HYDRAULICS TEST
(SSC BASED)

1. As per Law of fluid friction for steady streamline flow, the frictional resistance
   a) varies proportionally to pressure
   b) varies in inverse proportion to pressure
   c) does not depend on pressure
   d) first increase then decreases

[2008]

2. Which one of the following assumptions of Bernoulli's theorem is not correct?
   a) Flow should not be unsteady
   b) Flow should be compressible
   c) The fluid should be incompressible
   d) Flow should be friction

[2008]

3. In laminar, incompressible flow in a circular pipe, the ratio between average velocity and maximum velocity would be
   a) $-\frac{1}{2}$ b) $\frac{1}{3}$
   c) $\frac{2}{3}$ d) $\frac{1}{\sqrt{2}}$

[2008]

4. Equation of continuity of flow is based on the principle of conservation of
   a) mass b) force
   c) momentum d) energy

[2009]

5. Pitot tube is used for the measurement of
   a) pressure b) flow
   c) velocity d) discharge

[2009]

6. In a centrifugal pump, the liquid enters the pump
   a) at the top
   b) at the bottom
   c) at the centre
   d) none of the above

[2009]

7. An ideal flow of any fluid must satisfy
   a) Pascal's law
   b) Newton's law of viscosity
   c) Boundary layer theory
   d) Continuity equation

[2009]

8. The flow which neglects changes in a transverse direction is known as
   a) one-dimensional flow
   b) uniform flow
   c) steady flow
   d) turbulent flow

[2009]

9. Venturimeter is used to measure flow of fluids in pipes when pipe is
   a) Horizontal
   b) Vertical, flow downwards
   c) Vertical, flow upwards
   d) In any position

[2010]

10. The property of a fluid which enables it to resist tensile stress is known as
   a) Compressibility
   b) Surface tension
   c) Cohesion
   d) Adhesion

[2010]

11. Kinematic viscosity is equal to
   a) Dynamic viscosity / density
   b) Dynamic viscosity × density
   c) Density / dynamic viscosity
   d) 1 / dynamic viscosity × density

[2010]

12. Piezometer is used to measure
   a) Pressure in pipe, channels etc
   b) Atmospheric pressure
   c) Very low pressures
   d) Difference of pressure between two points

[2010]

13. The equation of continuity holds good when the flow
   a) Is steady
   b) Is one dimensional
   c) Velocity is uniform at all the cross sections
   d) All of the above

[2010]

14. An ideal flow of any fluid must fulfil the following
   a) Newton's law of motion
   b) Newton's law of viscosity
   c) Pascal's law
   d) Continuity equation

[2010]

15. Hydrostatic law states that the rate of increase of pressure in vertical direction is equal to
   a) fluid density
   b) fluid specific weight
   c) fluid weight
   d) fluid specific gravity

[2011]

16. Pascal's law states that pressure at a pont is equal in all directions
   a) in a liquid at rest
   b) inside a solid
   c) in a laminar flow
   d) in a turbulent flow

[2011]

17. The flow of fluid through a pipe is laminar when
   a) the fluid is ideal
   b) the fluid is viscous
   c) Reynolds number is less than 2000

d) there is a considerable lateral dispersion of smoke or day injected into the flow stream

[2011]

18. Each term of Bernoulli's equation stated in the form $\frac{p}{w}+\frac{v^2}{2g}+y$ constant has units of

a) N b) mN/kg
c) m d) mN/s

[2011]

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

[2011]

20. For a fluid at rest,
a) The shear stress is zero only on the horizontal plane
b) The shear stress is maximum on a plane inclined at 45° to the horizontal
c) The shear stress depends upon the coefficient of viscosity
d) The shear stress is zero

[2012]

21. One torr pressure is equivalent to
a) 1 mm of mercury
b) 10 meter of water
c) 1 Pascal
d) 1 atmosphere

[2012]

22. Which one of the following in the Bulk Modulus K of fluid?

a) $\frac{\rho d\rho}{d\rho}$ b) $d\frac{\rho\rho}{d\rho}$
c) $\rho\frac{d\rho}{d\rho}$ d) $\frac{d\rho}{\rho d\rho}$

[2012]

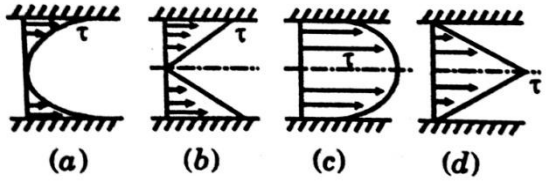
23. In flow through a pipe, the transition from Laminar to Turbulent does not depends on
a) Length of the pipe
b) Diameter of the pipe
c) Velocity of the fluid
d) Density of the fluid

[2012]

24. A pipe flow is said to be laminar, if
a) If the flow velocity is less than 2000 m/min
b) If the flow Reynolds number is less than or equal to 2000
c) There is no heat transfer
d) If the flow velocity is above 2000 m/min

[2012]

25. Which shear stress distribution is the correct one corresponding to the flow through a pipe of circular cross-section with parabolic velocity profile?



Ans: (b)

[2012]

26. Loss of energy due to sudden enlargement of pipe cross-section in meters of water is given by

a) $\frac{1}{4}(V_1^2-V_2^2)$
b) $\frac{1}{4}V_1^2\left(\frac{A_2}{A_1}\right)^2$
c) $\frac{1}{2}V_2^2\left[\left(\frac{A_2}{A_1}\right)^2-1\right]$
d) $\frac{1}{4}(V_1-V_2)^2$

[2012]

27. For maximum power transmission through a pipe line, the frictional head loss equals

a) $\frac{H}{2}$ b) $\frac{3H}{5}$
c) $\frac{H}{4}$ d) $\frac{H}{3}$

[2012]

28. Pressure of 80 kPa is equivalent to head in meter of carbon tetrachloride of relative density 1.59 of the value

a) 9.43 m b) 5.13 m
c) 8.32 m d) 6.71 m

[2012]

28. Two pipe systems are said to be equivalent when in two systems
a) Friction factor and length are same
b) Length and diameter are same
c) Head loss and discharge are same
d) Length of pipe and discharge are same

[2012]

29. Flow between any two stream lines
a) Increases along its path
b) Decreases along its path
c) Is always zero
d) Remains the same

[2012]

30.Pseudo-plastic substances are non-Newtonian fluids for which
a) Dynamic viscosity decreases with the time for which shearing forces applied

b) Dynamic viscosity increases with time for which shearing force applied
c) Dynamic viscosity decreases as the rate of shear increases
d) Dynamic viscosity increases as the rate shear increases

[2012]

31. The vertical distance of the centre of pressure below the c.g. of the inclined plane area (submerged in liquid) is

a) $\frac{I_{cg} \cdot \sin^2 \theta}{A\bar{x}}$

b) $\frac{I_{cg} \cdot \cos^2 \theta}{A\bar{x}}$

c) $\frac{I_{cg} \cdot A\cos^2 \theta}{\bar{x}}$

d) $\frac{I_{cg} \cdot A\sec^2 \theta}{\bar{x}}$

Where θ = inclination of plane area

$\bar{x}$ = distance of c.g. of plane area from free liquid surface

[2013]

32. An ideal fluid
a) has no viscosity
b) satisfies the relation pv = RT
c) obeys Newton's Law of Viscosity
d) is both incompressible and non-viscous

[2013]

33. A rectangular tank of square cross-section (2 m × 2 m) and height 4 m is completely filled up with the liquid. The ratio of total hydrostatic force on any vertical wall to its bottom is

a) 2.0 b) 1.5
c) 1.0 d) 0.5

[2013]

34. Shear stress in a turbulent flow is due to
a) viscous property of the fluid
b) fluid density
c) fluctuation of velocity is the direction of flow
d) fluctuation of velocity in the direction of flow as well as transverse to it

[2013]

35. For viscous flow between two parallel plates, the pressure drop per unit length is equal to

a) $12\mu\bar{U}L / egD^2$

b) $12\mu\bar{U} / D^2$

c) $12\mu\bar{U}L / D^2$

d) $32\mu\bar{U}L / D^2$

[2013]

36. With the same cross-sectional area and placed in the turbulent flow, the largest drag will be experienced by
a) a sphere
b) a steam lined body
c) a circular disc held normal to the flow direction
d) a circular disc held parallel to the flow direction

[2013]

37. A streamlined body is such that
a) it produces no drag for flow around if
b) it is symmetrical about the axis along the free stream
c) separation of flow is avoided along its surface
d) the shape of the body coincide with the stream surface

[2013]

38. Pascal second is the unit of
a) pressure
b) kinematic viscosity
c) dynamic viscosity
d) surface tension

[2013]

39. The shear stress in a turbulent pipe flow
a) varies parabolically with radius
b) is constant over the pipe radius
c) varies according to the $\frac{1}{7}$ th power law
d) is zero at the centre and increases linearly to the wall

[2013]

40. The length of the divergent portion of Venturimeter in comparison to convergent portion is
a) same
b) more
c) less
d) depending upon the type of flow

[2014]

41. Froude's Number relates to
a) inertia force and gravity force
b) inertia force and pressure force
c) inertia force and surface tension force
d) inertia force and elastic force

[2014]

42. In pitot-tube the velocity of flow at a point is reduced to zero. That point is called as
a) stagnation point
b) critical point
c) metacentre
d) equilibrium point

[2014]

43.. The velocity distribution in a pipe flow is parabolic if the flow is
a) uniform, turbulent

b) uniform, laminar
c) non-uniform, steady
d) rotational, compressible

[2014]

44. Mercury does not wet the glass surface. This property of mercury is due to
a) adhesion
b) cohesion
c) surface tension
d) viscosity

[2014]

45. Loss of head due to friction in a uniform diameter pipe with viscous flow is
a) Re b) 1/Re
c) 4/Re d) 16/Re

[2014]

46. The velocity distribution for flow over a flat plate is given by $u = (y - y^2)$ in which u is velocity in meters per second at a distance y meters above the plate. What is the shear stress value at y = 0.15 m? The dynamic viscosity of fluid is 8.0 poise.
a) 12.4 N/m^2 b) 1.24 N/m^2
c) 0.56 N/m^2 d) 5.6 N/m^2

[2014]

47. The discharge of a liquid of kinematic viscosity $4\times10^{-2} m^2/s$ through a 80 mm diameter pipe is $3200\pi\times10^{-4} m^3/s$. The flow is
a) Laminar
b) Turbulent
c) Transition
d) Critical

[2014]

48. The velocity at a point on the crest of a model dam was measured to be 1 m/s. The corresponding prototype velocity for a linear scale ratio of 25, in m/s, is
a) 25 b) 2.5
c) 5 d) 0.04

[2014]

49. Pressure force on the 15 cm diameter headlight of an automobile travelling at 0.25 m/s is
a) 10.4 N b) 6.8 N
c) 4.8 N d) 3.2 N

[2014]

50. A piece of metal of specific gravity 7 floats in mercury of specific gravity 13.6. What fraction of its volume is under mercury?
a) 0.5 b) 0.4
c) 0.515 d) 0.415

[2014]

51. The friction head lost due to flow of a viscous fluid through a circular pipe of length L and diameter d with a velocity v and pipe Fanning friction factor f is
a) $\frac{4fL}{d}\cdot\frac{v^2}{2g}$ b) $\frac{4fL}{\pi d^2}\cdot\frac{v^2}{2g}$
c) $\frac{v^2}{2g}$ d) $\frac{4fL}{\pi d}\cdot\frac{v^2}{2g}$

[2014]

52. The ratio of pressures between two points A and B located respectively at depths 0.5 m and 2 m below a constant level of water in a tank is
a) 1 : 1 b) 1 : 2
c) 1 : 4 d) 1 : 16

[2014]

53. Using Blasius equation, the friction factor for turbulent flow through pipes varies as
a) Re $^{-1}$ b) Re $^{-0.5}$
c) Re $^{-0.33}$ d) Re $^{-0.25}$

[2014]

54. Pressure intensity inside the water droplets is (where σ – surface tension d – diameter of bubble)
a) $p=\frac{8\sigma}{d}$ b) $p=\frac{2\sigma}{d}$
c) $p=\frac{4\sigma}{d}$ d) $p=\frac{\sigma}{d}$

[2014]

55. The length of a rectangular weir is L and height H_1. The maximum depth of water on the upstream side of the weir is H. Flow rate over the notch (Q) is
a) $Q=\frac{2}{3}c_d L\sqrt{2g}H^{5/2}$
b) $Q=\frac{2}{3}c_d L\sqrt{2g}(H-H_1)^{5/2}$
c) $Q=\frac{2}{3}c_d L\sqrt{2g}H^{3/2}$
d) $Q=\frac{2}{3}c_d L\sqrt{2g}(H-H_1)^{3/2}$

[2014]

56. The coefficient of discharge (c_d) of an orifice varies with
a) Weber number
b) Mach number
c) Reynold's number
d) Froude number

[2014]

57. A hydrometer is used to determine
a) relative humidity
b) surface tension of liquids
c) specific gravity of liquids
d) viscosity of liquids

[2014]

58. In flow through a pipe, the transition form laminar to turbulent flow does not depends on
a) velocity of the fluid
b) density of the fluid
c) length of the fluid

d) diameter of the pipe

[2014]

59. Flow of water in a pipe about 3 meters in diameter can be measured by
a) Orifice plate
b) Venture
c) Pitot tube
d) Nozzle

[2014]

60. In a pitot tube, at the stagnation point
a) pressure is zero
b) total energy is zero
c) pressure head is equal to velocity
d) all the velocity head is converted into pressure head

[2014]

61. Navier – Stokes equations are associated with
a) Buoyancy
b) Supersonic flow
c) Vortex flow
d) Viscous flow

[2014]

62. The water hammer pressure in a pipe can be reduced by
a) using pipe of greater diameter
b) using a more elastic pipe
c) using pipe of greater wall thickness
d) increasing the velocity of pressure wave

[2014]

63. When a fluid is in motion, the pressure at a point is same in all directions. Then the fluid is
a) Real fluid
b) Newtonian fluid
c) Ideal fluid
d) Non-Newtonian fluid

[2014]

64. Density of water is maximum at
a) $0^{\circ}C$ b) 4 K
c) $4^{\circ}C$ d) $1000^{\circ}C$

[2014]

65. According to Bernoulli's equation
a) $Z+\frac{p}{w}+\frac{v^2}{2g}=$ constant
b) $Z+\frac{p}{w}+\frac{v}{2g}=$ constant
c) $Z-\frac{p}{w}+\frac{v^2}{2g}=$ constant
d) $Z-\frac{p}{w}-\frac{v^2}{2g}=$ constant

[2015]

66. The length of the divergent portion of venturimeter in comparison to convergent portion is
a) less b) more c) same
d) none of these

[2015]

67. Orifice meter is used for measurement of
a) Temperature b) Pressure
c) Rate of flow d) Viscosity

[2015]

68. When Venturimeter is inclined, then for a given flow it will show
a) less reading
b) more reading
c) same reading
d) inaccurate reading

[2015]

69. A Manometer is used to measure
a) Discharge b) Pressure
c) Volume d) Temperature

[2015]

70. During the opening of a valve in a pipeline, the flow is
a) Steady b) Unsteady
c) Uniform d) free vortex

[2015]

71. Water at $20^{\circ}C$ is flowing through a 20 cm diameter pipe. Take kinematic viscosity of water at $20^{\circ}C$ = 0.0101 stoke. Assume that the changes from laminar to turbulent at Re = 2320. The critical velocity will be:
a) 1.117 cm/s b) 11.17 cm/s
c) 111.7 cm/s d) 0.117 cm/s

[2015]

72. Froude number is the ratio of inertial force to
a) Gravitation force
b) Surface tension
c) Elasticity
d) Viscosity

[2015]

73. Loss of energy per unit volume due to friction in case of flow through a pipe at length L and diameter D is expressed as:
a) $4fL\frac{v^2}{2gD}$
b) $4f\left(\frac{L}{D}\right)\times\left(\frac{v^2}{2}\right)$
c) $4f\left(\frac{L}{D}\right)\left(\frac{\rho v^2}{2G}\right)$
d) $4f\left(\frac{L}{D}\right)\times\left(\frac{v^2}{2}\right)$

[2015]

74. An ideal flow of any fluid must fulfil the following:
a) Boundary layer theory
b) Continuity equation
c) Newton's law of viscosity
d) Pascal's law

[2015]

75. If w is the specific weight of the liquid and h the depth of any point from the surface, then the pressure intensity at that point will be
a) h
b) wh
c) w/h
d) h/w

[2015]

76. The stress-strain relation of the newtonian fluid is
a) Hyperbolic
b) Inverse type
c) Linear
d) Parabolic

[2015]

77. When a vertical wall is subjected to pressure due to liquid on both sides, the resultant pressure is the _____ of the two pressures.
a) Sum
b) Difference
c) Arithmetic mean
d) Geometric mean

[2015]

78. A flow in which each liquid particle has a definite path, and the paths of individual particles do not cross each other is called
a) Steam flow
b) Uniform flow
c) Streamline flow
d) Turbulent flow

[2015]

79. A fluid is said to be ideal, if it is
a) inviscous and incompressible
b) inviscous and compressible
c) viscous and compressible
d) viscous and incompressible

[2015]

80. Newton's law of viscosity is a relationship between
a) pressure, velocity and temperature
b) shear stress and rate of shear strain
c) shear stress and velocity
d) rate of shear strain and temperature

[2015]

81. The coefficient of discharge of an orifice varies with
a) Reynold number
b) Weber number
c) Froude number
d) Mach number

[2015]

82. In manometer a better is one having
a) Lower surface tension
b) Higher surface tension
c) High viscosity
d) Low viscosity

[2015]

83. A micrometer with inclined tube is called as
a) Inverted manometer
b) Differential manometer
c) Closed tube manometer
d) Sensitive manometer

[2015]

84. hydrometer is used to determine
a) Density of liquid
b) Specific gravity of the liquid
c) Flow of liquid
d) Relative humidity

[2015]

85. Continuity equation for a compressible fluid is:
a) $A_1V_1 = A_2V_2$
b) $\rho_1 A_1 V_1 = \rho_2 A_2 V_2 (A \to area)$
c) $\frac{A_1V_1}{\rho_1} = \frac{A_2V_2}{V_2} (V \to velocity)$
d) $\frac{\rho_1 A_1}{V_1} = \frac{\rho_2 A_2}{V_2} (\rho \to density)$

[2015]

86. Meta-centric height is the distance between
a) Metacentre and water surface
b) Metacentre and centroid
c) Metacentre and centre of gravity
d) Metacentre and centre of buoyancy

[2015]

87. The centre of gravity of the volume of the liquid displaced by an immersed body is called
a) Metacentre
b) Centre of buoyancy
c) Centre of gravity
d) Centroid

[2015]

88. The ratio of actual measured head to head imparted to fluid by impeller for centrifugal pump is known as
a) Mechanical
b) Volumetric
c) Manometric
d) Impeller

[2015]