Hydraulics and Fluid Mechanics

1. Fluid Mechanics deals with:

(A) Study of fluids at rest and in motion

(B) Study of gases only

(C) Study of solids

(D) Study of liquids only

Answer: A) Study of fluids at rest and in motion

2. The unit of viscosity in SI system is:

(A) poise

(B) Pascal-second

(C) Newton-second

(D) dyne/cm²

Answer: B) Pascal-second

3. A fluid is a substance that:

(A) Offers no resistance to change of shape

(B) Offers great resistance to shear stress

(C) Has fixed shape

(D) Is always a liquid

Answer: A) Offers no resistance to change of shape

4. The pressure at a point in a fluid at rest has:

(A) Different values in different directions

(B) Same value in all directions

(C) Zero value always

(D) Maximum along vertical direction

Answer: B) Same value in all directions

5. Manometer is used to measure:

(A) Atmospheric pressure

(B) Vacuum pressure

(C) Gauge pressure

(D) Pressure difference

Answer: D) Pressure difference

6. Bernoulli's equation is based on the conservation of:

(A) Mass

(B) Energy

(C) Force

(D) Momentum

Answer: B) Energy

7. The continuity equation represents conservation of:

(A) Energy

(B) Mass

(C) Momentum

(D) Force

Answer: B) Mass

8. Hydraulic gradient line represents:

(A) Pressure head only

(B) Sum of pressure and datum head

(C) Total head

(D) Velocity head

Answer: B) Sum of pressure and datum head

9. The property of fluid by which molecules resist relative motion is:

(A) Surface tension

(B) Viscosity

(C) Compressibility

(D) Density

Answer: B) Viscosity

10. In a venturimeter, maximum pressure occurs at the:

(A) Throat

(B) Inlet

(C) Outlet

(D) None of these

Answer: B) Inlet

11. The center of pressure is:

(A) Point of application of total pressure on immersed surface

(B) Geometric center of surface

(C) Center of gravity of liquid

(D) Point of maximum pressure

Answer: A) Point of application of total pressure on immersed surface

12. The device used to measure velocity of fluid is:

(A) Manometer

(B) Pitot tube

(C) Orifice meter

(D) Rotameter

Answer: B) Pitot tube

13. Reynold's number is defined as ratio of:

(A) Gravitational force to inertial force

(B) Inertial force to viscous force

(C) Viscous force to pressure force

(D) Pressure force to inertia force

Answer: B) Inertial force to viscous force

14. Laminar flow occurs when Reynold’s number is:

(A) Less than 2000

(B) Between 2000 and 4000

(C) Greater than 4000

(D) More than 10000

Answer: A) Less than 2000

15. The SI unit of surface tension is:

(A) N/m

(B) Nm

(C) N/m^2

(D) N·s/m

Answer: A) N/m

16. Flow through pipes is governed by:

(A) Newton’s law

(B) Darcy’s law

(C) Pascal’s law

(D) Euler’s law

Answer: B) Darcy’s law

17. The ratio of inertia force to gravity force is called:

(A) Weber number

(B) Froude number

(C) Reynold’s number

(D) Mach number

Answer: B) Froude number

18. Water hammer in pipes is due to:

(A) Sudden opening of valve

(B) Sudden closure of valve

(C) Gradual closure of valve

(D) Sudden increase in velocity

Answer: B) Sudden closure of valve

19. The viscosity of a liquid increases with:

(A) Increase in temperature

(B) Decrease in temperature

(C) Stay constant

(D) No effect

Answer: B) Decrease in temperature

20. The bulk modulus of elasticity for an incompressible fluid is:

(A) Zero

(B) Unity

(C) Infinite

(D) High

Answer: C) Infinite

21. Pascal's law is applicable for:

(A) Liquids at rest

(B) Liquids in motion

(C) Gases at rest

(D) None

Answer: A) Liquids at rest

22. The flow in a river is an example of:

(A) Steady flow

(B) Uniform flow

(C) Both steady and uniform flow

(D) Unsteady flow

Answer: D) Unsteady flow

23. The pressure difference between two points in a static liquid is a function of:

(A) Horizontal distance

(B) Vertical distance

(C) Force applied

(D) Area of surface

Answer: B) Vertical distance

24. The dimension of dynamic viscosity is:

(A) $ML^{-1}T^{-2}$

(B) $ML^{-1}T^{-1}$

(C) MT^{-2}

(D) $ML^{-2}T^{-1}$

Answer: B) $ML^{-1}T^{-1}$

25. Hydraulic jump occurs in:

(A) Pipe flow

(B) Open channel flow

(C) Closed conduit flow

(D) Water hammer

Answer: B) Open channel flow

26. Streamline is an imaginary line in a fluid:

(A) Along which flow does not occur

(B) Along which fluid particle moves

(C) Perpendicular to the flow

(D) Where pressure is zero

Answer: B) Along which fluid particle moves

27. In turbulent flow, mixing is:

(A) Minimum

(B) Maximum

(C) Zero

(D) Negative

Answer: B) Maximum

28. Capillarity is a phenomenon observed due to:

(A) Surface tension

(B) Viscosity (C) Pressure

(D) Gravity

Answer: A) Surface tension

29. The continuity equation for flow is based on:

(A) Conservation of mass

(B) Conservation of energy

(C) Newton's law

(D) Pascal's law

Answer: A) Conservation of mass

30. Absolute pressure is the sum of:

(A) Atmospheric and gauge pressure

(B) Atmospheric and vacuum pressure

(C) Gauge and hydrostatic pressure

(D) Gauge and vacuum pressure

Answer: A) Atmospheric and gauge pressure

31. Centre of pressure as compared to centroid is always:

(A) Above

(B) Below

(C) At same point

(D) Variable

Answer: B) Below

32. Specific weight of water is:

(A) 1000 N/m³ (B)

9810 N/m³

(C) 1 N/m³

(D) 9.81 N/m³

Answer: B) 9810 N/m³

33. In a venturimeter, maximum velocity occurs at the:

(A) Throat

(B) Inlet

(C) Outlet

(D) None of these

Answer: A) Throat

34. In laminar flow, fluid particles move:

(A) In random directions

(B) Along well-defined paths

(C) In circles

(D) None of these

Answer: B) Along well-defined paths

35. A piezometer measures:

(A) Atmospheric pressure

(B) Static pressure

(C) Dynamic pressure

(D) Gauge pressure

Answer: B) Static pressure

36. For turbulent flow, Reynold's number is:

(A) < 2000 (B)

> 4000

(C) 1000–2000

(D) 2000–4000

Answer: B) > 4000

37. Hydraulic gradient line never rises above:

(A) Total energy line

(B) Pipe axis

(C) Datum

(D) None of these

Answer: A) Total energy line

38. Cavitation in pumps is due to:

(A) High pressure

(B) Low pressure

(C) High velocity

(D) Low velocity

Answer: B) Low pressure

39. To avoid cavitation in centrifugal pumps:

(A) Increase velocity

(B) Reduce suction lift

(C) Increase speed

(D) Decrease discharge

Answer: B) Reduce suction lift

40. Manometric efficiency of a pump depends on:

(A) Speed

(B) Discharge

(C) Pressure rise

(D) Power consumed

Answer: C) Pressure rise

41. The discharge through a rectangular notch varies as:

(A) Head

(B) Head²

(C) Head^(3/2)

(D) Square root of head

Answer: C) Head^(3/2)

42. For maximum power transmission through a pipe, the head lost due to friction should be:

(A) 1/3 of total head

(B) 2/3 of total head

(C) Equal to total head

(D) Half of total head

Answer: A) 1/3 of total head

43. When the number of jets is increased in a Pelton wheel:

(A) Speed increases

(B) Power increases

(C) Efficiency decreases

(D) Efficiency increases

Answer: B) Power increases

44. In reciprocating pumps, air vessels are provided at:

(A) Suction side only

(B) Delivery side only

(C) Both sides

(D) Either side

Answer: C) Both sides

45. The main function of hydraulic accumulator is to:

(A) Store liquid under pressure

(B) Store air

(C) Absorb shocks

(D) Mix fluids

Answer: A) Store liquid under pressure

46. In an orifice meter, the coefficient used is:

(A) Discharge coefficient

(B) Velocity coefficient

(C) Contraction coefficient

(D) All of these

Answer: D) All of these

47. The velocity of water in an open channel is measured by:

(A) Pitot tube

(B) Float

(C) Notch

(D) Manometer

Answer: B) Float

48. For low discharge and high head, the suitable turbine is:

(A) Francis

(B) Kaplan

(C) Pelton

(D) Propeller

Answer: C) Pelton

49. Multistage pumps are used to:

(A) Increase discharge

(B) Increase speed

(C) Increase pressure

(D) Reduce friction

Answer: C) Increase pressure

50. Hydraulic ram is used to:

(A) Pump water from low to high level

(B) Remove air from pipe

(C) Mix water and air

(D) Store energy

Answer: A) Pump water from low to high level

51. The efficiency of a centrifugal pump is maximum at:

(A) Zero flow

(B) Best efficiency point

(C) Maximum head

(D) Minimum speed

Answer: B) Best efficiency point

52. Water turbine converts:

(A) Electrical energy to mechanical energy

(B) Mechanical energy to water energy

(C) Water energy to mechanical energy

(D) Water energy to electrical energy

Answer: C) Water energy to mechanical energy

53. Free vortex flow is characterized by:

(A) Radial velocity is zero

(B) Tangential velocity is constant

(C) Pressure is maximum at the center

(D) Mass is maximum at the center

Answer: A) Radial velocity is zero

54. For high discharge and low head, the suitable turbine is:

(A) Francis

(B) Kaplan

(C) Pelton

(D) Turgo

Answer: B) Kaplan

55. The energy dissipation in a hydraulic jump is due to:

(A) Frictional loss

(B) Turbulent mixing

(C) Cavitation

(D) Head loss only

Answer: B) Turbulent mixing

56. The ratio of actual velocity of jet to theoretical velocity is:

(A) Coefficient of contraction

(B) Coefficient of velocity

(C) Coefficient of discharge

(D) Reynolds number

Answer: B) Coefficient of velocity

57. The main function of a draft tube in turbines is to:

(A) Reduce pressure

(B) Increase efficiency

(C) Recover kinetic energy of water

(D) Increase head

Answer: C) Recover kinetic energy of water

58. Moody chart is used for:

(A) Determining friction factor

(B) Calculating discharge

(C) Pressure calculation

(D) Cavitation prediction

Answer: A) Determining friction factor

59. Glycerin has viscosity:

(A) Greater than water

(B) Less than water

(C) Equal to water

(D) Zero

Answer: A) Greater than water

60. Head loss due to friction in pipes varies as:

(A) Velocity

(B) Velocity squared

(C) Square of pipe diameter

(D) Inverse of pipe length

Answer: B) Velocity squared

61. The discharge of a centrifugal pump is:

(A) Directly proportional to speed

(B) Directly proportional to head

(C) Directly proportional to power

(D) Not related to speed

Answer: A) Directly proportional to speed

62. The phenomenon of surging occurs in:

(A) Centrifugal pump

(B) Hydraulic ram

(C) Jet pump

(D) Francis turbine

Answer: A) Centrifugal pump

63. Specific speed of a turbine is:

(A) Dimensionless number

(B) Ratio of speed to diameter

(C) Used for classification

(D) Ratio of speed to flow

Answer: C) Used for classification

64. Hydrodynamics is the study of:

(A) Motion of fluids

(B) Static fluids

(C) Kinetic energy of solids

(D) Surface tension

Answer: A) Motion of fluids

65. Boyle's law is applicable for:

(A) Liquids only

(B) Gases only (C) Solids only

(D) All fluids

Answer: B) Gases only

66. The measurement of the flow rate in pipes is done by:

(A) Orifice meter

(B) Rotameter

(C) Venturimeter

(D) All of these

Answer: D) All of these

67. Cavitation is undesirable as it causes:

(A) Noise

(B) Vibration

(C) Damage to parts

(D) All of these

Answer: D) All of these

68. The Reynolds number is a measure of:

(A) Viscous forces to inertial forces

(B) Inertia force to viscous forces

(C) Ratio of pressure force to gravity force

(D) Gravity force to inertia force

Answer: B) Inertia force to viscous forces

69. The discharge through an orifice varies as:

(A) Head

(B) Square root of head

(C) Head squared

(D) Head cubed

Answer: B) Square root of head

70. The total energy line represents:

(A) Datum head

(B) Pressure head

(C) Velocity head

(D) Sum of all heads

Answer: D) Sum of all heads

71. Jet ratio is defined for:

(A) Pelton wheel

(B) Kaplan turbine

(C) Francis turbine

(D) Hydraulic ram

Answer: A) Pelton wheel

72. Fluid with zero viscosity is called:

(A) Real fluid

(B) Ideal fluid

(C) Compressible fluid

(D) Free fluid

Answer: B) Ideal fluid

73. The maximum efficiency of a Pelton wheel is approximately:

(A) 50% (B)

60% (C)

85%

(D) 100%

Answer: C) 85%

74. Power delivered by jet on moving vane is maximum when vane speed is:

(A) One-fourth jet speed

(B) One-half jet speed

(C) Equal to jet speed

(D) Double jet speed

Answer: B) One-half jet speed

75. A turbine always works under:

(A) Atmospheric pressure

(B) Vacuum pressure

(C) Positive pressure

(D) Negative pressure

Answer: C) Positive pressure

76. When the fluid does not possess any viscosity, it is said to be:

(A) Ideal

(B) Real

(C) Newtonian

(D) Compressible

Answer: A) Ideal

77. Specific gravity is defined as:

(A) Ratio of density of fluid to water

(B) Ratio of mass to volume

(C) Ratio of weight to volume

(D) None of these

Answer: A) Ratio of density of fluid to water

78. Hydraulic lift works on:

(A) Pascal's law

(B) Bernoulli's law

(C) Euler's law

(D) Archimedes' law

Answer: A) Pascal's law

79. The degree of freedom of water molecule is:

(A) One (B)

Two

(C) Three

(D) Four

Answer: C) Three

80. Flow of liquid in pipes is generally:

(A) Laminar

(B) Turbulent

(C) Steady

(D) Unsteady

Answer: B) Turbulent

81. Francis turbine is a type of:

(A) Impulse turbine

(B) Reaction turbine

(C) Axial flow turbine

(D) Mixed flow turbine

Answer: D) Mixed flow turbine

82. Head developed by pump is measured by:

(A) Speed

(B) Pressure gauge

(C) Manometer

(D) Barometer

Answer: C) Manometer

83. Fluid statics deals with:

(A) Fluids at rest

(B) Fluids in motion

(C) Turbulent fluids

(D) Ideal fluids

Answer: A) Fluids at rest

84. Mechanical efficiency of a pump is:

(A) Output power/Input power (B)

Input power/Output power

(C) Power lost/Power output

(D) None of these

Answer: A) Output power/Input power

85. A streamline is:

(A) A path always followed by fluid particles

(B) Tangent to velocity at every point

(C) Perpendicular to velocity at every point

(D) Random line in fluid

Answer: B) Tangent to velocity at every point

86. Propeller turbine is used for:

(A) Low heads

(B) Medium heads

(C) High heads

(D) All heads

Answer: A) Low heads

87. The energy per unit mass possessed by a fluid due to its motion is:

(A) Kinetic energy

(B) Pressure energy

(C) Potential energy

(D) Total energy

Answer: A) Kinetic energy

88. Hydraulic accumulator stores:

(A) Liquids at high pressure

(B) Gases at high pressure

(C) Solids at high pressure

(D) None of these

Answer: A) Liquids at high pressure

89. Steady flow means:

(A) Fluid properties do not change with time

(B) Fluid properties change with time

(C) Fluid moves with uniform speed

(D) Flow is always laminar

Answer: A) Fluid properties do not change with time

90. The ratio of specific weight to specific gravity is:

(A) Unity

(B) Acceleration due to gravity

(C) Density

(D) Viscosity

Answer: B) Acceleration due to gravity

91. The bulk modulus is maximum for:

(A) Gas

(B) Liquid

(C) Solid

(D) Air

Answer: C) Solid

92. In centrifugal pumps, priming is required to:

(A) Remove air from casing

(B) Increase pressure

(C) Increase velocity

(D) Decrease discharge

Answer: A) Remove air from casing

93. A pump always delivers liquid from:

(A) Low pressure to high pressure

(B) High pressure to low pressure

(C) High velocity to low velocity

(D) Low flux to high flux

Answer: A) Low pressure to high pressure

94. Cavitation occurs in pumps due to:

(A) High velocity

(B) Low pressure

(C) High discharge

(D) Low speed

Answer: B) Low pressure

95. The performance of a pump is affected by:

(A) Speed

(B) Head

(C) Discharge

(D) All of these

Answer: D) All of these

96. Loss of head in pipe due to sudden expansion is:

(A) $(V1-V2)^2/2g$

(B) $(V1+V2)^2/2g$

(C) $(V1^2-V2^2)/2g$

(D) $(V1^2+V2^2)/2g$

Answer: D) $(V1^2+V2^2)/2g$

97. Laminar flow is preferred over turbulent flow because:

(A) Less energy loss

(B) More energy loss

(C) Better mixing

(D) Higher discharge

Answer: A) Less energy loss

98. Reynolds number depends on:

(A) Viscosity

(B) Density

(C) Velocity

(D) All of these

Answer: D) All of these

99. Water hammer occurs in:

(A) Open channels

(B) Closed pipes

(C) Reservoir

(D) Pumps

Answer: B) Closed pipes

100. The fluid used in hydraulic brakes is:

(A) Water

(B) Oil (C) Air

(D) Petrol

Answer: B) Oil

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