FLUID DYNAMICS

Each question has four possible answers, encircled the correct answer:

1. The fractional effect between different layers of a flowing fluid is called:

(a) Viscosity of the fluid **(b)** Velocity of the fluid

(c) Displacement of the fluid **(d)** Acceleration of the fluid

2. The force required to slide one layer of the liquid over another layer is measured by:

(a) Acceleration **(b)** Viscosity

(c) Momentum **(d)** Velocity

3. An object moving through a fluid experience a retarding force is called:

(a) Centripetal force **(b)** Horizontal force

(c) Drag force **(d)** Gravitational force

4. The study of the properties of fluid at rest is called:

(a) Viscosity **(b)** Fluid dynamic

(c) Fluid static **(d)** Friction

5. The study of properties of fluids in motion is called:

(a) Viscosity **(b)** Fluid dynamics

(c) Fluid static **(d)** Friction

6. Drag force between two layers under consideration depends upon:

(a) Distance between the layers **(b)** Relative velocity

(c) Surface area of layer **(d)** All of these

7. The drag force between different layers of the liquid is given by:

(a) $F_d = 6\pi\eta rv$ **(b)** $F_d = \frac{6\pi\eta}{rv}$

(c) $F_d = \frac{6\pi\eta r}{v}$ **(d)** None of these

8. Stoke's law holds for:

(a) Cylindrical bodies **(b)** Cubical bodies

(c) Spherical bodies **(d)** None of these

9. According to Stoke's law, drag force depends on:

(a) Coefficient of viscosity **(b)** Terminal velocity

(c) Radius of the spherical body **(d)** All of these

10. The drag force increases as the speed of particle:

(a) Increases **(b)** Decreases

(c) Remains constant **(d)** None of these

11. The drag force F_d on a sphere of radius r moving slowly with speed v through the fluid of viscosity η is given by:

(a) $4\pi\eta rv$ **(b)** $6\pi\eta rv$

(c) $2\pi\eta rv$ **(d)** $3\pi\eta rv$

12. The word fluid means:

(a) To fall **(b)** To rise

(c) To flow **(d)** None of these

13. Stokes law obey only:

(a) Ideal fluid **(b)** Viscous fluid

(c) Perfect fluid **(d)** Non-ideal fluid

14. The formula $F_d = 6\pi\eta rv$ is derived by:

(a) Einstein **(b)** Newton

(c) Sadi Carnot **(d)** Stoke

15. Due to increase in temperature, the viscosity of the fluid:

(a) Increases **(b)** Decreases

(c) Remains constant **(d)** Becomes double

16. The dimensions of coefficient of viscosity are:

(a) $[ML^{-1}T^{-2}]$ **(b)** $[ML^{2}T^{-1}]$

(c) $[ML^{-1}T^{-1}]$ **(d)** None of these

17. Viscosity of the gases with rise in temp:

(a) Increases **(b)** Decreases

(c) Remains constant **(d)** None of these

18. Which one of the following is most viscous:

(a) Glycerine **(b)** Coal Tar

(c) Honey **(d)** None of these

19. The SI unit of coefficient of viscosity is:

(a) $kg\ m^{-1}s^{-1}$ **(b)** $Nm^{2}s^{2}$

(c) $kg\ m^{2}s^{-2}$ **(d)** $kg\ ms^{-2}$

20. Internal friction of a fluid is called:

(a) Surface tension **(b)** Resistance

(c) Viscosity **(d)** None of these

21. When the magnitude of the drag force becomes equal to the weight, the net force acting on the droplet is:

(a) Zero **(b)** Maximum

(c) Remains the same **(d)** None of these

22. The drag force increases as the speed of the object:

(a) Decreases **(b)** Increases

(c) Remains constant **(d)** None of these

23. The force of friction that comes into action after the motion has started is called:

(a) Limiting friction **(b)** Static friction

(c) Friction **(d)** None of these

24. A body of mass m is falling downward in a viscous medium with terminal velocity v, net force on the body is:

(a) mg **(b)** $mg - 6\pi\eta rv$

(c) $6\pi\eta rv - mg$ **(d)** Zero

25. Viscosity of air is:

(a) $0.019 \times 10^{3}\ Nsm^{-2}$ **(b)** $0.019 \times 10^{-3}\ N\text{-}sm^{-2}$

(c) $0.0019 \times 10^{-3}\ N\text{-}sm^{-2}$ **(d)** $0.0019 \times 10^{3}\ N\text{-}sm^{-2}$

26. The viscosity of water is:

(a) $0.019 \times 10^{-3}\ N\text{-}sm^{-2}$ **(b)** $0.801 \times 10^{-3}\ N\text{-}sm^{-2}$

(c) $6.29 \times 10^{-3}\ N\text{-}sm^{-2}$ **(d)** $0.081 \times 10^{3}\ N\text{-}sm^{-2}$

27. The viscosity of glycrine is:

(a) $0.019 \times 10^{-3}\ Nsm^{-2}$ **(b)** $0.801 \times 10^{-3}\ Nsm^{-2}$

(c) $6.29 \times 10^{-3}\ N\text{-}sm^{-2}$ **(d)** $6.29 \times 10^{3}\ Nsm^{-2}$

28. The maximum velocity attained by a spherical droplet when drag force F and the weight of the droplet becomes equal is called:

(a) Instantaneous velocity **(b)** Terminal velocity

(c) Uniform velocity **(d)** None of these

29. The terminal velocity in case of spherical droplet is directly proportional to the:

(a) Square of the radius **(b)** Radius of the droplet

(c) Half of the radius **(d)** None of these

30. The terminal velocity of the spherical object is given by:

(a) $v_t = \frac{2gr^2\rho}{9\eta}$ **(b)** $v_t = \frac{mg}{4\pi\eta r}$

(c) $v_t = \frac{mg}{6\pi\eta r}$ **(d)** None of these

31. The terminal velocity of water droplet of radius 1×10^{-4} m and density 1000 kg/m^3 falling through air of viscosity 19×10^{-6} kg/ms is:

(a) 1.5 m/s **(b)** 2.3 m/s

(c) 3.4 m/s **(d)** 1.1 m/s

32. The terminal velocity v_t of a sphere of radius r in fluid of viscosity η depends upon:

(a) Radius **(b)** Viscosity

(c) Density **(d)** All of above

33. If each particle of fluid passing through a point follows the same path, then flow is called:

(a) Regular flow **(b)** Streamline flow

(c) Normal flow **(d)** Turbulent flow

34. The irregular flow of the fluids is called:

(a) Regular flow **(b)** Normal flow

(c) Turbulent flow **(d)** Streamline flow

35. For the steady flow of incompressible fluid, the equation of continuity is given by:

(a) $A_1v_1 = A_2v_2$ **(b)** $\frac{A_1}{v_1} = \frac{A_2}{v_2}$

(c) $\frac{v_1}{A_1} = \frac{v_2}{A_2}$ **(d)** $A_1v_1t_1 = A_2v_2t_2$

36. The product of cross-sectional area of the pipe and the fluid speed at any point along the pipe is:

(a) Zero **(b)** Constant

(c) Variable **(d)** None of these

37. A fog droplet falls vertically through air with an acceleration:

(a) Greater than g **(b)** Less than g

(c) Equal to g **(d)** Equal to zero

38. The formula for continuity is given by the relation:

(a) $\rho_1v_2v_1 = \rho_2v_1v_2$ **(b)** $\rho_1A_1v_1 = \rho_2v_2A_2$

(c) $\rho_2A_2v_1 = \rho_1A_1v_2$ **(d)** None of these

39. The SI units of flow rate is:

(a) m^2/s^2 **(b)** m^3/s

(c) m^3/s^2 **(d)** m^2/s

40. Bernoullis equation is based upon law of conservation of:

(a) Momentum **(b)** Energy

(c) Mass **(d)** All of these

41. The fluid which is in compressible and non-viscous is called:

(a) Viscous fluid **(b)** Non-ideal fluid

(c) Ideal fluid **(d)** Perfect fluid

42. When the velocity of a liquid flowing steadily in a tube increases, its pressure:

(a) Becomes zero **(b)** Remains the same

(c) Increases **(d)** Decreases

43. The application of Bernoulli's theorem is:

(a) Torricelli's theorem **(b)** Venturi relation

(c) Both (a) and (b) **(d)** None of these

44. According to Bernoulli's theorem, velocity and pressure:

(a) Are inversely proportional **(b)** Are directly proportional

(c) Have no relation **(d)** None of these

45. Bernoulli's equation includes as a special case of:

(a) Torricelli's theorem **(b)** Stoke's law

(c) Newton's laws **(d)** None of these

46. When there is no change in pressure at the beginning and end of a flow process, Bernoulli's equation reduces to:

(a) $v = \sqrt{2gh}$ **(b)** $P = \rho gh$

(c) $P + \frac{1}{2}\rho v^2 = \text{Constant}$ **(d)** None of these

47. If the cross-sectional area of the pipe decreases, the speed of the fluid must increases according to:

(a) Venturi relation **(b)** Equation of continuity

(c) Torricelli's thereom **(d)** None of these

48. Bernoulli's equation is applicable to points flow:

(a) In a streamline flow **(b)** In any non-viscous liquid

(c) In a steady of flowing liquid **(d)** None of these

49. The Torricellis expression is expressed as:

(a) $v_2 = \sqrt{2g(h_1 + h_2)}$ **(b)** $v_2 = \sqrt{2g(h_1 + h_2)}$

(c) $v_2 = \sqrt{2g(h_1 - h_2)}$ **(d)** None of these

50. The velocity of efflux of a liquid from an orifice is:

(a) $\sqrt{gh}$ **(b)** $\sqrt{2gh}$

(c) $\frac{gh}{2}$ **(d)** $2\sqrt{gh}$

51. The Venutri relation is given by:

(a) $P_1 + P_2 = \rho v_2^2$ **(b)** $P_1 - P_2 = \rho v_2^2$

(c) $P_1 - P_2 = \frac{1}{2}\rho v_2^2$ **(d)** $P_1 + P_2 = \frac{1}{2}\rho v_2^2$

52. The speed of efflux is equal to the velocity gained by the falling fluid under the action of gravity through a certain height is called:

(a) Torricell's theorem **(b)** Venture's theorem

(c) Cornot engine **(d)** None of these

53. Venturi meter is a device used to measure:

(a) Viscosity of fluid **(b)** Density of fluid

(c) Pressure of fluid **(d)** Speed of fluid

54. The fundamental equation in fluid dynamics which relates the pressure with speed fluid and height is:

(a) Bernoulli's equation **(b)** Equation of continuity

(c) Torricelli's equation **(d)** Venturi equation

55. The Bernoulli's equation is written as:

(a) $P - \frac{1}{2}\rho v^2 = \text{Constant}$ **(b)** $P + \frac{1}{2}\rho v^2 + \rho gh = \text{Constant}$

(c) $P + \frac{1}{2}\rho v^2 - \rho gh = \text{Constant}$ **(d)** None of these

56. The pressure will be low, where the speed of fluid is:

(a) High **(b)** Low

(c) Zero **(d)** Constant

57. At any two points along streamline flow, the sum of the pressure, P.E per unit volume and K.E per unit volume remains constant, this is the statement:

(a) Equation of continuity **(b)** Venturi relation

(c) Terricelli's theorem **(d)** Bernoulli's theorem

58. The speed of efflux of liquid is the same as the speed of ball falls through a height of:

(a) $h_1 + h_2$ **(b)** $h_2 - h_1$

(c) $h_1 - h_2$ **(d)** None of these

59. Blood is an incompressible fluid having a density nearly equal to that of:

(a) Water **(b)** Oil

(c) Milk **(d)** All of these

60. Human blood pressure is measured in:

(a) N/m^2 **(b)** Torr

(c) Pascal **(d)** cm

61. Blood has a density:

(a) Greater than water **(b)** Equal to water

(c) Less than water **(d)** None of these

62. Blood pressure is measured by:

(a) Barometer **(b)** Stetho scope

(c) Sphygmomanometer **(d)** Hydrometer

63. Blood is an:

(a) Incompressible fluid **(b)** Compressible fluid

(c) Ideal fluid **(d)** Perfect fluid

64. The instrument which detects the instant at which the external pressure becomes equal to the systolic pressure is called:

(a) Manometer **(b)** Sphygmomanometer

(c) Barometer **(d)** Hydrometer

65. Tubes of narrow bore and liquids of high viscosity and low density promote:

(a) Streamline flow **(b)** Turbulent flow

(c) Both (a) and (b) **(d)** None of these

66. Streamlines passing through a given cross-section normally form:

(a) Liquid does not cross the boundaries of tubes of flow

(b) Tubes of flow

(c) Steady flow do not overlap each other

(d) All of these

67. Dimensions of $\left[\frac{1}{2}\rho v^2\right]$ are:

(a) $[ML^{-1}T^{-1}]$ **(b)** $[ML^{3}T^{-2}]$

(c) $[ML^{-1}T^{-2}]$ **(d)** $[ML^{-1}T^{-1}]$

68. Dimensions of $[\rho gh]$ are:

(a) $[ML^{-1}T^{-2}]$ **(b)** $]ML^{-3}T^{-2}]$

(c) $[ML^{-1}T^{-1}]$ **(d)** $[ML^{-2}T^{-2}]$

69. In the formula for velocity of efflux $v = \sqrt{2gh}$ where h is:

(a) The height of orifice from the bottom of the vessel

(b) Height of liquid column above the orifice

(c) Height of liquid column

(d) None of these

70. Sphygmo is a:

(a) Greek word **(b)** Spanish word

(c) Latin word **(d)** None of these

71. Sphygmo means:

(a) Liver **(b)** Pulse

(c) Liver **(d)** Heart

72. Bunsen burner works on the principle of:

(a) Venturi effect **(b)** Torricilli's effect

(c) Bernoulli's effect **(d)** None of these

73. In Laminar flow, adjacent layers:

(a) Mix with each other **(b)** Smoothly slide one over the other

(c) Oppose each other **(d)** None of these

74. A man is standing near a fast moving train:

(a) To fall towards the track **(b)** To fall away from the track

(c) No effect **(d)** None of these

75. Two boats moving parallel in a river:

(a) Remain always parallel **(b)** Pulled towards each other due to less pressure

(c) Get a part due to increase in pressure **(d)** None of these

76. Streamlines are:

(a) Largely spaced on the upper side than on the inner side of the wing

(b) Equally spaced both on the upper and lower side of the wing

(c) Closer together on the upper side of the wing

(d) None of these

77. A fluid is said to be ideal if it is:

(a) Non-viscous, incompressible and streamline

(b) Non-viscous and streamline

(c) Non-viscous and incompressible

(d) None of these

78. The blood pressure varies from high systolic pressure to low diastolic pressure of about:

(a) 80 – 90 torr **(b)** 75 – 85 torr

(c) 75 – 80 torr **(d)** None of these

79. 1 torr in N/m^2 is:

(a) 129 N/m^2 **(b)** 133.3 N/m^2

(c) 135.6 N/m^2 **(d)** 125 N/m^2

80. The systolic pressure is about:

(a) 120 torr **(b)** 125 torr

(c) 115 torr **(d)** 130 torr

81. Blood pressure of a person:

(a) Increases with age **(b)** Decreases with age

(c) Remain same **(d)** None of these

82. The smoot or steady streamline flow is known as:

(a) Turbulent flow **(b)** Laminar flow

(c) Simple flow **(d)** None of these

83. The velocity of liquid below which its flow is laminar is called:

(a) Critical velocity **(b)** Escape velocity

(c) Relative velocity **(d)** None of these

84. For which position, will the maximum blood pressure in the body have the smallest value:

(a) Standing one's leg **(b)** Lying horizontally

(c) Standing up right **(d)** None of these

85. The smooth r steady streamline flow is called:

(a) Turbulent flow **(b)** Laminar flow

(c) Simple flow **(d)** Regular flow

86. Friction in fluids is known as:

(a) Drag force **(b)** Viscosity

(c) Surface tension **(d)** None

87. Unit of coefficient of viscosity:

(a) $Nm^{-2}s$ **(b)** $kg\ m^{-1}s^{-1}$

(c) Both (a), (b) **(d)** None

88. When the magnitude of the drag force becomes equal to the weight, the net force acting on the droplet:

(a) Minimum **(b)** Zero

(c) Maximum **(d)** None

89. If velocity of particle at different points does not change with time, flow is:

(a) Streamline **(b)** Laminar

(c) Steady **(d)** All

90. Equation of continuity is the basis of law of conservation of:

(a) Mass **(b)** Momentum

(c) Energy **(d)** None

91. The product of cross-sectional area of the pipe and the fluid speed at any point along the pipe:

(a) Constant **(b)** Flow rate

(c) Volume flow per second **(d)** All

92. As Bernoulli's equation $P + \frac{1}{2}\rho v^2 + \rho gh = \text{Constant}$. Here $\frac{1}{2}\rho v^2$ is:

(a) K.E. **(b)** K.E. per unit volume

(c) K.E. per unit time **(d)** None

93. Torricelli's theorem is:

(a) $\sqrt{2g}$ **(b)** $\sqrt{2g(h_1 - h_2)}$

(c) $\sqrt{2g(x_1 - x_2)}$ **(d)** None

94. A device used to measure speed of liquid flow:

(a) Venturi-meter **(b)** Speed-meter

(c) Sphyginomeno-meter **(d)** None

95. A liquid flows through a pipe of varying diameter. The velocity of the liquid is 2 m/s at a point where the diameter is 6 cm. The velocity of the liquid at a point where diameter is 3 cm will be:

(a) 1 m/s **(b)** 4 m/s

(c) 8 m/s **(d)** 16 m/s

96. The dimensional formula of surface tension is:

(a) $[MLT^{-1}]$ **(b)** $[MLT^{-2}]$

(c) $[ML^0T^{-2}]$ **(d)** $[ML^{-1}T^{-1}]$

ANSWERS

1.	(a)	**2.**	(b)	**3.**	(c)	**4.**	(c)
5.	(b)	**6.**	(d)	**7.**	(a)	**8.**	(c)
9.	(d)	**10.**	(a)	**11.**	(b)	**12.**	(c)
13.	(b)	**14.**	(d)	**15.**	(b)	**16.**	(c)
17.	(a)	**18.**	(b)	**19.**	(a)	**20.**	(c)
21.	(a)	**22.**	(b)	**23.**	(a)	**24.**	(b)
25.	(b)	**26.**	(b)	**27.**	(c)	**28.**	(b)
29.	(a)	**30.**	(a)	**31.**	(d)	**32.**	(d)
33.	(b)	**34.**	(c)	**35.**	(a)	**36.**	(b)
37.	(a)	**38.**	(b)	**39.**	(b)	**40.**	(b)
41.	(c)	**42.**	(d)	**43.**	(c)	**44.**	(a)
45.	(a)	**46.**	(a)	**47.**	(b)	**48.**	(b)
49.	(c)	**50.**	(b)	**51.**	(c)	**52.**	(a)
53.	(d)	**54.**	(a)	**55.**	(b)	**56.**	(a)
57.	(d)	**58.**	(c)	**59.**	(a)	**60.**	(b)
61.	(b)	**62.**	(c)	**63.**	(a)	**64.**	(b)
65.	(a)	**66.**	(d)	**67.**	(c)	**68.**	(a)
69.	(b)	**70.**	(c)	**71.**	(b)	**72.**	(a)
73.	(b)	**74.**	(a)	**75.**	(b)	**76.**	(c)
77.	(a)	**78.**	(c)	**79.**	(b)	**80.**	(a)
81.	(a)	**82.**	(b)	**83.**	(a)	**84.**	(b)
85.	(b)	**86.**	(b)	**87.**	(c)	**88.**	(b)
89.	(d)	**90.**	(a)	**91.**	(d)	**92.**	(b)
93.	(b)	**94.**	(a)	**95.**	(c)	**96.**	(c)