300+ TOP Fluid Mechanics Multiple Choice Questions with Answers Pdf

FLUID MECHANICS Multiple Choice Questions :-

1. Pascal-second is the unit of
a) pressure
b) kinematic viscosity
c) dynamic viscosity
d) surface tension
Ans: c

2. An ideal fluid is
a) one which obeys Newton's law of viscosity
b) frictionless and incompressible
c) very viscous

d) frictionless and compressible
Ans: b

3. The unit of kinematic viscosity is
a) gm/cm-sec2
b) dyne-sec/cm2
c) gm/cm2-sec
d) cm2/sec
Ans: d

4. If the dynamic viscosity of a fluid is 0.5 poise and specific gravity is 0.5, then the kinematic viscosity of that fluid in stokes is
a) 0.25
b) 0.50
c) 1.0
d) none of the above
Ans: c

5. The viscosity of a gas
a) decreases with increase in temperature
b) increases with increase in temperature
c) is independent of temperature
d) is independent of pressure for very high pressure intensities
Ans: b

FLUID MECHANICS
MCQs

6. Newton's law of viscosity relates
a) intensity of pressure and rate of angular deformation
b) shear stress and rate of angular deformation
c) shear stress, viscosity and temperature
d) viscosity and rate of angular deformation
Ans: b

7. An open tank contains 1 m deep water with 50 cm depth of oil of specific gravity 0.8 above it. The intensity of pressure at the bottom of tank will be
a) 4 kN/m2
b) 10 kN/m2
c) 12 kN/m2
d) 14 kN/m2
Ans: d

8. The position of center of pressure on a plane surface immersed vertically in a static mass of fluid is
a) at the centroid of the submerged area
b) always above the centroid of the area
c) always below the centroid of the area
d) none of the above
Ans: c

9. The total pressure on a plane surface inclined at an angle 9 with the horizontal is equal to

a) PA
b) pA sin 9
c) pA cos 9
d) pA tan 9

where p is pressure intensity at centroid of area and A is area of plane surface.

Ans: a

10. A vertical rectangular plane surface is submerged in water such that its top and bottom surfaces are 1.5 m and 6.0 m res-pectively below the free surface. The position of center of pressure below the free surface will be at a distance of

a) 3.75 m
b) 4.0 m
c) 4.2m
d) 4.5m

Ans: c

11. Centre of buoyancy always

a) coincides with the centre of gravity
b) coincides with the centroid of the volume of fluid displaced
c) remains above the centre of gravity
d) remains below the centre of gravity

Ans: b

12. If the weight of a body immersed in a fluid exceeds the buoyant force, then the body will

a) rise until its weight equals the buoyant force
b) tend to move downward and it may finally sink
c) float
d) none of the above
Ans: b

13. Metacentric height for small values of angle of heel is the distance between the
a) centre of gravity and centre of buoy-ancy
b) centre of gravity and metacentre
c) centre of buoyancy and metacentre
d) free surface and centre of buoyancy
Ans: b

14. A floating body is said to be in a state of stable equilibrium
a) when its metacentric height is zero
b) when the metacentre is above the centre of gravity
c) when the metacentre is below the centre of gravity
d) only when its centre of gravity is below its centre of buoyancy
Ans: b

15. The increase in meta centric height
i) increases stability
ii) decreases stability
iii) increases comfort for passengers
iv) decreases comfort for passengers
The correct answer is
a) (i) and (iii)
b) (i)and(iv)

c) (ii) and (iii)
d) (ii) and (iv)
Ans: b

16. A rectangular block 2 m long, 1 m wide and 1 m deep floats in water, the depth of immersion being 0.5 m. If water weighs 10 kN/m3, then the weight of the block is
a) 5kN
b) lOkN
c) 15 kN
d) 20 kN
Ans: b

17. The point in the immersed body through which the resultant pressure of the liquid may be taken to act is known as
a) center of gravity
b) center of buoyancy
c) center of pressure
d) metacentre
Ans: c

18. If a vessel containing liquid moves downward with a constant acceleration equal to 'g' then
a) the pressure throughout the liquid mass is atmospheric
b) there will be vacuum in the liquid
c) the pressure in the liquid mass is greater than hydrostatic pressure
d) none of the above
Ans: a

19. When a liquid rotates at a constant angular velocity about a vertical axis as a rigid body, the pressure intensity varies
a) linearly with radial distance
b) as the square of the radial distance
c) inversely as the square of the radial distance
d) inversely as the radial distance
Ans: b

20. An open cubical tank of 2 m side is filled with water. If the tank is rotated with an acceleration such that half of the water spills out, then the acceleration is equal to

a) g/3
b) g/2
c) 2g/3
d) g
Ans: d

21. A right circular cylinder open at the top is filled with liquid and rotated about its vertical axis at such a speed that half the liquid spills out, then the pressure intensity at the center of bottom is

a) zero
b) one-fourth its value when cylinder was full
c) one-half its value when cylinder was full
d) cannot be predicted from the given data
Ans: a

22. The horizontal component of force on a curved surface is equal to the

a) product of pressure intensity at its centroid and area
b) force on a vertical projection of the curved surface
c) weight of liquid vertically above the curved surface
d) force on the horizontal projection of the curved surface
Ans: b

23. A closed tank containing water is moving in a horizontal direction along a straight line at a constant speed. The tank also contains a steel ball and a bubble of air. If the tank is decelerated horizontally, then

i) the ball will move to the front
ii) the bubble will move to the front
iii) the ball will move to the rear
iv) the bubble will move to the rear Find out which of the above statements are correct ?

a) (i) and (ii)
b) (i)and(iv)
c) (ii) and (iii)
d) (iii) and (iv)
Ans: b

24. The eddy viscosity for turbulent flow is
a) a function of temperature only
b) a physical property of the fluid.
c) dependent on the flow
d) independent of the flow
Ans: c

25. Flow at constant rate through a tapering pipe is
i) steady flow
ii) uniform flow
iii) unsteady flow
iv) non-uniform flow
The correct answer is
a) (i) and (ii)
b) (i)and(iv)
c) (ii) and (iii)
d) (ii) and (iv)
Ans: b

26. In a two dimensional incompressible steady flow around an airfoil, the stream lines are 2 cm apart at a great distance from the airfoil, where the velocity is 30 m/sec. The velocity near the airfoil, where the stream lines are 1.5 cm apart, is
a) 22.5 m/sec.
b) 33 m/sec.
c) 40 m/sec.
d) 90 m/sec.
Ans: c

27. When the velocity distribution is uniform over the cross-section, the correction factor for momentum is
a) 0
b) 1
c) 4/3
d) 2
Ans: b

28. Least possible value of correction factor for
i) kinetic energy is zero
ii) kinetic energy is 1

iii) momentum is zero
iv) momentum is 1
The correct statements are
a) (i) and (iii)
b) (ii) and (iii)
c) (i) and (iv)
d) (ii) and (iv)
Ans: d

29. If the velocity is zero over half of the cross-sectional area and is uniform over the remaining half, then the momentum correction factor is
a) 1
b) 4/3
c) 2
d) 4
Ans: c

30. If velocity is zero over l/3rd of a cross-section and is uniform over remaining 2/3rd of the cross-section, then the correction factor for kinetic energy is
a) 4/3
b) 3/2
c) 9/4
d) 27/8
Ans: c

31. The continuity equation
pi V,A,= p2V2A2 is based on the following assumption regarding flow of fluid
a) steady flow
b) uniform flow
c) incompressible flow
d) frictionless flow
where pi and p2 are mass densities.
Ans: a

32. Which of the following velocity potentials satisfies continuity equation ?
a) x2y
b) x2-y2

c) cosx
d) x2 + y2
Ans: b

33. The motion of air mass in a tornado is a
a) free vortex motion
b) forced vortex motion
c) free vortex at center and forced vortex outside
d) forced vortex at center and free vortex outside
Ans: d

34. In a forced vortex motion, the velocity of flow is
a) directly proportional to its radial distance from axis of rotation
b) inversely proportional to its radial distance from the axis of rotation
c) inversely proportional to the square of its radial distance from the axis of rotation
d) directly proportional to the square of its radial distance from the axis of rotation
Ans: a

35. Stream lines and path lines always coincide in case of
a) steady flow
b) laminar flow
c) uniform flow
d) turbulent flow
Ans: a

36. Equation of continuity is based on the principle of conservation of
a) mass
b) energy
c) momentum
d) none of the above
Ans: a

37. In steady flow of a fluid, the total accele ration of any fluid particle
a) can be zero
b) is never zero
c) is always zero

d) is independent of coordinates
Ans: a

38. The pitot tube is used to measure
a) velocity at stagnation point
b) stagnation pressure
c) static pressure
d) dynamic pressure
Ans: b

39. Hot wire anemometer is used to measure
a) discharge
b) velocity of gas
c) pressure intensity of gas
d) pressure intensity of liquid
Ans: b

40. The theoretical value of coefficient of contraction of a sharp edged orifice is
a) 0.611
b) 0.85
c) 0.98
d) 1.00
Ans: a

41. Which of the following is used to measure the discharge ?
a) current meter
b) venturimeter
c) pitot tube
d) hotwire anemometer
Ans: b

42. Select the incorrect statement.
a) The pressure intensity at vena contracta is atmospheric.
b) Contraction is least at vena contracta.
c) Stream lines are parallel throughout the jet at vena contracta.
d) Coefficient of contraction is always less than one.
Ans: c

43. Size of a venturimeter is specified by

a) pipe diameter
b) throat diameter
c) angle of diverging section
d) both pipe diameter as well as throat diameter
Ans: a

44. Due to each end contraction, the discharge of rectangular sharp crested weir is reduced by

a) 5%
b) 10%
c) 15%
d) 20%
Ans: a

45. The discharge through a V- notch varies as

a) H1/2
b) H3'2
c) H5/2
d) H5'4 where H is head.
Ans: c

46. Which of the following is an incorrect statement ?

a) Coefficient of contraction of a venturimeter is unity.
b) Flow nozzle is cheaper than venturimeter but has higher energy loss.
c) Discharge is independent of orientation of venturimeter whether it is horizontal, vertical or inclined.
d) None of the above statement is correct.
Ans: d

47. Coefficient of velocity of venturimeter

a) is independent of Reynolds number
b) decreases with higher Reynolds number
c) is equal to the coefficient of discharge of venturimeter
d) none of the above
Ans: c

48. The pressure at the summit of a syphon is

a) equal to atmospheric
b) less than atmospheric

c) more than atmospheric
d) none of the above
Ans: b

49. Ay between two stream lines represents
a) velocity
b) discharge
c) head
d) pressure
Ans: b

50. Coefficient of velocity for Borda's mouth piece running full is
a) 0.611
b) 0.707
c) 0.855
d) 1.00
Ans: b

51. Coefficient of discharge for a totally submerged orifice as compared to that for an orifice discharging free is
a) slightly less
b) slightly more
c) nearly half
d) equal
Ans: a

52. The major loss of energy in long pipes is due to
a) sudden enlargement
b) sudden contraction
c) gradual contraction or enlargement
d) friction
Ans: d

53. Coefficient of contraction for an external cylindrical mouthpiece is
a) 1.00
b) 0.855
c) 0.7H
d) 0.611
Ans: a

54. Which of the following has highest coefficient of discharge ?
a) sharp edged orifice
b) venturimeter
c) Borda's mouthpiece running full
d) CipoUetti weir
Ans: b

55. In a Sutro weir, the discharge is proportional to
a) H1/2
b) H3/2
c) H5/2
d) H
where H is head.
Ans: d

56. The discharge over a broad crested weir is maximum when the depth of flow is
a) H/3
b) H/2
c) 2 H/5
d) 2 H/3
where H is the available head.
Ans: d

57. Which of the following statements is correct?
a) Lower critical Reynolds number is of no practical significance in pipe flow problems.
b) Upper critical Reynolds number is significant in pipe flow problems.
c) Lower critical Reynolds number has the value 2000 in pipe flow
d) Upper critical Reynolds number is the number at which turbulent flow changes to laminar flow.
Ans: a

58. For a sphere of radius 15 cm moving with a uniform velocity of 2 m/sec through a liquid of specific gravity 0.9 and dynamic viscosity 0.8 poise, the Reynolds number will be
a) 300
b) 337.5

c) 600
d) 675
Ans: d

59. The shear stress distribution for a fluid flowing in between the parallel plates, both at rest, is
a) constant over the cross section
b) parabolic distribution across the section
c) zero at the mid plane and varies linearly with distance from mid plane
d) zero at plates and increases linearly to midpoint
Ans: c

60. If x is the distance from leading edge, then the boundary layer thickness in laminar flow varies as
a) x
b) x
c) x
d) x/7
Ans: a

61. Stanton diagram is a
a) log-log plot of friction factor against Reynolds number
b) log-log plot of relative roughness against Reynolds number
c) semi-log plot of friction factor against Reynolds number
d) semi-log plot of friction factor against relative roughness
Ans: a

62. The depth 'd' below the free surface at which the point velocity is equal to the average velocity of flow for a uniform laminar flow with a free surface, will be
a) 0.423 D
b) 0.577 D
c) 0.223 D
d) 0.707 D
where D is the depth of flow.
Ans: b

63. The boundary layer thickness in turbulent flow varies as
a) x"7

b) x,/2
c) x4/5
d) x3/5
where x is the distance from leading edge.
Ans: c

64. The distance y from pipe boundary, at which the point velocity is equal to average velocity for turbulent flow, is
a) 0.223 R
b) 0.423 R
c) 0.577 R
d) 0.707 R
where R is radius of pipe.
Ans: a

65. If a sphere of diameter 1 cm falls in castor oil of kinematic viscosity 10 stokes, with a terminal velocity of 1.5 cm/sec, the coefficient of drag on the sphere is
a) less than 1
b) between 1 and 100
c) 160
d) 200
Ans: c

66. In case of an airfoil, the separation of flow occurs
a) at the extreme rear of body
b) at the extreme front of body
c) midway between rear and front of body
d) any where between rear and front of body depending upon Reynolds number
Ans: a

67. When an ideal fluid flows past a sphere,
a) highest intensity of pressure occurs around the circumference at right angles to flow
b) lowest pressure intensity occurs at front stagnation point
c) lowest pressure intensity occurs at rear stagnation point
d) total drag is zero
Ans: d

68. With the same cross-sectional area and immersed in same turbulent flow, the largest total drag will be on

a) a circular disc of plate held normal to flow
b) a sphere
c) a cylinder
d) a streamlined body
Ans: a

69. In which of the following the friction drag is generally larger than pressure drag?

a) a circular disc or plate held normal to flow
b) a sphere
c) a cylinder
d) an airfoil
Ans: d

70. For hydro-dynamically smooth boundary, the friction coefficient for turbulent flow is

a) constant
b) dependent only on Reynolds number
c) a function of Reynolds number and relative roughness
d) dependent on relative roughness only
Ans: b

71. The value of friction factor 'f' for smooth pipes for Reynolds number 106 is approximately equal to

a) 0.1
b) 0.01
c) 0.001
d) 0.0001
Ans: b

72. For laminar flow in a pipe of circular cross-section, the Darcy's friction factor f is

a) directly proportional to Reynolds number and independent of pipe wall roughness
b) directly proportional to pipe wall roughness and independent of Reynolds number
c) inversely proportional to Reynolds number and indpendent of pipe wall roughness
d) inversely proportional to Reynolds number and directly

proportional to pipe wall roughness
Ans: c

73. Separation of flow occurs when
a) the pressure intensity reaches a minimum
b) the cross-section of a channel is reduced
c) the boundary layer comes to rest
d) all of the above
Ans: c

74. The ratio of average velocity to maximum velocity for steady laminar flow in circular pipes is
a) 1/2
b) 2/3
c) 3/2
d) 2
Ans: a

75. The distance from pipe boundary, at which the turbulent shear stress is one-third die wall shear stress, is
a) 1/3 R
b) 1/2 R
c) 2/3 R
d) 3/4R
where R is the radius of pipe.
Ans: a

76. The discharge of a liquid of kinematic viscosity 4 cm2/sec through a 8 cm dia-meter pipe is 3200n cm7sec. The type of flow expected is
a) laminar flow
b) transition flow
c) turbulent flow
d) not predictable from the given data
Ans: a

77. The Prartdtl mixing length is
a) zero at the pipe wall
b) maximum at the pipe wall
c) independent of shear stress

d) none of the above
Ans: a

78. The velocity distribution for laminar flow through a circular tube
a) is constant over the cross-section
b) varies linearly from zero at walls to maximum at centre
c) varies parabolically with maximum at the centre
d) none of the above
Ans: c

79. A fluid of kinematic viscosity 0.4 cm2/sec flows through a 8 cm diameter pipe. The maximum velocity for laminar flow will be
a) less than 1 m/sec
b) 1 m/sec
c) 1.5 m/sec
d) 2 m/sec
Ans: b

80. The losses are more in
a) laminar flow
b) transition flow
c) turbulent flow
d) critical flow
Ans: c

81. The wake
a) always occurs before a separation point
b) always occurs after a separation point
c) is a region of high pressure intensity
d) none of the above
Ans: b

82. The maximum thickness of boundary layer in a pipe of radius r is
a) 0
b) r/2
c) r
d) 2r
Ans: c

83. The hydraulic grade line is
a) always above the centre line of pipe
b) never above the energy grade line
c) always sloping downward in the direction of flow
d) all of the above
Ans: b

84. Two pipe systems are said to be equivalent when
a) head loss and discharge are same in two systems
b) length of pipe and discharge are same in two systems
c) friction factor and length are same in two systems
d) length and diameter are same in two systems
Ans: a

85. In series-pipe problems
a) the head loss is same through each pipe
b) the discharge is same through each pipe
c) a trial solution is not necessary
d) the discharge through each pipe is added to obtain total discharge
Ans: b

86. Select the correct statement.
a) The absolute roughness of a pipe de-creases with time.
b) A pipe becomes smooth after using for long time.
c) The friction factor decreases with time.
d) The absolute roughness increases with time.
Ans: d

87. A valve is suddenly closed in a water main in wl.ich the velocity is 1 m/sec and velocity of pressure wave is 981 m/ sec. The inertia head at the valve will be
a) 1 m
b) 10m
c) 100m
d) none of the above
Ans: c

88. The speed of a pressure wave through a pipe depends upon
a) the length of pipe

b) the viscosity of fluid
c) the bulk modulus for the fluid
d) the original head
Ans: c

89. When time of closure tc = L/v0 (where L is length of pipe and v0 is speed of pressure wave), the portion of pipe length subjected to maximum head is
a) L/4
b) L/3
c) L/2
d) L
Ans: a

90. If the elevation of hydraulic grade line at the junction of three pipes is above the elevation of reservoirs B and C and below reservoir A, then the direction of flow will be
a) from reservoir A to reservoirs B and C
b) from reservoir B to reservoirs C and A
c) from reservoir C to reservoirs A and B
d) unpredictable
Ans: c

91. The length of a pipe is 1 km and its diameter is 20 cm. If the diameter of an equivalent pipe is 40 cm, then its length is
a) 32 km
b) 20 km
c) 8 km
d) 4 km
Ans: a

92. Two pipes of same length and diameters d and 2d respectively are connected in series. The diameter of an equivalent pipe of same length is
a) less than d
b) between d and 1.5 d
c) between 1.5 d and 2d
d) greater than 2d
Ans: a

93. The horse power transmitted through a pipe is maximum when the ratio of loss of head due to friction and total head supplied is

a) 1/3
b) 1/4
c) 1/2
d) 2/3
Ans: a

94. The boundary layer thickness at a distance of l m from the leading edge of a flat plate, kept at zero angle of incidence to the flow direction, is O.l cm. The velocity outside the boundary layer is 25 ml sec.
The boundary layer thickness at a distance of 4 m is

a) 0.40 cm
b) 0.20 cm
c) 0.10 cm
d) 0.05 cm
Assume that boundary layer is entirely laminar.
Ans: b

95. Drag force is a function of
i) projected area of the body
ii) mass density of the fluid
iii) velocity of the body
The correct answer is

a) (i) and (ii)
b) (i) and (iii)
c) (ii) and (iii)
d) (i), (ii) and (iii)
Ans: d

96. The correct relationship among displacement thickness d, momentum thickness m and energy thickness e is

a) d > m > e
b) d > e > m
c) e > m > d
d) e > d > m
Ans: d

97. For laminar flow in circular pipes, the Darcy's friction factor f is equal to

a) 16/Re

b) 32/ Re

c) 64/ Re

d) none of the above where R,, is Reynolds number.

Ans: c

100. Surge wave in a rectangular channel is an example of

i) steady flow

ii) unsteady flow

iii) uniform flow

iv) non-uniform flow

The correct answer is

a) (i) and (iii)

b) (ii) and (iii)

c) (i) and (:v)

d) (ii) and (iv)

Ans: d

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