

01 — CIVIL ENGINEERING

(Answer ALL questions)

56. Maximum external tension in any bolt should not exceed the proof load of the bolt by
1. 0.8 times
  2. 0.6 times
  3. 0.4 times
  4. 0.2 times
57. Rise in temperature of a member in a pin jointed frame causes
1. Compressive force in the member
  2. Tensile force in the member
  3. Bending in the member
  4. No effect
58. Which one of the following arch is statically determinate?
1. Three hinged arch
  2. Two hinged arch
  3. Fixed arch
  4. Flexible arch
59. Di-Calcium silicate
1. Hydrates rapidly
  2. Generates less heat of hydration
  3. Reacts with water only
  4. Generates more heat of hydration
60. The insoluble residue in cement should be less than
1. 4.5%
  2. 3.5%
  3. 2.5%
  4. 1.5%
61. The maximum permissible shear stress for M25 concrete as per IS 456: 2000 in Limit State Method of design is
1. 1.25 N/mm<sup>2</sup>
  2. 1.5 N/mm<sup>2</sup>
  3. 1.75 N/mm<sup>2</sup>
  4. 2.0 N/mm<sup>2</sup>
62. Proof resilience is the maximum energy stored at
1. Elastic Limit
  2. Elasto Plastic Limit
  3. Plastic Limit
  4. Limit of Proportionality
63. Method of joints is applicable when the number of unknown member forces at the joint under consideration is not more than
1. One
  2. Two
  3. Three
  4. Four
64. For a determinate pin jointed plane frame, the relation between the number of joints  $j$  and the number of members  $m$  is given by
1.  $m = 2j - 3$
  2.  $m = 3j - 6$
  3.  $m = 2j + 3$
  4.  $m = 3j - 2$
65. The relationship between the Radius of Curvature (R), Bending Moment (M) and Flexural Rigidity (EI) is
1.  $R = M / EI$
  2.  $M = EI / R$
  3.  $EI = R / M$
  4.  $E = MI / R$
66. Shear stress on the principal plane is
1. Zero
  2. Maximum
  3. Minimum
  4. Half the principal stress
67. The relationship between the Young's Modulus (E), Bulk Modulus (K) and Poissons ratio ( $\mu$ ) is
1.  $E = 2K (1 - 2\mu)$
  2.  $E = 3K (1 + 2\mu)$
  3.  $E = 3K (1 - 2\mu)$
  4.  $E = 2K (1 - 3\mu)$



68. The most common admixture which is used to accelerate the initial setting time of concrete is
1. Gypsum
  2. Calcium chloride
  3. Calcium carbonate
  4. Sodium chloride
69. The main ingredients of Portland cement are
1. Lime and silica
  2. Lime and alumina
  3. Silica and iron
  4. Lime and iron
70. Plywood is made by bonding together thin layers of wood in such a way that the angle between grains of any layer to grains of adjacent layers is
1.  $0^\circ$
  2.  $30^\circ$
  3.  $45^\circ$
  4.  $90^\circ$
71. In beams the general assumption "Plane sections remain plane even after bending" is valid only where the shear deformations are negligible in
1. Deep beams
  2. Deep and Shallow beams
  3. Shallow beams
  4. Edge beams
72. Identify the correct statement which corresponds to accelerator : retarder
1.  $\text{CaCl}_2 : \text{CaSO}_4$
  2.  $\text{NaCl} : \text{CaCl}_2$
  3.  $\text{NaOH} : \text{KOH}$
  4.  $\text{KOH} : \text{NaOH}$
73. Lifting a horizontal wooden beam of length 'L' at two points ————— from the ends substantially reduces the lifting bending stresses
1.  $0.207 L$
  2.  $0.217 L$
  3.  $0.227 L$
  4.  $0.237 L$
74. Rheological properties of concrete are independent of
1. Water content
  2. Aggregate shape
  3. Type of mixer
  4. Temperature
75. Williot-Mohr Diagram provides a method for determining the absolute displacements of joints of
1. Frames structures
  2. Articulated structures
  3. Tall structures
  4. Long span structures
76. The disk of the prismatic compass is graduated in
1. Clockwise direction starting with Zero at North
  2. Clockwise direction starting with Zero at South
  3. Anticlockwise direction starting with Zero at North
  4. Anti clockwise direction starting with Zero at South
77. A point denotes the shifting of the level is called as
1. Centre point
  2. Control point
  3. Intermediate point
  4. Turning point
78. A method to determine the horizontal distance between two inaccessible points with the help of observation using theodolite and chain is
1. Triangulation
  2. Trilateration
  3. Triangulation
  4. Orientation
79. The curves used for railway lines are generally of
1. large radius
  2. medium radius
  3. small radius
  4. very small radius



80. An important operation in hydrographic surveying is
1. lighting
  2. leveling
  3. sounding
  4. waving
81. If the water content of a fully saturated soil mass is 100%, then the voids ratio of the sample is
1. less than specific gravity of soil
  2. equal to specific gravity of soil
  3. greater than specific gravity of soil
  4. independent of specific gravity of soil
82. In hydrometer analysis for a soil mass
1. both meniscus correction and dispersing agent correction are additive
  2. both meniscus correction and dispersing agent correction are subtractive
  3. meniscus correction is additive and dispersing agent correction is subtractive
  4. meniscus correction is subtractive and dispersing agent correction is additive
83. When the plastic limit of a soil is greater than the liquid limit, then the plasticity index is reported as
1. negative
  2. zero
  3. non-plastic (NP)
  4. 1
84. The value of compression index for a remoulded sample whose liquid limit is 50% is
1. 0.028
  2. 0.28
  3. 0.36
  4. 0.036
85. Which one of the following clay behaves like a dense sand?
1. Over-consolidated clay with a high over-consolidation ratio
  2. over-consolidated clay with a low over-consolidation ratio
  3. normally consolidated clay
  4. under-consolidated clay
86. Rankine's theory of earth pressure assumes that the back of the wall is
1. plane and smooth
  2. plane and rough
  3. vertical and smooth
  4. vertical and rough
87. If S, L and R are the arc length, Long Chord and the sliding circle then the perpendicular distance of the cohesive force, given by
1.  $a = S.R/L$
  2.  $a = L.S/R$
  3.  $a = L.R/S$
  4. None of the above
88. The minimum number of driven piles required to support column load
1. 1
  2. 4
  3. 2
  4. 3
89. Laterally loaded short rigid pile fails due to
1. Bending of pile
  2. Rotation of pile
  3. Buckling of pile
  4. None of the above
90. Suitable in-situ test to obtain the undrained strength in cohesionless soil stratum is
1. Standard penetration test
  2. Cone penetration test
  3. Vane shear test
  4. Pressure meter test
91. If the coefficient of friction on the road surface is 0.15 and a maximum super-elevation 1 in 15 is provided, the maximum speed of the vehicles on a curve of 100 metre radius, is
1. 32.44 km/hour
  2. 42.44 kg/hour
  3. 52.44 km/hour
  4. 62.44 km/hour



92. What will be the length of transition curve of a road with radius of curvature 50m and design speed of 60kmph as per rate of change of centrifugal acceleration formula
1. 80 m
  2. 100 m
  3. 156 m
  4. 200 m
93. In a bituminous pavement alligator cracking is mainly due to
1. inadequate wearing course
  2. inadequate thickness of sub base course of pavement
  3. use of excessive bituminous material
  4. fatigue arising from repeated stress applications
94. Weaving is
1. Merging
  2. Diverging
  3. Crossing
  4. Merging, diverging and crossing
95. All red phase is
1. timing for exclusive pedestrian movements
  2. timing for two wheeler movement
  3. timing for cyclist movement
  4. all of the above
96. Triaxial compression test is conducted to determine
1. CBR value of various materials
  2. elastic moduli of various materials
  3. deflection of pavement
  4. all of the above
97. Repair and maintenance of the underwater parts of the ship are carried out at
1. Quay
  2. Berth
  3. Dry dock
  4. Jetty
98. Extra locomotive is required to push the train on tracks located on
1. momentum gradient
  2. gradients in station
  3. gradients steeper than ruling gradient
  4. gradients in marshaling yard
99. Runways are designated with numbers calculated
1. as one tenth of the magnetic azimuth of the runways heading in degrees
  2. as one tenth of the angle the runway heading makes with south
  3. based on direction of wind
  4. based on height above MSL
100. Sleeper density denotes the
1. length of the rail in metres
  2. number of sleepers per rail length
  3. density of sleeper
  4. sleeping state of signals in fog condition
101. Rotometer is used to measure
1. Velocity of fluid in pipes
  2. Velocity of gauges
  3. Vortex flow
  4. Flow of fluids
102. An ideal fluid is
1. Very viscous
  2. One which obeys Newton's law of viscosity
  3. Frictionless and incompressible
  4. A useful assumption in problems in conduit flow
103. The general energy equation is applicable to
1. Steady flow
  2. Unsteady flow
  3. Non-uniform flow
  4. Turbulent flow



104. The hydraulic gradient is equal to
1.  $\frac{\text{Angle of slope of Channel}}{\text{Total length of channel}}$
  2.  $\frac{\text{Drop in pipe height}}{\text{Total length of channel}}$
  3.  $\frac{\text{Wetted Perimeter}}{\text{Total length of channel}}$
  4.  $\frac{\text{Head loss due friction}}{\text{Total length of channel}}$
105. Which two forces are most important in laminar flow between closely spaced parallel plates
1. Inertia, Viscous
  2. Pressure, Inertia
  3. Gravity, Pressure
  4. Viscous, Pressure
106. The branch of hydrology which deals with water in natural or artificial reservoirs is known as
1. Potamology
  2. Limnology
  3. Pedo hydrology
  4. Geohydrology
107. In a psychrometric chart, the abscissa represents
1. Dry bulb temperature
  2. Wet bulb temperature
  3. Relative humidity
  4. Specific humidity
108. A hydrograph is a plot of
1. Precipitation against time
  2. Direct run off against time
  3. Stream flow against time
  4. Surface run off against time
109. A 100 years peak discharge means
1. A maximum discharge which occurs in 101<sup>st</sup> year
  2. A maximum discharge of 100 year recurrence interval
  3. An average of peak discharge of preceding 100 years
  4. The peak discharge during preceding years will occur 100 years after that
110. An aquifer is
1. A permeable geological stratum in which there is storage of ground water
  2. A geological stratum which does not have underground water upto 30 m
  3. An area where ground water remains at saturation level throughout the year
  4. All of the above
111. The transitional middle portion of a logistic curve follows
1. a logarithmic growth
  2. a geometric growth
  3. a first over curve
  4. a constant rate
112. The acceptable limit of chloride (as Cl) in domestic water supply as per IS10500-2012 is:
1. 400 mg/L
  2. 200 mg/L
  3. 250 mg/L
  4. 1000 mg/L
113. If the moisture content of a sludge is reduced from 98% to 96% the volume of sludge will decrease by
1. 2%
  2. 20%
  3. 25%
  4. 50%
114. Air pollution from automobiles can be controlled by fitting:
1. Cyclone separator
  2. Electrostatic precipitator
  3. Catalytic converter
  4. Wet scrubber
115. The mean sound level from the following two readings 25 dBA and 40 dBA will be
1. 39.52 dBA
  2. 40.00 dBA
  3. 32.50 dBA
  4. 37.12 dBA