

067/2022

Question Booklet
Alpha Code

A

Question Booklet
Serial Number

Total No. of Questions : 100

Maximum : 100 Marks

Time : 1 Hour 30 Minutes

INSTRUCTIONS TO CANDIDATES

1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. Blank sheets of paper is attached to the question booklet. These may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

067/2022-A





CIVILIANZ

CENTRE FOR CIVIL ENGG. COMPETITIVE EXAMS
SINCE 2012

1. Determine the deflection at free end of the cantilever of span 4 m in which a point load of 10 kN is acting at a distance of 3 m from fixed end. Take flexural rigidity as $50 \times 10^2 \text{ kN m}^2$.
(A) 37.5 mm (B) 26.6 mm (C) 27.0 mm (D) 32 mm
2. A three span continuous beam with one end fixed and other supports on rollers, the degree of Static indeterminacy is
(A) 6 (B) 3 (C) 2 (D) 0
3. The sum of distribution factor in moment distribution method is
(A) 1 (B) 1/2 (C) -1 (D) 3/4
4. A simply supported T beam section with flange $10 \times 1 \text{ cm}$ and web depth from flange 10 cm with 1 cm thickness carrying a uniformly distributed load of 10 kN/m over a span of 4 m. The maximum bending stress in the section is at
(A) 3.25 cm from N.A (B) 7.75 cm from N.A
(C) At the intersection of flange & web (D) At N.A
5. A pin jointed plane truss considered as stable and determinate, if
(A) $m + r < 2j$ (B) $m + r > 2$
(C) $m + r = 2j$ (D) None of the above
6. A continuous beam ABC with support A hinged, B & C are on rollers have span AB, BC are 6 m & 4 m respectively. There is an internal hinge at the middle of span BC at D. Find the value of ordinate at D corresponding to the I.L.D for the shear at A.
(A) 1 (B) 1/3 (C) -1 (D) -1/3
7. A three hinged parabolic arch has a span of L, central rise h and loaded with a uniformly distributed load of w/unit length on the span. The value of bending moment in the arch on quarter span is
(A) $3wL^2/8$ (B) $WL/8$ (C) $wl^2/16$ (D) Zero
8. A simply supported beam AB of span 8 m supports a point load of 20 kN at 2 m from support A and a uniformly distributed load of 15 kN/m for a length of 4 m from support B. The location of maximum bending moment in the beam is at
(A) 4 m from left support (B) 5.5 m from left support
(C) 4 m from right support (D) 3.33 m from right support
9. Kanis method is a
(A) Displacement method (B) Force method
(C) Virtual work method (D) None of these
10. In stress strain diagram proof stress is measured corresponding to a strain of
(A) 0.2% (B) 0.02% (C) 0.002% (D) 2.0%

11. A concrete block 2 m high, 2 m wide and 1 m thick is used for holding mud at one side of the block as shown in the Fig. 1. The density of concrete is 2500 kg/m^3 while the density of the mud is 1600 kg/m^3 . Take specific weight of water as 10 kN/m^3 . If the coefficient of friction between the ground and the concrete block is 0.16, then the mud height(h) at which the block will start to slide is

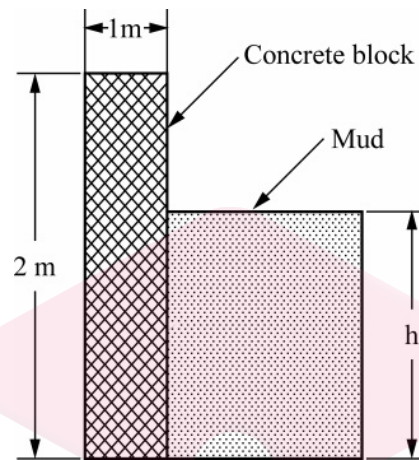


Fig. 1

- (A) 1 m (B) 1.5 m (C) 2 m (D) 1.1 m

12. For the cylindrical log of wood freely floating in water as shown in Fig. 2, go through the following statements

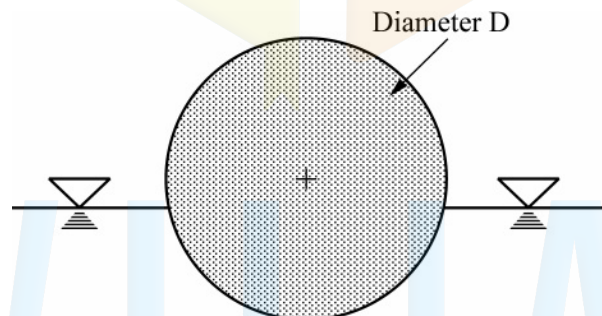


Fig. 2

- I. As the depth of submergence increases the metacentric height decreases
 II. As the depth of submergence increases the buoyancy height from centre decreases
 III. Irrespective of the depth of submergence the body is in stable equilibrium
 IV. Irrespective of the depth of submergence body is always in neutral equilibrium
 Choose the correct statement combination out of the above :

- (A) I & III (B) II & III (C) IV only (D) I & IV

13. The velocity in m/s at a point in a two dimensional flow is given as $\vec{V} = 3\hat{i} + 4\hat{j}$. The equation for stream line passing through the point is

- (A) $3xdx - 4ydy = 0$ (B) $4dx - 3dy = 0$
 (C) $4dx + 3dy = 0$ (D) $4ydx + 3xdy = 0$

14. On an immersed body in a flowing fluid, the drag force is due to
 (A) force of buoyancy
 (B) recirculation regions
 (C) the dynamic fluid force component in the direction of flow
 (D) stagnation pressure points
15. The range of Froude number of a weak hydraulic jump is
 (A) 1.0 to 1.7
 (B) 1.7 to 2.5
 (C) 2.5 to 4.5
 (D) 4.5 to 9.0
16. A rainfall of intensity 30 mm/hour is occurring over a catchment area of 2 km². The duration of the rainfall is 3 hours. It was calculated that the total surface runoff reaching the river is 60,000 m³. The total rainfall and total abstractions in this rainfall are
 (A) 6 cm, 6 cm
 (B) 9 cm, 6 cm
 (C) 6 cm, 9 cm
 (D) 9 cm, 9 cm
17. The total rainfall for a 3 hour duration storm is 9 cm. The loss rate over the catchment is 2 cm/hour. The peak of the flood hydrograph is 330 m³/s and the base flow calculated was 30 m³/s. The peak of the 3- hour unit hydrograph is
 (A) 100 m³/s
 (B) 33.333 m³/s
 (C) 50 m³/s
 (D) 110 m³/s
18. The available moisture content of soil with depth is 20 cm/m. The root zone depth of the crop being cultivated is 1 m. The field is to be irrigated when 50% of the available moisture content in the root zone is depleted. The daily consumptive use of water for the crop is 10 mm. The water application efficiency over the field is 50%. The frequency of irrigation and depth of water for the cultivation are
 (A) 5 days, 10 cm
 (B) 10 days, 10 cm
 (C) 10 days, 20 cm
 (D) 8 days, 20 cm
19. The current metre rating curve is given in Fig. 3. The maximum number of revolutions permitted is 20,000 per second. The same current metre is used for the measurement of a stream velocity and it was observed that the total number of revolutions in one minute was 6000. The velocity of the water in the stream is

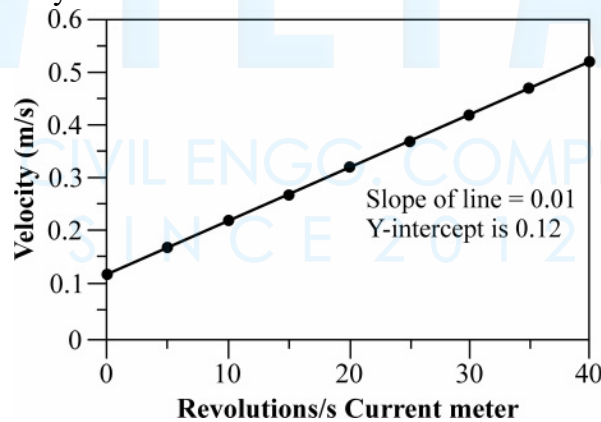


Fig. 3

- (A) 5.2 m/s
 (B) 0.80 m/s
 (C) 1.00 m/s
 (D) 1.12 m/s

20. Through Recuperation test it was obtained that the specific yield of soil is 0.01 hr^{-1} . The sides of the open well is fully covered with concrete and the inner diameter of the well is 2 m. If the well works under a safe depression head of 1.4 m, the ratio between safe yield to specific capacity
- (A) 44 Litres/hour (B) 1.4 m
(C) 44 Litres/hour/m (D) $44 \text{ m}^3/\text{hour/m}$
21. A theodolite, the telescope of which can be revolved in a vertical plane about its horizontal axis, is known as a
- (A) Transit theodolite (B) Non-transit theodolite
(C) Vernier type theodolite (D) Glass arc type theodolite
22. A 20 m tape is found to be 0.1 m too short throughout measurement. If the distance measured is recorded as 200 m, what will be the actual distance measured ?
- (A) 202 m (B) 198 m (C) 199 m (D) 201 m
23. A total station is a combination of the following set of instruments :
- (A) theodolite and compass
(B) electronic theodolite and electronic distance measurement
(C) theodolite and level
(D) global positioning system and electronic distance measurement
24. A staff reading taken on a point of known reduced level is termed as
- (A) intermediate sight (B) fore sight
(C) height of instrument (D) back sight
25. The standard time meridian in India is $82^\circ 30' \text{ E}$. If the standard time at any instant is 15 hr 10 min, the local mean time for a place with longitude 20° E will be equal to
- (A) 4 am (B) 11 pm (C) 4 pm (D) 11 am

26. Match the Lists :

List – I (Item for Estimation)	List – II (Measurement unit)
(I) Door shutters wood work	(P) cubic metre
(J) Rebar bending	(Q) quintal
(K) Rock excavation	(R) square metre
(L) Iron bar threading	(S) centimetre

- I J K L
(A) P S Q R
(B) R Q P S
(C) S R Q P
(D) Q S P R

27. A deposit taken as a guaranty from the bidder while submitting a tender is known as
- (A) bank guarantee deposit (B) security deposit
(C) earnest money deposit (D) caution deposit

28. Original cost of property after allowing for depreciation is known as
 (A) book value (B) salvage value
 (C) obsolescence value (D) rateable value
29. The weight of steel reinforcement of one cubic metre is equal to
 (A) 7850 kN (B) 7850 kg (C) 785 tonne (D) 7850 N
30. A fund that is gradually accumulated by periodic or annual deposit for the replacement of building or structure at the end of its useful life is termed as
 (A) rising fund (B) scrap fund
 (C) local fund (D) sinking fund
31. Deciduous trees fall under the category of
 (A) Exogenous trees (B) Endogenous trees
 (C) Conifers trees (D) Evergreen trees
32. Based on modulus of elasticity, timber used for construction purposes are classified as Group B when
 (A) Modulus of elasticity in bending above 12.5 kN/mm^2
 (B) Modulus of elasticity in bending above 5.6 kN/mm^2 and below 9.8 kN/mm^2
 (C) Modulus of elasticity in bending above 9.8 kN/mm^2 and below 12.5 kN/mm^2
 (D) Modulus of elasticity in bending below 5.6 kN/mm^2
33. As per relevant Bureau of Indian Standard, the soundness of 43 grade Ordinary Portland Cement tested according to Le Chatelier apparatus shall not be more than
 (A) 2 mm (B) 10 mm (C) 1% (D) 0.8%
34. Match the following :

List – I	List – II
(K) Bitumen emulsion	(P) fluxing asphaltic bitumen in presence of some suitable liquid distillates of coal tar or petroleum
(L) Blown bitumen	(Q) obtained by passing air under pressure at a higher temperature
(M) Cut-back bitumen	(R) distilled to a definite viscosity or penetration without further treatment.
(N) Straight run bitumen	(S) liquid product containing bitumen to a great extent in an aqueous medium

- | | K | L | M | N |
|-----|---|---|---|---|
| (A) | S | Q | P | R |
| (B) | Q | P | R | S |
| (C) | P | R | Q | S |
| (D) | R | Q | S | P |

35. A plastic material obtained by oxidizing linseed oil into a rubber like substance mixed with ground cork, wood flour and pigments is known as
 (A) Thermocol (B) Fibre glass
 (C) Glass wool (D) Linoleum

36. A finely ground powder containing an admixture, forms a gas on being mixed with water and expands the mixture to 3 or 4 times, its volume is known as
 (A) Stucco (B) Gypsum
 (C) Pyrocell (D) Keene's cement
37. Identify the processes used in conditional assessment of existing structures
 (i) Visual inspection with or without NDT
 (ii) Filed and Laboratory testing
 (iii) Data Analysis
 (iv) Sealing existing cracks
 (A) (i) and (iv) only (B) (ii) and (iii) only
 (C) (i) and (ii) only (D) (i), (ii) and (iii)
38. Plastic settlement cracks occur in concrete due to
 (i) excess bleeding
 (ii) rapid cooling
 (iii) rapid early drying conditions
 (iv) lack of cover
 (A) (i) and (iii) only (B) (ii) and (iii) only
 (C) (i) and (iv) only (D) (i), (ii), (iii) and (iv)
39. A special formwork which moves continuously without support from ground used in tall building construction is known as
 (A) Myvan form (B) Tunnel form
 (C) Slip form (D) Shell form
40. A wall that is constructed to carry the load of the structure above it is known as
 (A) parapet wall (B) load bearing wall
 (C) cavity wall (D) in-fill walls
41. Moment due to triangular load of masonry wall above the lintel is taken as
 (A) $\frac{WL}{6}$ (B) $\frac{WL}{4}$ (C) $\frac{WL}{8}$ (D) $\frac{WL}{10}$
42. As per IS 456 : 2000, the pH value of water used in building construction shall be
 (A) greater than 7 (B) equal to 7
 (C) less than 10 (D) less than 6
43. The purpose of underpinning is to :
 (i) strengthen an existing foundation
 (ii) to deepen an existing foundation
 (iii) to construct a new foundation
 (iv) to construct a basement in an existing building
 (A) (i), (ii) and (iii) only (B) (i) and (iii) only
 (C) (i), (ii) and (iv) only (D) (i), (ii), (iii) and (iv)
44. The process of scaling away patches of plaster of previous coat, due to lack of adhesion with the undercoat is called
 (A) grinning (B) flaking (C) blistering (D) crazing

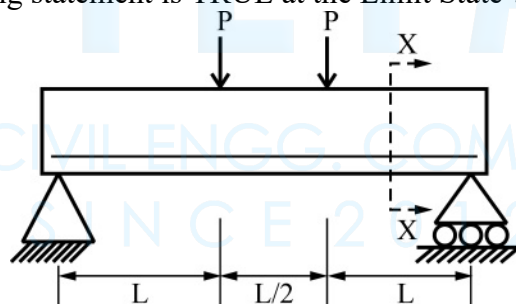
53. The maximum permissible limit for fluoride in drinking water is
 (A) 0.1 mg/litre (B) 1.5 mg/litre
 (C) 5 mg/litre (D) 10 mg/litre
54. What is the working pH range for methyl orange ?
 (A) 6.4 – 8.0 (B) 1.2 – 2.8 (C) 3.1 – 4.4 (D) 6.0 – 7.8
55. Which of the following are least soluble forms of Ca and Mg at Normal water temperature ?
 (A) CaCl_2 and MgCO_3 (B) $\text{Ca}(\text{HCO}_3)_2$ and MgCl_2
 (C) $\text{Ca}(\text{OH})_2$ and $\text{Mg}(\text{HCO}_3)_2$ (D) CaCO_3 and $\text{Mg}(\text{OH})_2$
56. A water sample has a pH of 9.25. The concentration of hydroxyl ions in the water sample is
 (A) 10-9.25 moles/L (B) 10-4.75 moles/L
 (C) 0.302 mg/L (D) 3.020 mg/L
57. The process in which the chlorination is done beyond the break point is known as
 (A) Pre-chlorination (B) Post-chlorination
 (C) Super chlorination (D) Break point chlorination

58. Match the given water properties in Group-I to the given titrants shown in Group-II

Group-I		Group-II	
P.	Alkalinity	1.	N/35.5 AgNO_3
Q.	Hardness	2.	N/40 $\text{Na}_2\text{S}_2\text{O}_3$
R.	Chlorine	3.	N/50 H_2SO_4
S.	Dissolved oxygen	4.	N/50 EDTA

- (A) P-1, Q-2, R-3, S-4
 (B) P-2, Q-1, R-4, S-3
 (C) P-3, Q-4, R-1, S-2
 (D) P-4, Q-3, R-2, S-1
59. Which of the following cations impart(s) pseudo-hardness to water ?
 (A) Calcium only (B) Magnesium only
 (C) Calcium and magnesium (D) Sodium
60. A single rapid test to determine the pollution status of river water is
 (A) Biochemical oxygen demand (B) Chemical oxygen demand
 (C) Total organic solids (D) Dissolved oxygen
61. As per IS 1893 : 2002 “A soft storey is one in which the lateral stiffness is less than what % of that in the storey above or less than 80 percent of the average lateral stiffness of the three storeys above.
 (A) 70 percent (B) 80 percent
 (C) 75 percent (D) 90 percent
62. As per IS 13920 : 2016, what is the minimum grade of structural concrete that should be used in buildings ?
 (A) 30 (B) 25 (C) 15 (D) 20

63. Modulus of rigidity of structural steel irrespective of its grade may be taken as:
 (A) 7.69×10^5 MPa (B) 0.769×10^5 N/m²
 (C) 0.769×10^9 kN/m² (D) 7.69×10^9 kN/m²
64. Minimum grade of concrete that has to be used for post tensioned concrete structures
 (A) M20 (B) M30 (C) M25 (D) M40
65. Which of the following is not a time dependent loss in pre-stressed concrete system ?
 (A) Creep (B) Relaxation
 (C) Shrinkage (D) Elastic shortening
66. The external wind pressure acting on a roof depends on
 (A) Permeability of Roof (B) Slope of roof
 (C) Both (A) & (B) (D) None of the above
67. Angle of inclination to axis of member for lacing bars shall not be less than
 (A) 30° (B) 40° (C) 60° (D) 70°
68. Lacing and Battens are designed to take care of
 (A) Bending moment (B) Compression
 (C) Bearing (D) Shear force
69. Maximum effective slenderness ratio for compression flanges of beam subjected to lateral torsional buckling is
 (A) 180 (B) 250 (C) 300 (D) 350
70. In beams designed for seismic detailing criteria, the tension steel ratio on any face shall not be less than
 (A) $0.24 \sqrt{\frac{f_{ck}}{f_y}}$ (B) $0.36 \sqrt{\frac{f_{ck}}{f_y}}$
 (C) $0.66 \sqrt{\frac{f_{ck}}{f_y}}$ (D) None of these
71. Consider the singly reinforced beam shown in the figure below : At cross-section XX, which of the following statement is TRUE at the Limit State ?



- (A) The variation of stress is linear and that of strain is non-linear
 (B) The variation of strain is linear and that of stress is non-linear
 (C) The variation of both stress and strain is linear
 (D) The variation of both stress and strain is non-linear

72. The development length of deformed reinforcement bar can be expressed as $(1/k) (\phi \sigma_s / \tau_{bd})$. From IS 456 : 2000, the value of k can be calculated as
 (A) 6.4 (B) 4.8 (C) 5.2 (D) 5.6
73. Consider the following statements :
 1. There will be no defects in select grade timbers.
 2. The codal values for strength of grade-II timber without defects may be reduced by 37.5%.
 3. For timber used as columns, the permissible stress in ungraded timbers is adopted with a multiplying factor of 0.50.
 4. In case of wind force and earthquakes, a modification factor of 1.33 is adopted.
 Which of the above statements are correct ?
 (A) 1 and 3 only (B) 1 and 4 only
 (C) 2 and 4 only (D) 2 and 3 only
74. When a spirally reinforced short column is loaded axially, the concrete inside the core is subjected to
 (A) Bending and compression (B) Biaxial compression
 (C) Triaxial compression (D) Uniaxial compression
75. The spacing of bars in a flat slab, shall not exceed how many times, the slab thickness, except where a slab is cellular or ribbed construction
 (A) 2 (B) 1.5 (C) 0.5 (D) 3
76. The unsupported length between end restraints shall not exceed how many times the least lateral dimension of a column ?
 (A) 10 times (B) 20 times (C) 40 times (D) 60 times
77. As per IS 875 (Part-3) : 2015, value of internal pressure co-efficient for Buildings with medium openings between about 5 to 20 percent of wall area is
 (A) ± 0.2 (B) ± 0.3 (C) ± 0.5 (D) ± 0.7
78. Two bolted plates under tension with alternative arrangement of bolt holes are shown in figure 1 and 2. The hole diameter, pitch, and gauge length are d, p and g respectively.

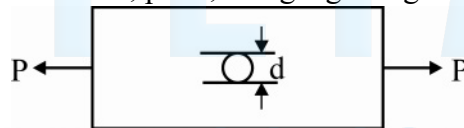


Figure 1

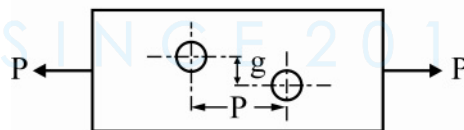


Figure 2

Which one of the following conditions must be ensured to have higher net tensile capacity of configuration shown in figure 2 than that shown in figure 1 ?

- (A) $p^2 > 2gd$ (B) $p^2 < \sqrt{4gd}$ (C) $p^2 > 4gd$ (D) $p^2 < 4gd$

79. If a column of 5 m is effectively held in position and restrained against rotation at one end and, at the other restrained against rotation but not held in position, recommended value of effective length to considered in design will be:
 (A) 6 m (B) 7.5 m (C) 5 m (D) 3.25 m
80. Which of the following equation is correct for bolt subjected to combined shear and tension ?
 (A) $(V_{sb}/V_{db})^2 + (T_{sb}/T_{db})^2 \leq 1$ (B) $(V_{sb}/V_{db})^2 + (T_{sb}/T_{db})^2 \geq 1$
 (C) $(V_{sb}/V_{db}) + (T_{sb}/T_{db}) \leq 1$ (D) $(V_{sb}/V_{db}) + (T_{sb}/T_{db}) \geq 1$
81. Typical values of specific gravity of solid particles of silty sands are about
 (A) < 2.0 (B) 2.0 to 2.18
 (C) 2.2 to 2.62 (D) 2.66 to 2.7
82. The soil has $D_{60} = 0.08$ and $D_{10} = 0.004$. Then the uniformity co-efficient of soil is
 (A) 20 (B) 25 (C) 42 (D) 67
83. Consistency index shows the nearness of the water content of the soil to its
 (A) Natural water content (B) Liquid limit
 (C) Plastic limit (D) Shrinkage limit
84. Co-efficient of permeability of an unsaturated soil can be determined by using
 (A) Variable head permeability test (B) Pumping in tests
 (C) Computation from the particle size (D) Capillarity permeability test
85. The critical gradient at which the specific gravity of solids as 2.67, and the void ratio of 0.67 is
 (A) 1 (B) 1.5 (C) 2 (D) 2.5
86. Primary consolidation of soils occurs due to
 (A) Expulsion of air voids
 (B) Expulsion of water from the voids
 (C) Compression of solid particles
 (D) Re-adjustment of soil particles
87. Type of failure occur in loose sands during shearing stage of shear strength test is
 (A) Plastic (B) Brittle (C) Compression (D) Shear
88. Select the incorrect statement.
 (A) Bearing capacity of a soil depends upon the amount and direction of load.
 (B) Bearing capacity of a soil depends on the type of soil.
 (C) Bearing capacity of a soil depends upon shape and size of footing.
 (D) Bearing capacity of a soil is independent of rate of loading.
89. The minimum spacing between compaction piles in terms of their diameter d is
 (A) 1.5 d (B) 2 d (C) 2.5 d (D) 1 d
90. Rise of water table in cohesionless soils upto ground surface reduces the net ultimate bearing capacity approximately by
 (A) 25% (B) 50% (C) 75% (D) 90%

91. The distance between two consecutive vehicles is called
 (A) Time headway (B) Traffic flow
 (C) Jam density (D) Space headway
92. The number of vehicles per unit length at any instant of time is called as
 (A) Density (B) Capacity
 (C) Volume (D) Saturation flow
93. The minimum space headway in a traffic stream is equal to
 (A) $S_g + L$ (B) $0.278 V + L$
 (C) $0.7 L + V$ (D) $0.2 V + S$
94. If the spot speeds are 50, 40, 60, 54 and 45 kmph then the time mean speed is
 (A) 49.8 kmph (B) 46.8 kmph
 (C) 48.9 kmph (D) 48.6 kmph
95. The speed distribution of vehicles at a point on the roadway is
 (A) Spot speed (B) Journey speed
 (C) Space mean speed (D) Time mean speed
96. The vertical alignment of a highway includes
 (A) Sight distance and traffic intersection
 (B) Highway lighting
 (C) Design of valley curves and gradients
 (D) Widening of pavement
97. The ruling gradient required for plain or rolling terrain is
 (A) 1 in 15 (B) 1 in 20 (C) 1 in 30 (D) 1 in 40
98. Bleeding in the bituminous pavement surface causes
 (A) Loss of skid resistance (B) Permeability of subgrade
 (C) Pothole in base layer (D) Water pumping
99. The surface depression along the wheel path is called as
 (A) Longitudinal cracking (B) Surface rutting
 (C) Surface cracking (D) Longitudinal gradient
100. In the rigid pavement construction, the dowel bars provided to
 (A) distribute loads between slabs in horizontal direction
 (B) keep the slabs in longitudinal position
 (C) strengthen the slabs from longitudinal movement
 (D) to avoid the vertical movement of slabs

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