1. Falling drops of water become spheres due to the property of
   (A) Surface tension of water
   (B) Compressibility of water
   (C) Capillarity of water
   (D) Viscosity of water

2. A propped cantilever beam of span 2*l* is carrying uniformly distributed load of intensity *w* per unit length all through the span. Bending moment at the fixed end is:
   (A) $\frac{wl^2}{8}$
   (B) $\frac{wl^2}{2}$
   (C) $\frac{wl^2}{12}$
   (D) $\frac{wl^2}{16}$

3. A uniformly distributed load is imposed on simply supported beam, which one is correct related to this:

   (I) Maximum and minimum shear force occurs where curvature is zero.

   (II) Maximum or minimum bending moment occurs where shear force is zero.

   (III) Maximum or minimum bending moment occurs where the curvature is zero.

   (IV) Maximum bending moment and maximum shear force occurs at the same location.
   (A) (I) and (II) only
   (B) (I), (II) and (III)
   (C) (I) only
   (D) (II) and (III)

4. If the void ratio of a soil sample is 0.5, then its porosity would be
   (A) 1/2
   (B) 2/3
   (C) 1/4
   (D) 1/3

5. The neutral axis of beam cross-section must
   (A) Pass through the centroid of the section
   (B) Be equidistant from the top of bottom films
   (C) Be an axis of symmetry of the section
   (D) None of these

6. For a soil sample, air occupies one third of its total volume whereas water occupies one sixth of its volume. What is the degree of saturation of the soil?
   (A) 33%
   (B) 66%
   (C) 100%
   (D) None of these

7. The value of porosity of a soil sample in which the total volume of soil grains in equal to twice the total volume of voids would be nearest to?
   (A) 33%
   (B) 44%
   (C) 66%
   (D) 99%

8. The pressure intensity in kN/m² (or kPa) at any point in a liquid is
   (A) w
   (B) wh
   (C) w/h
   (D) h/w
   Where
   w = Specific weight of liquid and
   h = Depth of liquid from the surface.

9. In a triaxial test, for a saturated soil specimen, the magnitude of Skempton's B-Parameter is nearly equal to
   (A) Zero
   (B) Unity
   (C) Infinity
   (D) $\pi/4 + \phi/2$

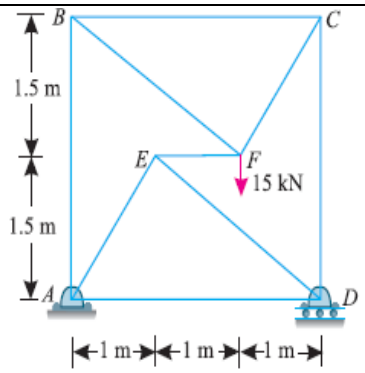
10. The height of a water column equivalent to a pressure of 0.15 MPa is
   (A) 15.3 m
   (B) 25.3 m
   (C) 35.3 m
   (D) 45.3 m

11. The ratio of the maximum deflections of a beam simply supported at its ends with an isolated central load and that of with a uniformly distributed load over its entire length, is
   (A) 1
   (B) 5/8
   (C) 8/5
   (D) 8/3

12. The pressure measured with the help of a pressure gauge is called
   (A) atmospheric pressure
   (B) gauge pressure
   (C) absolute pressure
   (D) mean pressure

13. For a given material Young's modulus is 200 GN/m^2 and modulus of rigidity is 80 GN/m^2. The value of Poisson's ratio is
   (A) 0.15
   (B) 0.20
   (C) 0.25
   (D) 0.30

14. Determine the member force in the member CD



(A) 15
(B) 10
(C) 30
(D) 20

15. The occurrence of the slow growth of strain under steady tensile stress is called
(A) Yielding
(B) Creeping
(C) Breaking
(D) None of these

16. When the pressure intensity at a point is more than the local atmospheric pressure, then the difference of these two pressures is called
(A) gauge pressure
(B) absolute pressure
(C) positive gauge pressure
(D) vacuum pressure

17. A water tank contains 1.3 m deep water. The pressure exerted by the water per meter length of the tank is
(A) 2.89 kN
(B) 8.29 kN
(C) 9.28 kN
(D) 28.9 kN

18. The degree of indeterminacy for beam fixed at both the ends and is subjected to lateral loads only is
(A) 1
(B) 2
(C) 3
(D) 4

19. Muller Breslau's principal in structural analysis is used for

(A) Drawing influence line diagram for any force function
(B) Writing virtual work equation
(C) Superposition of load effects
(D) None of these

20. The water pressure per meter length on a vertical masonry wall of dam is
(A) wH/2
(B) wH
(C) $wH^2/2$
(D) $wH^2/4$
where w = Specific weight of the liquid, and H = Height of the liquid.

21. For a linear elastic structural system, minimization of potential energy leads to
(A) Compatibility condition
(B) Constitutive relation
(C) Equilibrium equation
(D) Strain displacement relation

22. A pipe of length more than double the diameter of orifice fitted externally or internally to the orifice is called a
(A) notch
(B) weir
(C) mouthpiece
(D) nozzle

23. The modulus of rupture of concrete in terms of its characteristic compressive strength (f_{ck}) of cube in MPa according to IS 456:2000 is
(A) 5000 f_{ck}
(B) 0.7 f_{ck}
(C) 5000 $\sqrt{f_{ck}}$
(D) 0.7 $\sqrt{f_{ck}}$

24. When a body is subjected to direct tensile stress (σ) in one plane and accompanied by a single shear (τ), the maximum normal stress is
(A) $\frac{1}{2}\sqrt{\sigma^2+4\tau^2}+\sigma/2$
(B) $\frac{1}{2}\sqrt{\sigma^2-4\tau^2}+\sigma/2$
(C) $\frac{1}{2}\sqrt{\sigma^2-4\tau^2}-\sigma/2$
(D) $\sqrt{\sigma^2-4\tau^2}-\sigma/2$

25. The partial safety factor recommended by IS 456:2000 for estimating the design strength of concrete and reinforcing steel are respectively.

(A) 1.15 and 1.5
(B) 1 and 1
(C) 1.5 and 1.15
(D) 1.5 and 1

26. Maximum possible value of compaction factor for fresh green concrete is
(A) 0.5
(B) 1.5
(C) 2.0
(D) 1

27. The total energy line lies over the hydraulic gradient line by an amount equal to the
(A) pressure head
(B) velocity head
(C) pressure head + velocity head
(D) pressure head – velocity head

28. The power transmitted through the pipe is maximum when the head loss due to friction is equal to
(A) one-fourth of the total supply head
(B) one-third of the total supply head
(C) one-half of the total supply head
(D) two-third of the total supply head

29. According to Manning's formula, the discharge through an open channel is
(A) $1/A \times n \times R^{2/3} \times s_0^{1/2}$
(B) $R \times 1/n \times A^{2/3} \times s_0^{1/2}$
(C) $1/R \times n \times A^{1/2} \times s_0^{3/2}$
(D) $A \times 1/n \times R^{2/3} \times s_0^{1/2}$

Where
A = cross-sectional area, R = hydraulic radius, n = Manning's Coefficient and S_0 = Bed slope

30. The stiffness coefficient K_{ij} indicates
(A) Force at *i* due to the deformation at *j*
(B) Deformation at *j* due to a unit force at *i*
(C) Deformation at *i* due to a unit force at *j*
(D) Force at *j* due to a unit deformation at *i*

31. The limit state of collapse can be avoided by checking the safety of RC structure for appropriate combination of Dead load (DL), Live load (LL), Wind load (WL) and Earthquake

load (EL). Which of the following combination is not considered?

(A) 0.9 DL + 1.5 WL

(B) 1.5 DL + 1.5 WL

(C) 1.5 DL + 1.5 WL + 1.5 EL

(D) 1.2 DL + 1.2 LL + 1.2 WL

32. A channel is said to be of most economical cross-section, if

(A) it gives maximum discharge for a given cross-sectional area and bed slope

(B) it has minimum wetted perimeter

(C) it involves lesser excavation for the designed amount of discharge

(D) all of the above

33. The discharge through a channel of circular section will be maximum when the depth of water is ———————— the diameter of the circular channel.

(A) 0.34 times

(B) 0.67 times

(C) 0.81 times

(D) 0.95 times

34. Minimum spacing between horizontal parallel reinforcement of the same size should not be less than

(A) 1 diameter

(B) 2.5 diameters

(C) 3 diameters

(D) 4.5 diameters

35. The width of flange of a L-beam, should not be less than

(A) One sixth of the effective span

(B) Breadth of the rib + four times of the slab

(C) Breadth of the rib + half clear distance between ribs

(D) Least of the above

36. The speed of an imaginary turbine, identical with the given turbine, which will develop a unit power under a unit head, is known as

(A) normal speed

(B) unit speed

(C) specific speed

(D) none of these

37. Which of the following turbine is preferred for a specific speed of 60 to 300 r.p.m.?

(A) Pelton wheel

(B) Francis turbine
(C) Kaplan turbine
(D) None of these

38. For pre-stressed member it is recommended to use
(A) Low strength concrete only
(B) High strength concrete only
(C) Low strength concrete but high tensile steel
(D) High strength concrete and high tensile steel

39. A Pelton wheel working under a constant head and discharge, has maximum efficiency when the speed ratio is
(A) 0.26
(B) 0.36
(C) 0.46
(D) 0.56

40. V-notch in a test specimen is prepared for which of the following testing methods?
(A) Bend test
(B) Rockwell hardness number
(C) Charpy impact test
(D) Elongation test

41. The neutral axis of a T- beam exists
(A) Within the flange
(B) At the bottom edge of the slab
(C) Below the slab
(D) All of the above

42. What do understand from loss of stress in prestress concrete?
(A) Slow lowering of the induced compressive stress in a prestressed part
(B) Slow lowering of the induced compressive strain in a prestressed part
(C) Slow lowering of the induced compressive tension in a prestressed part
(D) Slow lowering of the friction in a prestressed part

43. The specific speed of a centrifugal pump, delivering 750 litres of water per second against a head of 15 meters at 725 r.p.m., is

(A) 24.8 r.p.m.
(B) 48.21 r.p.m.
(C) 82.4 r.p.m.
(D) 248 r.p.m

44. The estimation of flood can be made
(A) by physical indication of past floods
(B) by flood discharge formulae
(C) by unit hydrograph
(D) all of these

45. The method of prestressing the concrete after it attains its strength is known as
(A) Pre tensioning
(B) Post tensioning
(C) Chemical prestressing
(D) Axial prestressing

46. If 1.5 kg of water is required to have a cement paste of 1.8 kg of normal consistency, the percentage of water is
(A) 20%
(B) 25%
(C) 22%
(D) 30%

47. A graph showing variations of discharge with time, at a particular point of a stream is known as
(A) mass inflow curve
(B) logistic curve
(C) hydrograph
(D) none of these

48. A canal aligned nearly parallel to the contours of a country, is known as
(A) side slope canal
(B) contour canal
(C) water shed canal
(D) ridge canal

49. The channel after attaining its section and longitudinal slope, will be said to be in ---------- regime.

(A) initial
(B) final
(C) permanent
(D) None of these

50. Bitumen felt -
(A) is used as water proofing material
(B) is used as damp proofing material
(C) is made from bitumen and hessian fibres
(D) all the above

51. An aggregate is said to be flaky if its least dimension is less than
(A) 1/5 of mean dimension
(B) 2/5 of mean dimension
(C) 4/5 of mean dimension
(D) 3/5 of mean dimension

52. The compressive strength test of concrete is repeated if the difference in strength of three test specimens, exceeds
(A) 5 kg/cm^2
(B) 10 kg/cm^2
(C) 15 kg/cm^2
(D) 12 kg/cm^2

53. Generally the purlins are placed at the panel points so as to avoid
(A) Axial force in rafter
(B) Shear force in rafter
(C) Deflection of rafter
(D) Bending moment in rafter

54. A Hypothetical Raft of 2 m x 3 m is founded at a depth of 3 m on a pure cohesive soil having undrained shear strength (S_u) of 240 kPa. The net ultimate bearing capacity of the soil will be closest to (as per Terzaghi's Theory)
(A) 820 kPa
(B) 920 kPa
(C) 240 kPa
(D) Data insufficient

55. Match List 1 with List 2 appropriately

List 1	List 2
(a) Oedometer	(1) Specific Gravity

(b) Plate Load Test (2) Compaction

(c) Proctor Test (3) Consolidation

(d) Pycnometer (4) Bearing Capacity

(A) (a)-(3), (b)-(4), (c)-(2), (d)-(1)

(B) (a)-(4), (b)-(2), (c)-(1), (d)-(3)

(C) (a)-(4), (b)-(3), (c)-(2), (d)-(1)

(D) (a)-(3), (b)-(4), (c)-(1), (d)-(2)

56. In the "Engineering News Formula" for determining the safe load carrying capacity of a pile, the Factor of safety used is

(A) 2.5

(B) 3

(C) 4

(D) 6

57. According to IS 800:2007, the minimum thickness of a vertically stiffened web plate, shall not be less than

(A) d/85

(B) d/200

(C) d/225

(D) d/250

58. Which of the following correction is NOT applied to a SPT N-value?

(A) Overburden correction

(B) Dilatancy correction

(C) Both, Overburden and Dilatancy correction

(D) Temperature correction

59. What is the maximum permissible width of a vehicle as per IRC?

(A) 1.58 m

(B) 2.44 m

(C) 3.81 m

(D) 1.85 m

60. Traffic flow equation for a section of road is [$u = 80 - 0.7k$] where *u* = speed in kmph and *K* is the density in vpkm [vehicles per *KM*]. The maximum expected flow is

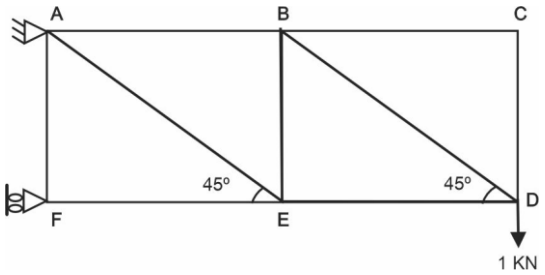
(A) 4572 vph

(B) 2286 vph

(C) 1143 vph

(D) 572 vph

61. Calculate the force in the member BC.



(A) 0 kN

(B) 1.414 kN

(C) 1 kN

(D) 2 kN

62. The equilibrium superelevation required to counteract the centrifugal force fully is given by (V = speed in kmph and R = Radius of Curvature in m)

(A) V/75R

(B) V/265R

(C) V^2/75R

(D) V^2/127R

63. With increase in speed of the traffic stream, the maximum capacity of the lane

(A) Increases

(B) Decrease

(C) First increases and then decreases after reaching a maximum value at optimum speed

(D) First decreases and then increases after reaching a minimum value at optimum speed

64. Which of the following statement is correct?

(A) Group Index (GI) of soils vary in the range of 0 to 20

(B) Higher the GI value, stronger is the soil sub-grade

(C) GI method of pavement design is a semi-empirical method

(D) None of these

65. In conjugate beam hinge is replaced by

(A) Roller

(B) Hinge

(C) Fixed support

(D) Link

66. Ultimate strength to cement is provided by
(A) Tricalcium silicate
(B) Di-calcium silicate
(C) Tri-calcium aluminate
(D) Tetra calcium alumino ferrite

67. In railway locomotives, coning of wheels are done at a slope of
(A) 1 in 15
(B) 1 in 20
(C) 1 in 25
(D) 1 in 30

68. In a BG track in curvature with R = 360 m, the maximum permissible speed of train is 60 kmph. Then, the equilibrium cant required will be
(A) 10 cm
(B) 13.2 cm
(C) 6 cm
(D) 3.6 cm

69. The best direction of a runway is
(A) Along the longest line on the windrose diagram
(B) Along the direction perpendicular to the longest line on the windrose diagram
(C) At 30 degrees to the direction of the longest line on the windrose diagram
(D) Along the NW-SE line

70. Stainless steel contains
(A) 18% of chromium and 8% nickel
(B) 8% of chromium and 18% of nickel
(C) 12% of chromium and 36% of nickel
(D) 36% of chromium and 12% of nickel

71. Which one of the following pollutants or pairs of pollutants is formed due to photochemical reactions?
(A) CO alone

(B) O_3 and PAN
(C) PAN and NH_3
(D) NH_3 and CO

72. A single rolling load of 8 kN rolls along a girder of 15 m span. The absolute maximum bending moment will be
(A) 8 kN.m
(B) 15 kN.m
(C) 30 kN.m
(D) 60 kN.m

73. Which one of the following solid waste disposal methods is ecologically most acceptable?
(A) Sanitary Landfill
(B) Incineration
(C) Composting
(D) Pyrolysis

74. Castigliano's first theorem is applicable
(A) For statically determinate structures only
(B) When the system behaves elastically
(C) Only when principle of superposition is valid
(D) None of the above

75. The leachate is an effluent from which of the following?
(A) Septic tank
(B) Sanitary landfills
(C) Compost plants
(D) Aerated Lagoons

76. What is "source reduction" in solid waste management?
(A) Separating waste at source
(B) Reducing the quantity of waste generated
(C) Increasing waste production
(D) Mixing different types of waste

77. What is "Composting" in the context of waste management?
(A) Burning waste material
(B) Burying waste in landfills
(C) Converting organic waste into nutrient-rich soil
(D) Disposing waste in oceans

78. What are the gases produced by landfills primarily composed of?
    (A) CO and H_2S
    (B) CH_4 and CO_2
    (C) SO_2 and NO_2
    (D) C_2H_6 and O_2

79. Which of the following air pollutants is a result of incomplete combustion of fossil fuels?
    (A) CO
    (B) SO_2
    (C) O_3
    (D) Particulate Matter (PM)

80. Two sources generate noise levels of 90 dB and 94 dB respectively. The cumulative effect of these two noise levels on the human ear is
    (A) 184 dB
    (B) 95.5 dB
    (C) 94 dB
    (D) 92 dB

81. The term "dB(A)" represents the measurement of sound level:
    (A) With a linear scale
    (B) Using logarithmic scale
    (C) In terms of loudness
    (D) In terms of pitch

82. Surveys which are carried out to depict mountains, rivers, water bodies, wooded areas and other cultural details are known as
    (A) Cadastral surveys
    (B) City surveys
    (C) Topographical surveys
    (D) Guide map surveys

83. Theory of probability is applied to
    (A) Accidental errors only
    (B) Cumulative errors only
    (C) Both, accidental and cumulative errors
    (D) None of these

84. The horizontal angle between the true meridian and magnetic meridian at a place is called
(A) Azimuth
(B) Declination
(C) Local attraction
(D) Magnetic bearing

85. A line of true length 500 m when measured by a 20 m tape is reported to be 502 m long. The correct length of the tape is
(A) 19.92 m
(B) 20.08 m
(C) 20.80 m
(D) 21 m

86. If L is the length of transition curve and R is the radius of circular curve, then the shift of the curve is directly proportional to
(A) R and $1/L^2$
(B) 1/R and L^2
(C) $1/R^2$ and L
(D) R^2 and 1/L

87. The RL of a classroom floor is 30.0 m and the staff reading on the floor is 1.40 m. The staff reading, when held inverted, with the bottom touching the T-beam of the roof is 3.67 m. The height of the beam above the floor is
(A) 35.07 m
(B) 2.27 m
(C) 5.07 m
(D) 27.73 m

88. If the fore-bearing of a line AB is 35^o and that of line BC is 15^o, then the included angle between the lines is
(A) 20^o
(B) 50^o
(C) 160^o
(D) 230^o

89. The Mohs scale is used to measure the:
(A) Density of minerals
(B) Radioactive decay of minerals
(C) Hardness of minerals
(D) Elasticity of minerals

90. If, for a PERT network, the optimistic, pessimistic and most likely times are T_o, T_p and T_m. What will be the variance of the activity?
    (A) $\left(\frac{T_0 + 4T_m + T_p}{6}\right)$
    (B) $\left(\frac{T_p - T_0}{6}\right)$
    (C) $\left(\frac{T_p - T_0}{6}\right)^2$
    (D) None of these

91. Gantt chart indicate
    (A) Comparison of actual progress with the scheduled progress
    (B) Balance of work to be done
    (C) Progressive cost of project
    (D) Inventory costs

92. A critical path has
    (A) Zero slack
    (B) Minimum slack
    (C) Maximum slack
    (D) Infinite slack

93. In PERT, the critical path represents the
    (A) Shortest path for the earliest completion of project
    (B) Longest path of the network from the initial to the final event
    (C) Ideal path by proceeding along which the project can be completed as per schedule
    (D) Path which takes into account the completion of the parallel activities

94. Which one of the following represents the reduction in duration?
    (A) Crashing
    (B) Negative slack
    (C) Variance
    (D) All of the above

95. Total project cost versus item curve is a/an
    (A) S-shaped curve
    (B) Parabola
    (C) U-shaped curve

(D) Straight line

96. A PERT network has 9 activities on its critical path. The standard deviation of each activity on the critical path is 3. The standard deviation of the critical path is

(A) 3

(B) 9

(C) 27

(D) 81

97. In PERT analysis, a critical activity has

(A) Maximum float

(B) Zero float

(C) Maximum cost

(D) Minimum cost

98. The perimeter discharge (P-Q) relation is given by the equation

(A) $P = 2.25\ Q^{1/2}$

(B) $P = 2.25\ Q^{3/2}$

(C) $P = 4.75\ Q^{1/2}$

(D) $P = 4.75\ Q^{3/2}$

99. Which of the following formula is used for computing the quantity of water for fire demand?

(A) Freeman's formula

(B) Kuichling formula

(C) Buston's formula

(D) All of these

100. If P is the present population, P_N is the population estimated after N years and I is average percentage growth, then according to geometrical increase method

(A) $P_N = P\left(1 + \frac{I}{100}\right)^N$

(B) $P_N = P\left(1 - \frac{I}{100}\right)^{1/N}$

(C) $P_N = P + \frac{I}{100} \times N$

(D) $P_N = P - \frac{I}{100} \times N$

101. The bending moment at a section of a beam is maximum where the shear force at that section is:
   (A) Zero
   (B) Maximum
   (C) Minimum
   (D) Constant

102. The intensity of pressure at any point, in a liquid, is
   (A) directly proportional to the area of the vessel containing liquid
   (B) directly proportional to the depth of liquid from the surface
   (C) directly proportional to the length of the vessel containing liquid
   (D) inversely proportional to the depth of liquid from the surface

103. The pressure at a point 4 m below the free surface of water is
   (A) 19.24 kPa
   (B) 29.24 kPa
   (C) 39.24 kPa
   (D) 49.24 kPa

104. Economic saving of time results by crashing
   (A) Cheapest critical activity
   (B) Cheapest non-critical activity
   (C) Costliest critical activity
   (D) Costliest noncritical activity

105. The equivalent length of column of length (l) fixed at one end and free at the other end is
   (A) 0.5 L
   (B) 0.7 L
   (C) 2 L

(D) 1.5 L

106. The bending moment diagram shape over the length of a beam, having no external load, is always

(A) Linear

(B) Parabolic

(C) Cubical

(D) Circular

107. The atmospheric pressure at sea level is

(A) 103 kN/m²

(B) 10.3 m of water

(C) 760 mm of mercury

(D) all of these

108. The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(A) moment of inertia

(B) polar moment of inertia

(C) polar modulus

(D) modulus of rigidity

109. A vertical wall is subjected to a pressure due to one kind of liquid, on one of its sides. The total pressure on the wall per unit length is

(A) wH

(B) wH/2

(C) $wH^2/2$

(D) $wH^2/3$

Where

w = Specific weight of liquid, and

H = Height of liquid

110. A vertical wall is subjected to a pressure due to one kind of liquid, on one of its sides. Which of the following statement is correct?

(A) The pressure on the wall at the liquid level is maximum

(B) The pressure on the bottom of the wall is minimum

(C) The pressure on the wall at the liquid level is zero, and on the bottom of the wall is maximum

(D) The pressure on the bottom of the wall is zero

111. A hemispherical tank of radius (R) has an orifice of cross-sectional area (a) at its bottom and is full of liquid. The time required to empty the tank completely is

(A) $\frac{14\pi R^{1/2}}{15C_d \times a\sqrt{2g}}$

(B) $\frac{14\pi R^{3/2}}{15C_d \times a\sqrt{2g}}$

(C) $\frac{14\pi R^{5/2}}{15C_d \times a\sqrt{2g}}$

(D) $\frac{14\pi R^{7/2}}{15C_d \times a\sqrt{2g}}$

112. Column having a height of H with rectangular cross section of size (a × 2a) has buckling load of P. If the cross section is changed to (0.5 a × 3a) and height is adjusted to 1.5 h, the buckling load of the redesigned column will be

(A) P/12

(B) P/2

(C) P/4

(D) 3P/4

113. The kinetic indeterminacy of single bay portal frame fixed at base is

(A) 1

(B) 2

(C) 3

(D) 0

114. In a short cylindrical external mouthpiece, the vena contracta occurs at a distance ———— the diameter of the orifice from the outlet of orifice.

(A) equal to

(B) one-fourth

(C) one-third

(D) one-half

115. The hydraulic mean depth or the hydraulic radius is the ratio of

(A) area of flow and wetted perimeter

(B) wetted perimeter and diameter of pipe

(C) velocity of flow and area of flow

(D) none of these

116. The fixed end moment of a uniform beam of span L and fixed at the ends, subjected to central point load P is

(A) PL/2

(B) PL/8

(C) PL/12

(D) PL/16

117. The efficiency of power transmission through pipe is

(A) $\frac{H-h_f}{H}$

(B) $\frac{H}{H-h_f}$

(C) $\frac{H+h_f}{H}$

(D) $\frac{H}{H+h_f}$

118. Match List-1 with List-2.

List-1		List-2
(a) Slope deflection	(1)	Force method Method
(b) Moment method	(2)	Displacement distribution Method
(c) Method of Three moment		
(d) Castigliano's second theorem		

(A) (a)-(1), (b)-(2), (c)-(1), (d)-(2)

(B) (a)-(1), (b)-(1), (c)-(2), (d)-(2)

(C) (a)-(2), (b)-(2), (c)-(1), (d)-(1)

(D) (a)-(2), (b)-(1), (c)-(2), (d)-(1)

119. A compound pipe is required to be replaced by a new pipe. The two pipes are said to be equivalent, if

(A) length of both the pipes is same

(B) diameter of both the pipes is same

(C) loss of head and discharge of both the pipes is same

(D) loss of head and velocity of flow in both the pipes is same

120. On a Coastal area a reinforced concrete structure has to be constructed the minimum grade of concrete to be used as per IS 456:2000 is

(A) M25

(B) M30

(C) M10

(D) M40

121. When the flow in an open channel is gradually varied, the flow is said to be

(A) steady uniform flow

(B) steady non-uniform flow

(C) unsteady uniform flow

(D) unsteady non-uniform flow

122. The discharge through a channel of trapezoidal section is maximum when

(A) width of channel at the top is equal to twice the width at the bottom

(B) depth of channel is equal to the width at the bottom

(C) the sloping side is equal to half the width at the top

(D) the sloping side is equal to the width at the bottom

123. For M30 concrete as per IS 456:2000 what is the flexural strength?

(A) 3.83

(B) 5.47

(C) 21.12

(D) 30

124. The characteristic strength of concrete is defined as that compressive strength below which not more than

(A) 10 % result fail

(B) 5% result fail

(C) 2% result fail

(D) None of the above

125. Match List-1 with List-2.

List-1	List-2
(a) Resonant frequency test	(1) Tensile strength test
(b) Rebound hammer test	(2) Dynamic modulus of elasticity

(c) Split cylinder test (3) Workability

(d) Compaction factor test (4) Compressive strength

(A) (a)-(2), (b)-(4), (c)-(1), (d)-(3)

(B) (a)-(2), (b)-(1), (c)-(4), (d)-(3)

(C) (a)-(2), (b)-(4), (c)-(3), (d)-(1)

(D) (a)-(4), (b)-(3), (c)-(1), (d)-(2)

126. The highest efficiency is obtained with a channel of ————— section.

(A) Circular

(B) Square

(C) Rectangular

(D) Trapezoidal

127. A turbine develops 10,000 kW under a head of 25 meter at 135 r.p.m. Its specific speed is

(A) 175.4 r.p.m.

(B) 215.5 r.p.m.

(C) 241.5 r.p.m.

(D) 275.4 r.p.m.

128. The relation between target mean strength (f_{cm}) for concrete mix design obtained from characterstics strength (f_{ck}) and standard deviation (σ) as per IS 456:2000 is

(A) $f_{ck} + 1.56\sigma$

(B) $f_{ck} + 1.65\sigma$

(C) $f_{ck} + 1.60\sigma$

(D) $f_{ck} + 1.52\sigma$

129. For a slab simply supported and spanning in one direction, the maximum ratio of span to depth is

(A) 35

(B) 25

(C) 30

(D) 20

130. A turbine is required to develop 1500 kW at 300 r.p.m. under a head of 150 m. Which of the following turbine should be used?

(A) Pelton wheel with one nozzle

(B) Pelton wheel with two or more nozzles

(C) Kaplan turbine

(D) Francis turbine

131. The cavitation in a hydraulic machine is mainly due to
(A) low velocity
(B) high velocity
(C) low pressure
(D) high pressure

132. For development of uniform pressure distribution, the thickness of the foundation, is
(A) Kept uniform throughout
(B) Increased gradually towards the edge
(C) Decreased gradually towards the edge
(D) Kept zero at edge

133. Steel bars are generally connected together to get greater length than the standard length by providing
(A) Straight bar splice
(B) Hooked splice
(C) Dowel splice
(D) All of the above

134. The specific speed (N_s) of a centrifugal pump is given by
(A) $\frac{N\sqrt{Q}}{H^{2/3}}$
(B) $\frac{N\sqrt{Q}}{H^{3/4}}$
(C) $\frac{N\sqrt{Q}}{H}$
(D) $\frac{N\sqrt{Q}}{H^{5/4}}$

135. The minimum clear cover for R.C.C. columns shall be
(A) Greater of 40 mm or diameter
(B) Smaller of 40 mm or diameter
(C) Greater of 25 mm or diameter
(D) Smaller of 25 mm or diameter

136. The design of heel slab of a retaining wall is based on the maximum bending moment due to:
(A) Its own weight
(B) Weight of soil above it
(C) Load of the surcharge if any
(D) All of the above

137. For Chennai catchments, the flood discharge is estimated from $Q = CA^{2/3}$. This formula known as
   (A) Dicken's formula
   (B) Ryve's formula
   (C) Nawab Jang Bahadur formula
   (D) Inglis formula

138. Which of the following method is useful for obtaining values of flood discharges for a high recurrence interval?
   (A) California method
   (B) Hazen's method
   (C) Gumbel's method
   (D) All of these

139. Which fundamental concept is involved in analysis of prestressed concrete members?
   (A) Principle stresses
   (B) Combined direct and bending stress
   (C) Overhead stresses
   (D) Shear stresses

140. The requirement of high strength concrete in prestressed concrete is due to
   (A) Loading and Unloading
   (B) Cracking
   (C) Bending
   (D) Shear and Bonding

141. A hydrograph representing one cm of run off from a rainfall of some unit duration and specific area distribution is known as
   (A) Hyetograph
   (B) Flood hydrograph
   (C) Unit hydrograph
   (D) S-hydrograph

142. Lacey gave a relation between
   (A) velocity and hydraulic mean depth
   (B) area and velocity
   (C) both (A) and (B)

(D) none of these

143. M10 grade of concrete approximates
(A) 1:3:6 mix
(B) 1:1:2 mix
(C) 1:2:4 mix
(D) 1:1.5:3 mix

144. For getting quality concrete, it is recommended to use
(A) Single sized aggregate
(B) Two size aggregate
(C) Graded aggregate
(D) None of the above

145. Hydration of cement is due to chemical action of water with
(A) Tricalcium silicate and dicalcium silicate
(B) Dicalcium silicate and tricalcium aluminate
(C) Tricalcium aluminate and tricalcium alumino ferrite
(D) All the above

146. Curing in concrete
(A) reduces the shrinkage of concrete
(B) preserves the properties of concrete
(C) prevents the loss of water by evaporation
(D) all of the above

147. The general regime flow equation is
(A) $V = 10.8\, R^{2/3} s^{1/3}$
(B) $V = 10.8\, R^{1/3} s^{2/3}$
(C) $V = 10.8\, R^{3/2} s^{1/3}$
(D) $V = 10.8\, R^{3/2} s^{1/2}$

where V-Mean regime velocity, R-Hydraulic mean depth and S- Slope of water surface

148. Distributary head regulators are provided
(A) to control the supplies to the off-taking channel
(B) to control the silt entry in the off-taking canal
(C) to stop the supply, when not needed, in the off-taking canal
(D) all of the above

149. When lead is present in water, it
(A) changes its colour
(B) causes turbidity
(C) causes alkalinity
(D) none of these

150. Which of the following sections should preferably be used at places where torsion occurs?
(A) Angle section
(B) Channel section
(C) Box type section
(D) Any of the above

151. Shear centre is the point in or outside a section through which the shear force applied produces_____.
(A) Only twisting
(B) Only bending
(C) Twisting and bending
(D) No twisting and no bending

152. The shape factor for circular sections In plastic analysis,
(A) 1.5
(B) 1.6
(C) 1.697
(D) none of these

153. Turbidity of water is expressed in terms of
(A) silica scale
(B) platinum cobalt scale
(C) *pO* value
(D) none of these

154. The alkalinity in water is caused by
(A) sodium carbonate
(B) potassium carbonate
(C) calcium hydroxide
(D) all of these

155. What are Plasticizers?
(A) Which reduces water for workability
(B) Which oxidizes water for workability
(C) Which decreases workability at the same water content
(D) Which adds water for workability

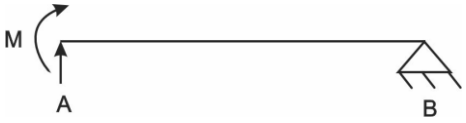
156. Which of the following is used to test the Standard consistency of cement?
(A) Duff Abrams apparatus
(B) Soundness meter
(C) Vicat apparatus
(D) Le Chatalier apparatus

157. Form work removal time for Sides of Walls, Columns and Vertical faces of beam is
(A) 24 to 48 hours
(B) 72 hours
(C) 56 hours
(D) 24 hours

158. Which of the following statement is correct?
(A) Slow sand filters work under atmospheric pressure
(B) Rapid sand filters require coagulation
(C) Rapid sand filters should be cleaned after 2 to 3 days
(D) all of the above

159. During earthquake vibration which structure will perform better
(A) Statically determinate and indeterminate
(B) Depends upon magnitude of earthquake
(C) Statically indeterminate
(D) Statically determinate

160. Due to application of moment M applied at end A for the given beam carryover Moment at end B is _____.



(A) $-M$

(B) $+M/2$

(C) $+M$

(D) 0

161. The percentage ratio of the oxygen available in sewage to the oxygen required to satisfy one stage of Bio-chemical Oxygen Demand (B.O.D.) is termed as stage

(A) chemical oxygen demand

(B) oxygen consumed

(C) relative stability

(D) bio-oxygen demand

162. In high rate activated sludge treatment, bacterias are removed from

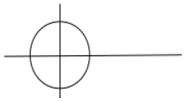
(A) 20 to 40 %

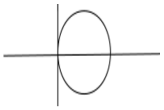
(B) 40 to 60%

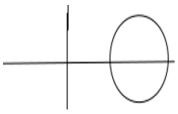
(C) 60 to 80%

(D) 80 to 95%

163. Which of the following Mohr's Circle represent the condition of pure uniaxial tension?

(A) 

(B) 

(C) 

(D) 

164. The rocks which are formed due to cooling of magma at a considerable depth from earth's surface are called

(A) Plutonic rocks

(B) Hypabyssal rocks

(C) Volcanic rocks

(D) Igneous rocks

165. A two dimensional fluid element rotates like a rigid body. At a point within the element, the pressure is 1 unit. Radius of the Mohr's circle, characterizing the state of stress at that point, is

(A) 0.5 unit

(B) 0 unit

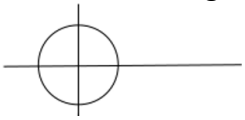
(C) 1 unit

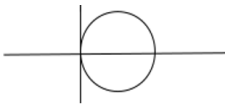
(D) 2 unit

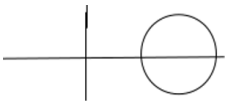
166. In one pipe system of plumbing

(A) only one pipe is provided
(B) the main pipe is connected directly to the drainage system
(C) all the traps are fully ventilated and connected to the ventilation pipe
(D) all of the above

167. Which of the following Mohr's Circle represents the condition of pure shear?

(A) 

(B) 

(C) 

(D) 

168. The anti-siphonage pipe is not required in
(A) one pipe system
(B) two pipe system
(C) single stack system
(D) none of these

169. Bending moment at any section in a conjugate beam gives in the actual beam
(A) Slope
(B) Curvature
(C) Deflection
(D) Bending moment

170. If the actual height of a stack is 150 m and plume height is 8 m, then the effective height of the stack is
(A) 150 m
(B) 142 m
(C) 158 m
(D) 166 m

171. For a soil sample, the plasticity index was obtained as 15%. A thread of 3 mm diameter, made of that soil, started to crumble at a water content of 20%. What will be the liquidity index of the soil at a natural water content of 25%?
(A) 1/2
(B) 2/3
(C) 1/4
(D) 1/3

172. A clay sample has a void ratio of 1.3 in dry state. The specific gravity of the soil solids is 2.6. What is the shrinkage limit of the soil?
(A) 20%
(B) 50%
(C) 26%
(D) 13%

173. For a dry granular soil sample, the maximum and minimum void ratios were obtained as 0.66 and 0.33 respectively. What would be the relative density of the soil sample having porosity (n) of 0.25?
(A) 0
(B) 1
(C) 1.24
(D) None of these

174. Which of the following is the most appropriate triaxial test to assess the immediate stability of an unloading problem, such as an excavation of a clay slope?
(A) UU test
(B) CU test
(C) CD Test
(D) Unconsolidated Drained Test

175. The Terzaghi's bearing capacity factors (N_c. N_q and N_γ) depends on
(A) Friction angle of the soil
(B) Cohesion and Friction angle of soil
(C) Cohesion only
(D) Cohesion, friction angle and Unit weight of soil

176. A vertical cut was formed during the excavation of a pure clay ($\phi_u = 0^o$) having unit weight of 20 kN/m^3. Estimate the cohesion of the soil if the bank failed at an excavation depth of 5 m.
(A) 25 kPa
(B) 50 kPa
(C) 5 kPa
(D) None of these

177. The group efficiency of a pile group is
(A) Always less than 100%

(B) Always more than 100%
(C) May be more or less than 100%
(D) Data insufficient

178. As per IRC, the ruling design speed on an NH in plain terrain is
(A) 100 kmph
(B) 80 kmph
(C) 60 kmph
(D) 40 kmph

179. When the path travelled along the road surface is more than the circumferential movement of wheels due to rotation, then it results in
(A) Slipping
(B) Skidding
(C) Turning
(D) Revolving

180. The absolute minimum radius of curve for safe operation for a speed of 100 kmph is nearest to
(A) 160 m
(B) 260 m
(C) 360 m
(D) 460 m

181. Which of the following test is adopted to evaluate the modulus of sub-grade reaction of soil?
(A) Plate bearing test
(B) CBR Test
(C) Direct shear test
(D) Tri-axial test

182. As per IRC 67:2001, a traffic sign indicating the speed limit on a road should be of
(A) Circular shape with white background and red border
(B) Triangular shape with white background and red border
(C) Triangular shape with red background and white border
(D) Circular shape with red background and white border

183. Gauge is the distance between
(A) Centre to Centre of rails
(B) Running faces of rails
(C) Outer faces of rails
(D) None of these

184. For a runway at an elevation of 1000 m above mean sea level and airport reference temperature of 16^{o}C, the rise in temperature to be taken into account as per ICAO is
(A) 24.5^{o}C
(B) 15^{o}C

(C) 7.5°C

(D) 6°C

185. Which of the following is considered a non-biodegradable waste?

(A) Food scraps

(B) Papers

(C) Fallen plant leaves

(D) Plastic bottles

186. Which of the following is the most suitable method of municipal solid waste disposal, for an inland village with sufficient land area?

(A) Composting

(B) Barging it out into the sea

(C) Incineration

(D) Destructive distillation

187. Sludge bulking can be controlled by

(A) Chlorination

(B) Coagulation

(C) Aeration

(D) Denitrification

188. The plan of a map was photocopied to a reduced size such that a line originally 100 mm, measures 90 mm. The original scale of the plan was 1:1000. The revised scale is

(A) 1 : 900

(B) 1 : 1111

(C) 1 : 1121

(D) 1 : 1221

189. The representative fraction 1/2500 means that the scale 1 cm is equal to

(A) 0.25 m

(B) 2.5 m

(C) 25 m

(D) 2.5 km

190. A circle of radius 7 m has a standard error of 0.02 m on radius. The standard error of its area is (in m^2)

(A) 0.04

(B) 0.14

(C) 0.28

(D) 0.88

191. The lengths of long chord and tangents of a circular curve are equal for a deflection angle of

(A) 30°

(B) 60^o

(C) 90^o

(D) 120^o

192. The sum of normal stress in a compound stress system is

(A) Constant

(B) Variable linearly

(C) Variable parabolically

(D) None of the above

193. Among the following methods, which one is the best to estimate the area of an irregular and curved boundary

(A) Trapezoidal Method

(B) Simpson's Method

(C) Average ordinate method

(D) Mid-ordinate Method

194. What type of rock is formed from the compaction and cementation of sediments?

(A) Igneous rocks

(B) Sedimentary rocks

(C) Metamorphic rocks

(D) Crystalline rocks

195. Activity on node type of network analysis involves

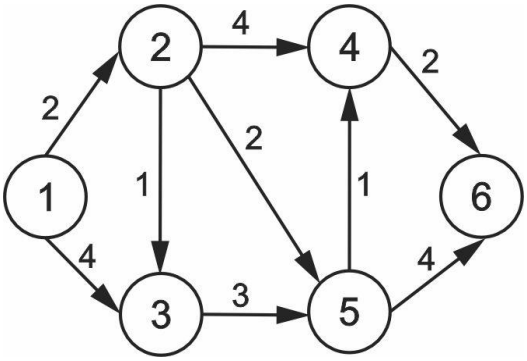
(A) PERT scheduling

(B) OPST scheduling

(C) CPM scheduling

(D) Bar chart scheduling

196. The arc lengths of a directed graph of a project are as shown in the Fig. The shortest path length from node 1 to node 6 is



(A) 7
(B) 9
(C) 11
(D) 14

197. In a bar chart, the vertical axis represents
(A) Time
(B) Types of activities
(C) Number of labours
(D) Various activities of the project

198. The main constituent of fly-ash, is
(A) aluminium oxide
(B) silica
(C) ferrous oxide
(D) all of these

199. A machine is purchased for Rs. 10,00,000 and has an estimate life of 10 years. The salvage value at the end of 10 years is Rs. 1,50,000. The book value of the machine at the end of 5 years using general straight line method of evaluation of depreciation is
(A) Rs. 4,75,000
(B) Rs. 5,75,000
(C) Rs. 6,50,000
(D) Rs. 8,50,000

200. The probability distribution taken to represent the completion time in PERT analysis is
(A) Gamma Distribution
(B) Normal distribution
(C) Beta distribution
(D) Log-normal distribution

_____

ROUGH WORK

ROUGH WORK