1. The kinetic energy correction factor a is a measure of effect of non-uniform distribution of velocity which is caused on account of viscous and other resistance ; it is expressed by

(A) $\frac{1}{A}\int_A\left(\frac{u}{V}\right)^2 dA$

(B) $\frac{1}{A}\int\left(\frac{u}{V}\right) dA$

(C) $\frac{1}{A}\int_A\left(\frac{u}{V}\right)^3 dA$

(D) $\frac{1}{A}\int\left(\frac{u}{V}\right)^u dA$ where A = area of Cross section, u = local velocity and V = average velocity

2. A stagnation point is a point

(A) where the velocity of flow reduces to zero
(B) where the pressure is zero
(C) where the total energy is zero
(D) where the total energy is maximum

3. For hydrodynamically smooth boundary, the friction co-efficient for turbulent flow

(A) is constant
(B) depends only on Reynold's number
(C) depends on relative roughness only
(D) is a function of Reynold's number and relative roughness.

4. In the most general form of Bernoulli's equation $\frac{P}{W}+\frac{V^2}{2g}+Z=$ constant, each term represents

(A) energy per unit mass
(B) energy per unit weight
(C) energy per unit volume
(D) None of the above

5. The loss of energy due to sudden enlargement is given by

(A) $\frac{V_2^2}{2g}\left[\frac{A_2}{A_1}-1\right]^2$

(B) $\frac{(V_1-V_2)^2}{2g}$

(C) $\frac{V_1^2-V_2^2}{2g}$

(D) $\frac{V_1^2}{2g}\left[1-\frac{A_2}{A_1}\right]^2$

Where A_1, V_1 are area of cross-section and velocity at entry and A_2, V_2 are area of cross-section and velocity at exit.

6. The flow duration curve is a plot of
(A) Accumulated flow against time
(B) Discharge against time in chronological order
(C) The base flow against the percentage of time the flow is exceeded
(D) The stream discharge against the percentage of times the flow is equalled or exceeded

7. At a rated capacity of 44 cumecs, a centrifugal pump develops 36 m of head when operating at 1450 rpm. Its specific speed is
(A) 654
(B) 509
(C) 700
(D) 90

8. An impulse turbine
(A) Always operates submerged
(B) Makes use of a draft tube
(C) Operates by initial complete conversion to kinetic energy
(D) Converts pressure head into velocity head throughout the vanes.

9. The parameters which determine the friction factor for turbulent flow in a rough pipe are
(A) Froude number and relative roughness
(B) Froude number and Mach number
(C) Reynold's number and relative roughness
(D) Mach number and relative roughness.

10. The causes of turbulence in fluid-flow may be
(A) high Reynold's number
(B) abrupt discontinuity in velocity distribution
(C) critical Reynold's number
(D) None of these

11. If the velocity distribution is rectangular, the kinetic energy correction factor will be
(A) greater than zero but less than unity
(B) less than zero
(C) equal to zero
(D) equal to unity

12. The discharge in m^3/s for Laminar flow through a pipe of diameter 0.04 m having a centre line velocity of 1.5 m/s is
(A) $3\pi/59$
(B) $3\pi / 2500$
(C) $3\pi / 5000$
(D) $3\pi / 10000$

13. 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) (B) and (C) both

14. The overall efficiency of a turbine is dependent on the hydraulic losses (n_h), volumetric losses (n_v) and the mechanical losses (n_m) represented by the respective efficiencies. It is related to these by the following relationship :

(A) $[n_h + n_v + n_m]/3$

(B) $[n_h n_v . n_m]/3$

(C) $n_h . n_v . n_m$

(D) $\sqrt{n_h . n_v . n_m}$

15. The time taken for a tank (filled to a height h above its flat base) to empty through an orifice in the base varies as h^n. The value of n is

(A) ½

(B) –1

(C) 1

(D) –1/2

16. The head over a 90° V- notch weir increases from 0.15 to 0.3 m. The ratio of the new discharge to the original discharge is

(A) 1.414

(B) 2.00

(C) 4.00

(D) 5.657

17. The average drag co-efficient for a flat plate on which the boundary layer growth is laminar is given by

(A) $C_f = \frac{2.327}{\sqrt{R_x}}$

(B) $C_f = \frac{5}{\sqrt{R_x}}$

(C) $C_f = \frac{7.5}{\sqrt{R_x}}$

(D) $C_f = \frac{1.327}{\sqrt{R_x}}$

Where R_x = Reynold's number.

18. The streamline body is defined as a body about which

(A) the flow is laminar
(B) the flow is along streamlines
(C) the flow separation is suppressed
(D) the drag is zero

19. 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) $\tau = \frac{\partial P}{\partial x}.2r$

20. To generate 10000 HP under a head of 81 m while working at a speed of 500 rpm, the turbine of choice would be

(A) Pelton
(B) Kaplan
(C) Bulb
(D) Francis

21. In a supersonic flow, a diverging nozzle results in

(A) increase in the velocity and pressure
(B) increase in the velocity and density
(C) decrease in pressure and density
(D) decrease in velocity and pressure

22. Cavitation damage in turbine runner occurs

(A) near the inlet on the concave side of blades

(B) near the outlet on the convex side of blades

(C) near the inlet on the convex side of blades

(D) near the outlet on the concave side of blades

23. The relationship $\frac{dp}{dx} = \frac{d\tau}{dy}$ is valid for

(A) irrotational flow

(B) non-uniform flow

(C) uniform flow

(D) unsteady flow

24. The discharge through Pelton-Turbine is given by

(A) $Q = \pi$ DBVf

(B) $Q = \frac{\pi}{4} d^2 . \sqrt{2gH}$

(C) $Q = \frac{\pi}{4}\left[D_0{}^2 - D_b{}^2\right]$

(D) $Q = 0.9\ \pi\ DBV_f$

25. The work done by impeller of 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) $\frac{1}{g}\left(V w_1 U_2 - V W_1 U_1\right)$

(D) None of these

26. The alignment of Pitot – tube is such that

(A) its opening faces upstream and the horizontal leg is perfectly aligned with the direction of flow

(B) its opening faces the downstream direction

(C) its horizontal leg is at right angle to the direction of flow

(D) None of these

27. A stepped notch is
(A) a notch of varying shapes along the line of flow
(B) semi-elliptical in section
(C) a combination of triangular and a circular section
(D) a combination of rectangular notches of different sizes

28. The maximum vacuum pressure at the summit of siphon is given by
(A) 7.4 m of water
(B) 7.0 m of water
(C) 7.6 m of water
(D) 8.1 m of water

29. A fluid having mass ρL^2, area L^2, length L and velocity L/T has a force acting on it and expressed by $\rho L^3 g$. Identify the force :
(A) Inertia force
(B) Viscous force
(C) Gravity force
(D) Surface tension force

30. The viscosity of
(A) liquids increase with temperature
(B) gases increase with temperature
(C) fluids decrease with temperature
(D) fluids increase with temperature

31. A perfect fluid (also known as an ideal fluid) is
(A) A real fluid
(B) The one which obeys perfect gas laws
(C) Compressive and gaseous
(D) Incompressible and frictionless

32. The pressure in metres of oil of specific gravity 0.8 equivalent to 80 m of water is
(A) 64 m
(B) 88 m
(C) 80 m
(D) 100 m

33. Mercury is generally used in barometers for measuring
(A) Low pressures accurately
(B) Large pressures only
(C) All pressures except the smaller ones
(D) None of the above

34. The hydrostatic pressure in kgf exerted on one side of an annular area enclosed by concentric circles of radii 2 and 1 m and having its centroid 4 m below free water surface is

(A) $12000\ \pi$

(B) $11000\ \pi$

(C) $10000\ \pi$

(D) None of the above

35. For a floating body if B = center of buoyancy, M = Metacentre and G= center of gravity, then to maintain stable equilibrium,

(A) BM > BG

(B) BM < BG

(C) BM = BG

(D) GM > BG

36. The incorrect statement about 'Buoyancy force' is

(A) it always acts vertically upwards

(B) it is equal to weight of fluid displaced by solid body

(C) it acts through the centre of gravity of displaced volume

(D) None of the above

37. A water supply pipeline changes its alignment through a bend. When the flow in the pipeline is increased by operating a value, the flow in the bend is classified as

(A) unsteady, uniform flow

(B) unsteady, non-uniform flow

(C) steady; uniform flow

(D) steady, non-uniform flow

38. Stream lines, streak lines, path lines are all identical in case of

(A) uniform flow

(B) non-uniform flow

(C) both (A) & (B)

(D) none of the above

39. A pump delivers 50 L/s of water and delivers 7.5 kW of power to the system. The head developed by the pump is

(A) 7.5 m

(B) 5.0 m

(C) 1.53 m

(D) 15.32 m

40. The streamlines of a flownet are concentric circles. If the velocity at a radius of 0.6 m is 2.7 m/s, then the velocity at a radius of 0.9 m, will be

(A) 3.6 m/s

(B) 2.7 m/s

(C) 1.8 m/s

(D) 1.2 m/s

41. The linear momentum equation is based on

(A) Newton's law of viscosity

(B) Newton's first law

(C) Newton's second law

(D) Newton's third law

42. The moment of momentum principle states that in a rotating system

(A) The resultant force exerted by the fluid on the body is equal to the rate of change of angular momentum

(B) The torque exerted by the resultant force is equal to the time rate of change of angular momentum

(C) The torque exerted by the resultant force is equal to the time rate of change of linear momentum

(D) The angular momentum is conserved.

43. The unit speed Nu of a turbine of rotational speed N and head H is equal to

(A) $N\sqrt{H}$

(B) $\frac{N}{\sqrt{H}}$

(C) $\sqrt{H}$ /N

(D) $\sqrt{H}N$

44. A turbine works under a head of 20 m, has a speed of 350 rpm and develops 400 kW of power. Its specific speed is

(A) 375

(B) 83

(C) 177

(D) 166

45. In all reaction turbines, maximum efficiency is obtained, if

(A) the guide vane angle is 90°

(B) the blade angle of the runners is 90° at the inlet

(C) the blade angle of the runners is 90° at the outlet

(D) the angle of the absolute velocity vector at the outlet is 90°

46. The net available head H in a Pelton turbine installation is the

(A) kinetic energy of the jet issuing from the nozzle

(B) difference in elevation between forebay water level and nozzle outlet

(C) head at the base of the nozzle

(D) difference in level between water levels at the forebay and the tailwater level.

47. A pump running at 1400 rpm is required to deliver 360 L/s of water at a head of 16 m. The pump of choice will be

(A) normal speed, radial type

(B) low speed, radial type

(C) mixed flow type

(D) axial flow type

48. Typical range of specific speeds for axial flow pumps is

(A) 380 – 950

(B) 80 – 200

(C) 10 – 100

(D) 200 – 300

49. The maximum permissible suction lift for centrifugal pump in practice (at sea level and 30° C) is

(A) 12 m

(B) 10 m

(C) 6 m

(D) 3 m

50. If two pumps identical in all respects and each capable of delivering a discharge Q against a head H are connected in series, the resulting discharge is

(A) 2Q against a head 2H

(B) 2Q against a head H

(C) Q against a head 2H

(D) $\sqrt{Q}$ against a head $\sqrt{2}$ H

51. The methods of plane tabling used for locating the plane table station is

(A) Resection

(B) Radiation

(C) Intersection

(D) Orientation

52. In the North-East quadrant the relation between Reduced Bearing (RB) and Whole Circle Bearing (WCB) is given by

(A) WCB = RB

(B) WCB = 180° – RB

(C) WCB = 180° + RB

(D) WCB = 360° – RB

53. In general the relation between Back Bearing (BB) and Fore Bearing (FB) is given by

(A) BB = FB ± 90º

(B) BB = FB ± 180º

(C) BB = FB ± 360º

(D) BB = FB ± 270º

54. The graduations in the Prismatic compass has

(A) 0º at South end, 90º at West, 180º at North and 270º at East.

(B) 0º at North end, 90º at East, 180º at South and 270º at West.

(C) 90º at North end, 90º at South, 0º at East and 0º at West

(D) 0º at North end, 0º at South, 90º at East and 90º at West

55. Which of the following instrument can be used to measure vertical angles ?

(A) Compass

(B) Levelling instrument

(C) Theodolite

(D) None of the above

56. If the elevation of Bench Mark (BM) is 210.855, Backsight at the BM is 2.325 and Fore Sight at a point B is 1.830, the elevation of point B is

(A) 211.350

(B) 210.360

(C) 206.700

(D) 215.010

57. Reciprocal levelling is done when

(A) levelling is required to be done across a river

(B) levelling is done on steep slopes

(C) levelling is to be done in summits and hollows

(D) levelling is to be done on a overhead point

58. In a Prismatic Compass

(A) The graduations are in W.C.B system

(B) The graduations are in Q.B system

(C) The graduations are in both Q.B and W.C.B system

(D) None of the above

59. The magnetic declination is the

(A) horizontal angle between the true meridian and the magnetic meridian

(B) vertical angle between the true meridian and the magnetic meridian

(C) inclined angle between the true meridian and the magnetic meridian

(D) None of the above

60. Local attraction prevents the needle from

(A) Pointing South

(B) Pointing West

(C) Pointing East

(D) Pointing North

61. The effect of refraction is making the objects

(A) appear lower than they are

(B) appear higher than they are

(C) appear sideways than they are

(D) None of the above

62. The Barometric levelling is based on the fact that atmospheric pressure

(A) varies directly with height

(B) varies inversely with height

(C) does not vary with height

(D) varies directly with temperature

63. A Contour is an imaginary line on the ground joining points of equal

(A) Temperature

(B) Pressure

(C) Elevation

(D) Slopes

64. A 'Strut' is a member, which is primarily subjected to

(A) Axial compression

(B) Axial tension

(C) Flexural compression

(D) Flexural tension

65. Variation of strain of a material under constant stress is :

(A) Relaxation

(B) Creep

(C) Shrinkage

(D) Hysteresis

66. For metals which do not have a well-defined yield point, the proof stress is determined by drawing a line parallel to the initial tangent at an offset of

(A) 0.2 percent strain

(B) 0.5 percent strain

(C) 1.0 percent strain

(D) 2.0 percent strain

67. A material which undergoes no deformation till its yield point is reached and then it flows at a constant stress is :

(A) Elastic – plastic

(B) Rigid – Plastic

(C) Non-plastic

(D) Pure – plastic

68. The modulus of elasticity of high tensile steel is

(A) smaller than that of mild steel

(B) equal to that of mild steel

(C) larger than that of mild steel

(D) equal to that of aluminium

69. For carbon steel, the endurance limit is approximately

(A) 0.3

(B) 0.45 to 0.50

(C) 0.75

(D) 0.85

70. For non-dilatant material, the maximum value of Poisson's ratio is :

(A) 0.25
(B) 0.50
(C) 0.75
(D) 1.00

71. A bar of certain material of section 4 cm square, is subjected to a pull of 16 T, where by the extension is 0.1 cm in a length of 20 cm. If the Poisson's ratio is $\frac{1}{4}$, the rigidity modulus of the material in kg / cm^2.

(A) 2×10^6
(B) 1.6×10^6
(C) 0.8×10^5
(D) 0.8×10^6

72. The relation between the three elastic constants is

(A) E = 3KC / (K + C)
(B) 6KC / (3K + C)
(C) E = 9KC / (3K + C)
(D) E = 3KC / (3K + C)

73. The diameter of a tapering rod varies from 'D' to 'D/2' in length of 'L' m. If it is subjected to an axial tension of 'P', the change in length is

(A) 4 PL / π ED^2
(B) 8 PL / π ED^2
(C) 2 PL / π ED^2
(D) None of the above

74. If a solid cube is subjected to equal normal forces on all its faces, the ratio of volumetric strain to linear strain in any of the three axes is

(A) 1
(B) 2
(C) 3
(D) 4

75. The rocks formed due to solidification of molten mass lying below or above the earth surface, are called

(A) aqueous rocks
(B) sedimentary rocks
(C) metamorphic rocks
(D) igneous rocks

76. An element is subjected to two mutually perpendicular unlike, but equal stress of magnitude 'P', the radius of Mohr's circle will be

(A) Zero
(B) P/2
(C) P
(D) 2P

77. When the two principal stresses are equal and like, the resultant stress on any plane is

(A) equal to the principal stress
(B) zero
(C) one half of the principal stress
(D) one third of the principal stress

78. On a plane, resultant stress is inclined at an angle of 45° to the plane. If the normal stress is 100 N/mm^2, the shear stress on the plane is

(A) 71.5 N/mm^2
(B) 100 N/mm^2
(C) 86.6 N/mm^2
(D) 120.8 N/mm^2

79. The normal stresses at a point are σ_x = 10 MPa and σ_y= 2 MPa; the shear stress at this point is 4MPa. The maximum principal stress at this point is

(A) 16 MPa
(B) 14 MPa
(C) 11.66 MPa
(D) 10 MPa

80. The radius of Mohr's circle is zero when the state of stress is such that

(A) shear stress is zero
(B) there is pure shear
(C) There is no shear stress but identical direct stresses in two mutually perpendicular directions
(D) There is no shear stress but equal direct stresses, opposite in nature, in two mutually perpendicular directions.

81. The number of independent reaction components for a hinged support are

(A) 0
(B) 1
(C) 2
(D) 3

82. Granite is an example of
(A) aqueous rocks
(B) sedimentary rocks
(C) metamorphic rocks
(D) igneous rocks

83. Which one of the following statements is correct ?
(A) Shear force is the first derivative of bending moment.
(B) Shear force is the first derivative of intensity of load
(C) Load intensity on a beam is the first derivative of bending moment
(D) Bending moment is the first derivative of shear force

84. Which of the following statements are true ?
(1) Bending moment in a beam is maximum at section where shear force is zero.
(2) Shear force at a section is given by the rate of change of bending moment.
(A) 1 Only
(B) 2 Only
(C) 1 and 2
(D) None

85. Neglecting self weight, which of the following beams will have points of contraflexure ?
(A) A simply supported beam with uniformly distributed load over part of the structure.
(B) An overhanging beam with loading only over supported span and not on overhangs.
(C) Fixed beam subjected to concentrated load.
(D) Cantilever beam subjected to uniformly varying load with zero load at free end.

86. The assumption that transverse sections which are plane and normal before bending remain plane and normal after bending results along a cross section.
(A) Linear variation of stress
(B) Linear variation of strain
(C) Constant strain
(D) Non linear variation of strain.

87. Curvature of a beam is equal
(A) EI / M
(B) M / EI
(C) ME / I
(D) MI / E

88. Two beams A and B are simply supported subjected to identical loads. The two beams have same width, but beam A has double the depth of beam B. The ratio of section modulus beam A and B is

(A) 2

(B) 3

(C) 4

(D) 8

89. A beam made of steel is subjected to pure bending. Yielding of the material in the beam will take place when the maximum bending stress is equal to

(A) two times the yield stress of steel

(B) $\sqrt{2}$ times the yield stress of steel

(C) half the yield stress of steel

(D) the yield stress of steel

90. A rectangular section beam subjected to a bending moment M varying along its length is required to develop same maximum bending stress at any cross-section. If the depth of the section is constant, then its width will vary as

(A) M

(B) $\sqrt{M}$

(C) M^2

(D) 1 / M

91. A simply supported beam of length 6 m is subjected to a U.D.L of 3 kN/m over the entire span. The size of the beam is 50 cm × 100 cm. The maximum bending stress developed at the top fibre at the support is

(A) 0.6 N/m^2

(B) 0.16 N/m^2

(C) 0

(D) 1.6 N/m^2

92. The ratio of moment of resistance of solid circular shaft of diameter 'D' and a hollow shaft of external diameter D and internal diameter 'd' is

(A) $D^4 / (D^4 - d^4)$

(B) $(D^4 - d^4) / D^4$

(C) $(D^2 - d^2) / D^2$

(D) $(D^3 - d^3) / D^3$

93. The width of a beam of uniform strength having a constant depth (d), length L, simply supported at ends with a central load W is

(A) $\frac{2}{3}\frac{WL}{fd^2}$

(B) $\frac{3}{2}\frac{WL}{fd^2}$

(C) $\frac{2}{3}\frac{fL}{Wd^2}$

(D) $\frac{3}{2}\frac{fL^2}{Wd}$

94. A beam of square section is first placed having its two sides horizontal and again, having its one diagonal vertical. The ratio of the flexural strengths in two positions, is

(A) $\sqrt{2}$

(B) $1/\sqrt{2}$

(C) $\sqrt{3}$

(D) $1/\sqrt{3}$

95. If the outer diameter of two circular sections (one solid and another hollow) is D and the inner diameter of the hollow circular cross section is D/2, the ratio of the moments of resistance of the solid circular section and the hollow circular section is

(A) 1 / 16

(B) 15 / 16

(C) 16 / 15

(D) 8 / 15

96. A closely coiled helical spring of radius R, contains n turns and is subjected to an axial load W. If the radius of the coil wire is r and modulus of rigidity of the coil material is C, the deflection of the coil is

(A) $\frac{WR^3n}{Cr^4}$

(B) $\frac{2WR^3n}{Cr^4}$

(C) $\frac{3WR^3n}{Cr^4}$

(D) $\frac{4WR^3n}{Cr^4}$

97. An open – ended cylinder of radius r and thickness t is subjected to internal pressure p. The Young's modulus for the material is E and Poisson's ratio is μ. The longitudinal strain is

(A) Zero

(B) $\frac{pr}{tE}$

(C) $\frac{pr}{2tE}$

(D) None of these

98. A solid circular shaft of diameter d is subjected to a torque T. The maximum normal stress induced in the shaft, is

(A) Zero

(B) $\frac{16T}{\pi d^3}$

(C) $\frac{32T}{\pi d^3}$

(D) None of these

99. For structural analysis, Maxwell's reciprocal theorem can be applied to

(A) Plastic structures

(B) Elastic structures

(C) Symmetrical structures

(D) All the above

100. Pick up the correct statement from the following. In a fixed beam, the points of contraflexure,

(A) for a uniformly distributed load are 2

(B) for a concentrated load are 2

(C) for a moment applied at mid point are 3

(D) all the above.

101. Pick up the correct statement from the following :

(A) The rate of change of bending moment is equal to rate of shear force

(B) The rate of change of shear force is equal to rate of loading

(C) Neither (A) nor (B)

(D) Both (A) and (B)

102. The ratio of the flexural strengths of two beams of square section one placed with its two sides horizontally and other diagonally, is

(A) $\sqrt{2}$

(B) $\sqrt{3}$

(C) $\sqrt{5}$

(D) $\sqrt{7}$

103. Excess of silica in the clay

(A) makes the brick brittle and weak

(B) makes the brick crack and wrap on drying

(C) changes the colour of the brick from red to yellow

(D) improves impermeability and durability of the brick

104. A simply supported beam (of length $l + 2a$) with equal overhangs 'a' carries a uniformly distributed load over the whole length, the B.M. changes sign if

(A) $l > 2a$

(B) $l < 2a$

(C) $l = 2a$

(D) $l = 4a$

105. The phenomenon of slow growth of strain under a steady tensile stress, is called

(A) yielding

(B) creeping

(C) breaking

(D) none of the above

106. The tension coefficient of any member is

(A) force divided by the length

(B) tension divided by the length

(C) tension per unit area

(D) tension in the member

107. Which is the hardest mineral among the following ?

(A) Gypsum

(B) Quartz

(C) Topaz

(D) Carborundum

108. Weep holes are provided in retaining walls

(A) to increase the earth pressure

(B) to reduce the earth pressure

(C) to increase the pore pressure

(D) to allow soil to move out

109. Open cylinder of 15 cm diameter and 100 cm long contains water upto a height of 70 cm. The speed at which the cylinder is to be rotated about its vertical axis, so that the axial depth becomes zero is

(A) 563 rpm
(B) 600 rpm
(C) 545 rpm
(D) 593 rpm

110. For the problem involving pipe flow in series,

(A) the discharge is same throughout each of the pipe.
(B) the head loss is same through each of the pipe.
(C) the discharge through each pipe is added to obtain total discharge.
(D) a solution by trial is unnecessary.

111. If the length of a pipe is 2 km and its diameter is 10 cm. If diameter of an equivalent pipe is 30 cm, then its length is

(A) 520 km
(B) 621 km
(C) 486 km
(D) 586 km

112. A long pipeline carries water from a river to a city. As part of an augmentation scheme similar pipe is added in parallel to the existing pipe for half the total length of the pipeline. The percentage increase in discharge will be

(A) 100
(B) 60
(C) 50
(D) 26

113. A body weighs 150 N in air and was found to weigh 100 N when fully submerged in water. The specific gravity of the body is

(A) 1.25
(B) 4
(C) 1.33
(D) 3

114. The ratio of pressure intensities inside a liquid jet, a droplet and a soap bubble having same internal radius and equal surface tension will be

(A) 1 : 4 : 2
(B) 4 : 2 : 1
(C) 2 : 1 : 4
(D) 1 : 2 : 4

115. If the friction factor of a laminar flow through a circular pipe is 0.01, then Reynold's number of the flow will be

(A) 6400

(B) 700

(C) 7000

(D) 6000

116. A square surface 3 m × 3 m lies in a vertical plane. Its upper edge is 15 metres below the water surface, then the total force acting on the square will be

(A) 1200 kN

(B) 1375 kN

(C) 1457 kN

(D) 1525 kN

117. If u and v are the components of velocity in the x and y-directions of a flow given by $u = ax + by$, $v = cx + dy$, then the condition to be satisfied is

(A) $a + c = 0$

(B) $b + d = 0$

(C) $a + b + c + d = 0$

(D) $a + d = 0$

118. The piezometric head in a static fluid

(A) remains constant in the horizontal direction, provided the fluid is continuous

(B) remains constant throughout the fluid

(C) does not vary in the horizontal direction

(D) varies only in the vertical direction

119. The concept of stream function which is based on the principle of continuity is applicable to

(A) Uniform flow cases only

(B) Two dimensional flow only

(C) Three dimensional flow

(D) All types of flow

120. A stream tube is one

(A) which is bounded by a closed surface containing the stream line

(B) in which the stream function does not change

(C) which has constant area throughout its length so that the velocity remains constant

(D) None of these

Space For Rough Work