** (*a*) **203.** (*b*) **204.** (*c*) **205.** (*d*) **206.** (*c*) **207.** (*a*) **208.** (*b*) **209.** (*b*) **210.** (*a*)
211. (*b*) **212.** (*c*) **213.** (*d*) **214.** (*a*) **215.** (*b*) **216.** (*c*) **217.** (*c*) **218.** (*c*) **219.** (*b*) **220.** (*b*)
221. (*a*) **222.** (*b*) **223.** (*b*) **224.** (*a*) **225.** (*b*) **226.** (*b*) **227.** (*c*) **228.** (*b*) **229.** (*c*) **230.** (*a*)
231. (*c*) **232.** (*b*) **233.** (*b*) **234.** (*a*) **235.** (*c*) **236.** (*a*) **237.** (*c*) **238.** (*a*) **239.** (*b*) **240.** (*c*)
241. (*c*) **242.** (*b*) **243.** (*c*) **244.** (*b*) **245.** (*a*) **246.** (*b*) **247.** (*a*) **248.** (*c*) **249.** (*b*) **250.** (*c*)
251. (*b*) **252.** (*a*) **253.** (*b*) **254.** (*b*) **255.** (*c*) **256.** (*c*) **257.** (*b*) **258.** (*d*) **259.** (*b*) **260.** (*c*)
261. (*b*) **262.** (*a*) **263.** (*b*) **264.** (*c*) **265.** (*d*) **266.** (*c*) **267.** (*d*) **268.** (*a*) **269.** (*a*) **270.** (*a*)
271. (*b*) **272.** (*a*) **273.** (*c*) **274.** (*b*), (*c*) **275.** (*b*) **276.** (*c*) **277.** (*c*) **278.** (*c*) **279.** (*c*)
280. (*c*) **281.** (*a*) **282.** (*b*) **283.** (*c*) **284.** (*a*) **285.** (*b*) **286.** (*b*) **287.** (*c*) **288.** (*a*) **289.** (*c*)
290. (*b*) **291.** (*b*) **292.** (*c*) **293.** (*b*) **294.** (*a*) **295.** (*b*) **296.** (*a*) **297.** (*a*) **298.** (*c*) **299.** (*a*)
300. (*b*) **301.** (*c*) **302.** (*c*) **303.** (*b*), (*d*) **304.** (*c*) **305.** (*a*) **306.** (*c*) **307.** (*b*) **308.** (*a*)
309. (*b*) **310.** (*a*) **311.** (*a*) **312.** (*c*) **313.** (*a*) **314.** (*b*) **315.** (*b*) **316.** (*a*) **317.** (*a*) **318.** (*d*)
319. (*a*) **320.** (*b*) **321.** (*c*) **322.** (*b*) **323.** (*c*) **324.** (*b*) **325.** (*c*) **326.** (*c*) **327.** (*c*) **328.** (*a*)
329. (*b*) **330.** (*c*) **331.** (*a*) **332.** (*b*).