

PART III

01— CIVIL ENGINEERING

(Answer ALL questions)

56. The ratio of elongations of a conical bar due to its own weight and that of a prismatic bar of the same length, is

a. $1/2$
b. $1/3$
c. $1/4$
d. $1/5$

57. The total elongation produced in a bar of uniform section hanging vertically downwards due to its own weight is equal to that produced by a weight

a. Of same magnitude as that of bar and applied at the lower end
b. Half the weight of bar applied at lower end
c. Half of the square of weight of bar applied at lower end
d. One fourth of weight of bar applied at lower end

58. For a simply supported beam of length L , the bending moment M is described as $M = a(x - x^3/L^2)$, $0 \leq x < L$; where a is a constant. The shear force will be zero at

a. the supports
b. $x = L/2$
c. $x = L/3$
d. $x = L/4$

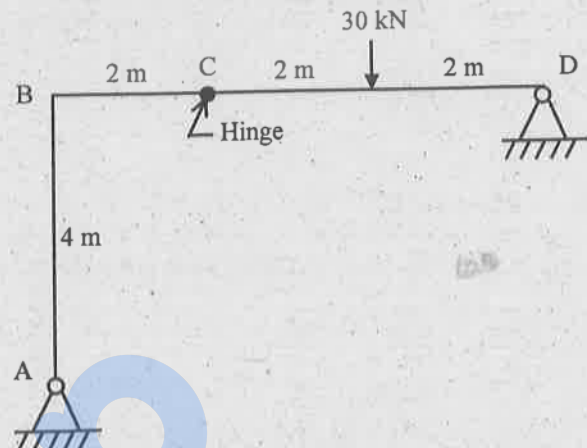
59. Two closely coiled helical springs 'A' and 'B' are equal in all respects but the number of turns of spring 'A' is half that of spring 'B'. The ratio of deflections in spring 'A' to spring 'B' is

a. $1/8$
b. $1/4$
c. $1/2$
d. 2

60. Two shafts 'A' and 'B' are made of same material. The shaft 'A' is solid and has diameter D . The shaft 'B' is hollow with outer diameter D and inner diameter $D/2$. The strength of hollow shaft in torsion is _____ as that of solid shaft.

a. $1/16$
b. $1/8$
c. $1/4$
d. $15/16$

61. The vertical reaction at the support A for the frame shown in the figure is



a. 20 kN
b. 10 kN
c. 15 kN
d. 5 kN

62. Naylor's simplification for moment distribution is applicable for

a. symmetrical frame with symmetrical loading
b. unsymmetrical frame with symmetrical loading
c. symmetrical frame with anti-symmetrical loading
d. any frame with anti - symmetrical loading

63. The influence line diagram for bending moment at any section in a propped cantilever has both positive and negative portions when the distance of the section from the propped end is

a. less than two - third of the span
b. equal to two - third of the span
c. greater than two - third of the span
d. equal to one - fourth of the span.

64. Match List – I with List – II and select the correct answer using the code given below the Lists :

List – I

List – II

- | | |
|----------------------|-------------------------------|
| A. Axel
Bendixen | 1. Force method |
| B. Hardy Cross | 2. Influence line |
| C. Winkler | 3. Slope Deflection
Method |
| D. Muller
Breslau | 4. Moment Distribution |

Code :

- | | A | B | C | D |
|----|---|---|---|---|
| a. | 1 | 4 | 2 | 3 |
| b. | 3 | 4 | 2 | 1 |
| c. | 1 | 2 | 4 | 3 |
| d. | 3 | 2 | 4 | 1 |

65. The shape factor for a circular section in plastic design of steel structure is

- a. $\frac{16}{3\pi}$
- b. $\frac{8}{3\pi}$
- c. $\frac{32}{3\pi}$
- d. $\frac{3\pi}{16}$

66. In Metamorphic rocks, the limestone is changed in to

- a. Quartzite
- b. Shale
- c. Slate
- d. Marble

67. These bricks are made from olivine rock to which magnesia is added in the manufacturing process. This bricks are called as

- a. Acid resistance bricks
- b. Fire clay bricks
- c. Forsterite bricks
- d. Silicon carbide bricks

68. The soundness test of cement is an indication of excess of this material caused by inadequate burning of cement or excess of magnesia or sulphates.

- a. Iron oxide
- b. Lime
- c. Alumina
- d. Aluminium

69. Glued and laminated wood is called as

- a. Laminates
- b. Spirals
- c. Laminboards
- d. Glulam

70. The process of cutting and sawing logs into suitable section of timber is known as

- a. Conversion
- b. Thickening
- c. Thinning
- d. Clotting

71. The camber of beams with straight tendons is given by

- a. $(PeL^2)/(8EI)$
- b. $(Pe^2L)/(8EI)$
- c. $(PeL^2)/(6EI)$
- d. $(Pe^2L)/(6EI)$

72. The loss of prestress in steel due to creep of concrete is given by _____ where creep coefficient ϕ is 0.6, stress in concrete at the level of steel is 10.2 N/mm^2 , Young's modulus of steel and concrete are 210 kN/mm^2 and 35 N/mm^2 respectively.

- a. 38.25 N/mm^2
- b. 2.72 N/mm^2
- c. 97.92 N/mm^2
- d. 0.941 N/mm^2

73. The working stress method of design specifies the value of modular ratio $m = 280/3\sigma_{cbc}$, where σ_{cbc} is the allowable stress in bending compression in concrete. To what extent does the above value of 'm' make any allowance for the creep of concrete?

- a. No compensation
- b. Full compensation
- c. Partial Compensation
- d. The two are unrelated

74. In the limit state design method of concrete structures, the recommended partial material safety factor (γ_m) for steel according to IS:456-2000 is
- 1.5
 - 1.15
 - 1.00
 - 0.87
75. The effective width of a reinforced concrete T-beam flange under compression, according to IS:456 - 2000, given ' I_0 ' is the distance between the adjacent zero moment points, ' b ' is the breadth of the rib and ' D ' is the thickness of the flange, is
- $(I_0/6) + b + 6 D$
 - $(I_0) + 6 D$
 - $(I_0/6) + 6 D$
 - $(I_0/6) + b$
76. IS800-2007 suggests that purlins be designed as
- cantilever beams
 - continuous beams
 - simply supported beams
 - fixed beams
77. Mode of failure of fillet weld is
- tension
 - bearing
 - bending
 - shear
78. The slenderness ratio of lacing should not exceed
- 125
 - 145
 - 165
 - 185
79. For rolled angle section the curve used for major axis buckling is
- curve A
 - curve B
 - curve C
 - curve D
80. As per IS800-2007, the maximum slenderness ratio for members under tension (other than pre-tensioned members) is
- 200
 - 300
 - 400
 - 500
81. In consolidated drained test on a saturated soil sample, pore water pressure is zero during.
- Consolidation stage only
 - Shearing stage only
 - Both consolidation and shearing stages
 - Loading stage
82. In a soil specimen, 70% of particles are passing through 4.75 mm I.S sieve and 40% of particles are passing through 75 μ I.S. sieve. Its uniformity coefficient is 8 and coefficient of curvature is 2. As per I.S. classification, this soil is classified as
- SP
 - GP
 - SW
 - GW
83. Match List I (Roller type) with List II (soil type) and select the correct answer :
- | List - I | List - II |
|--------------------------|---------------------------------------|
| A. Pneumatic roller | 1. Cohesive and granular soils |
| B. Smooth wheeled Roller | 2. Plastic soils of moderate cohesion |
| C. Sheep foot roller | 3. Cohesionless soils |
| D. Vibratory roller | 4. Silty soils of low plasticity |
- Code :
- | | A | B | C | D |
|----|---|---|---|---|
| a. | 4 | 2 | 1 | 3 |
| b. | 3 | 1 | 2 | 4 |
| c. | 4 | 1 | 2 | 3 |
| d. | 3 | 2 | 1 | 4 |

84. Consider the following statements :

- I. Effective stress in a sand layer below a lake with standing water does not alter as the water level fluctuates.
- II. Regarding water table below the ground surface, any rise in the water table causes equal changes in both pore pressure and effective stress.
- III. Capillary saturation will cause the effective stress to increase.

Which of the above statements are correct?

- a. I, II and III
- b. I and II only
- c. II and III only
- d. I and III only

85. A Soil yielded a maximum dry unit weight of 18 kN/m^3 at a moisture content of 16% during a Standard Proctor Test. What is the degree of saturation of the soil if its specific gravity is 2.65?

- a. 98.42%
- b. 95.50%
- c. 84.32%
- d. 75.71%

86. As per Terzaghi's equation, the bearing capacity of strip footing resting on cohesive soil ($c = 10 \text{ kN/m}^2$) for unit depth and unit width (assume N_c as 5.7) is

- a. 47 kN/m^2
- b. 57 kN/m^2
- c. 67 kN/m^2
- d. 77 kN/m^2

87. Consider the following statements:

1. Standard penetration test (SPT) is conducted by pushing a cone into soil at the rate of 2 cm/s.
2. Standard penetration test results are unreliable in deposits containing large number of boulders.
3. Dutch cone is a static penetrometer.

Which of the above statements is/are correct?

- a. 1 only
- b. 1 and 2
- c. 2 and 3
- d. 3 only

88. A drop hammer is used to drive a wooden pile. The hammer weight is 25 kN and its free falling height is 0.8 m. the penetration in the last blow is 12 mm. what is the nearest approximation to the load carrying capacity of the pile according to the Engineering News Formula?

- a. 125 kN
- b. 110 kN
- c. 3000 kN
- d. 90 kN

89. Consider the following statements :

- I. The soil obtained from wash boring is a representative sample.
- II. Recovery ratio will be high during drilling in sound rock.
- III. Hollow stem augers are sometimes used to drill holes in silty sand.

Which of the above statements is/are correct?

- a. I only
- b. I and II
- c. II and III
- d. III only

90. What is the intensity of active earth pressure at a depth of 10.0 m in dry sand with an angle of shearing resistance of 30° and unit weight of 18 kN/m^3 ?

- a. 50 kN/m^2
- b. 60 kN/m^2
- c. 70 kN/m^2
- d. 80 kN/m^2

91. The traffic design in India is based on

- a. 10th hourly volume
- b. 20th hourly volume
- c. 30th hourly volume
- d. 45th hourly volume

92. If space mean speed of a vehicle is 50 kmph, then the time mean speed will be

- a. Less than 50kmph
- b. Greater than 50kmph
- c. Equal to 50kmph
- d. Depends on the vehicle

93. The spacing between longitudinal joints may be.
- 3.0 m
 - 3.2 m
 - 3.5 m
 - 4.0 m
94. The side slope of embankments for a railway track is generally taken as
- 1:1
 - 1.5:1
 - 1:2
 - 2:1
95. A low wall built out into the sea more or less perpendicular to the coast line, to resist the travel of sand and shingle along a beach, is called
- Break Water
 - Groins
 - Break Wall
 - Shore Wall
96. A 100 year peak discharge means
- A maximum discharge which occurs in 101 years
 - A maximum discharge of 100 year recurrence interval
 - A average of peak discharge of preceding 100 years
 - The peak discharge during preceding year will occur 100 years after
97. Convective storm rainfall is caused by
- Thermal or orographic convection
 - Frontal disturbances
 - Sudden barometric drop
 - Isolated barometric fall in area
98. A rock formation that contains water but is not capable of transmitting it in significant amounts, is known as
- Isotrophic
 - Intrusive
 - Aquitard
 - Aquiclude
99. The dimensions of storage coefficient
- LT^2
 - $L^{-1}T$
 - LT
 - Dimensionless
100. According to Kennedy's theory, the silt transporting power of a canal is proportional to
- $V^{3.5}$
 - V^3
 - $V^{2.5}$
 - V^2
101. The uplift pressure on the roof of an inverted siphon is maximum when
- The canal is running with FSL
 - The drain is running with HFL
 - The canal is running dry
 - The drain is running dry
102. If the net positive suction head (NPSH) requirement for a pump is not satisfied, then
- No flow will take place
 - Efficiency will be low
 - Cavitation will be formed
 - Excessive power will be consumed
103. The reading of a pressure gauge fitted on a vessel is 25 bar. The atmospheric pressure is 1.03 bar and the value of g is 9.81 m/s^2 . The absolute pressure in the vessel is
- 23.97 bar
 - 25 bar
 - 26.03 bar
 - 34.84 bar
104. Sheet erosion is dominant in
- Regions of moderate rainfall
 - Regions of high rainfall
 - Arid regions
 - Semi-arid regions

105. The optimum depth of kor watering for a rice crop, is
- 23.0 cm
 - 19.0 cm
 - 17.5 cm
 - 13.5 cm
106. The usual detention time(hours) allowed in carifloculation is
- 2
 - 3
 - 4
 - 5
107. The cleaning of slow sand filter is done by
- reversing the direction flow of water
 - passing air through the filter
 - passing a solution of alum and lime through the filter
 - scraping off the top layers of sand and admitting water
108. BOD removal in extended aeration process is
- 85%
 - 40%
 - 95%
 - 60%
109. Self-cleansing velocity is
- velocity at dry weather flow
 - velocity at which no accumulation remains in the drains
 - velocity of water at flushing
 - velocity of water in a pressure filter
110. Which of the following gases has the highest affinity for blood haemoglobin?
- Carbon dioxide
 - Oxygen
 - Carbon monoxide
 - Nitrogen
111. A well conditioned triangle has no angle less than
- 15°
 - 30°
 - 60°
 - 90°
112. The line of sight is kept as high above ground surface as possible to minimise the error in the observed angles due to
- shimmering
 - horizontal refraction
 - vertical refraction
 - both shimmering and horizontal refraction
113. For locating a distant object visible from two transit stations, the method usually preferred to, is
- angles and distances from transit stations
 - angles from two transit stations
 - distances from two transit stations
 - angle from one transit station and distance from the other
114. While measuring the distance between two points along upgrade with the help of a 20 m chain, the forward end of the chain is shifted forward through a distance
- $20(\sin \theta - 1)$
 - $20(\cos \theta - 1)$
 - $20(\tan \theta - 1)$
 - $20(\sec \theta - 1)$
115. The operation of revolving a plane table about its vertical axis so that all lines on the sheet become parallel to corresponding lines on the ground, is known as
- levelling
 - centering
 - orientation
 - setting