Sl. No. :

200569

CLEG

Register
Number

2013
CIVIL ENGINEERING
(Degree Standard)

Time Allowed : 3 Hours | [Maximum Marks : 300

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Booklet has a cover (this page) which should not be opened till the invigilator gives signal to open it at the commencement of the examination. As soon as the signal is received you should tear the right side of the booklet cover carefully to open the booklet. Then proceed to answer the questions.

2. This Question Booklet contains **200** questions.

3. Answer all questions.

4. All questions carry equal marks.

5. You must write your Register Number in the space provided on the top right side of this page. Do not write anything else on the Question Booklet.

6. An Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Register No., Question Booklet Sl. No. and other particulars <u>with Blue or Black ink Ball point pen</u> on side 2 of the Answer Sheet provided, failing which your Answer Sheet will not be evaluated.

7. You will also encode your Register Number, Subject Code, Question Booklet Sl. No. etc. <u>with Blue or Black ink Ball point pen</u> in the space provided on the side 2 of the Answer Sheet. If you do not encode properly or fail to encode the above information, your Answer Sheet will not be evaluated.

8. Each question comprises *four* responses (A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your Answer Sheet. In case, you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.

9. In the Answer Sheet there are **four** brackets [A] [B] [C] and [D] against each question. To answer the questions you are to mark with Ball point pen ONLY ONE bracket of your choice for each question. Select one response for each question in the Question Booklet and mark in the Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong e.g. If for any item, [B] is the correct answer, you have to mark as follows :

[A] ■ [C] [D]

10. You should not remove or tear off any sheet from this Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. <u>After the examination is concluded, you must hand over your Answer Sheet to the Invigilator. You are allowed to take the Question Booklet with you only after the Examination is over.</u>

11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

12. Do not tick-mark or mark the answers in the Question booklet.

13. The last sheet of the Question Booklet can be used for Rough Work.

1. The compressive strength of first class bricks should not be less than
   (A) 7 N/mm²   (B) 10.5 N/mm²(C) 12 N/mm²   (D) 15 N/mm²

2. The process of burning the lime stone to redness in contact with air is termed
   (A) Carbonation   (B) Oxidation   (C) Hydration   (D) Calcination

3. Stucco plastering is used in
   (A) excellent finish   (B) X-ray rooms
   (C) sound proofing   (D) all of the above

4. Refractory bricks resist
   (A) Chemical action   (B) Shocks and vibrations
   (C) Dampness   (D) High temperature

5. Due to attack of dry rob, the timber
   (A) cracks   (B) twist   (C) shrinks   (D) reduces to powder

6. A well seasoned timber may contain moisture upto
   (A) 1%   (B) 2%   (C) 5%   (D) 12%

7. The central part of a tree is called
   (A) Heart wood   (B) Pith   (C) Sap wood   (D) Cambium layer

8. Chemically, marble is known as
   (A) Metamorphic rock   (B) Argillaceous rock
   (C) Calcareous rock   (D) Siliceous rock

9. Lime mortar is generally made with
   (A) quick lime   (B) fat lime   (C) hydraulic lime   (D) white lime

10. A good building stone is one which does not absorb more than ____ of its weight of water after one day's immersion
    (A) 5%   (B) 10%   (C) 15%   (D) 20%

11. A stretcher bond is usually used for
    (A) Half brick wall   (B) One and half brick wall
    (C) Two brick wall   (D) One brick wall

12. A series of steps without any platform or landing is called
    (A) Soffit   (B) Flight   (C) Pitch   (D) Nosing

13. The construction of a temporary structure required to support an unsafe structure is called
    (A) under pinning   (B) shoring   (C) scaffolding   (D) shuttering

14. A levelled horizontal mortar joint in a masonry wall is called
    (A) wall joint   (B) bed joint   (C) cross joint   (D) bonded joint

15. A wall constructed to withstand the pressure of an earth filling is
    (A) Parapet wall   (B) Sloping wall
    (C) Buttress   (D) Retaining wall

16. For damp proof course at plinth level, the commonly adopted material is
    (A) Membrane sheeting   (B) Mortar sheeting
    (C) Bitumen sheeting   (D) Paint coating

17. When a brick is cut into two halves longitudinally, one part is called
    (A) King closer   (B) Queen closer
    (C) Cornice brick   (D) Bat

18. The minimum number of days required to strip-off the side form work of RC beams after casting of the concrete is about
    (A) 1   (B) 5   (C) 10   (D) 14

19. The type of stone masonry commonly adopted in the construction of residential building is
    (A) Uncoursed rubble masonry   (B) Coursed rubble masonry
    (C) Random rubble masonry   (D) Dry rubble masonry

20. A type of flooring made with special aggregate of marble chips mixed with white and coloured cement, is called
    (A) Mosaic flooring   (B) Terrazzo flooring
    (C) Asphalt flooring   (D) None of the above

21. The window used with the object of providing light and air to the enclosed space below the pitched roof, is called
    (A) Dormer window   (B) Corner window
    (C) Bay window   (D) Clerestory window

22. A bat is the portion of a
    (A) wall between facing and backing
    (B) wall not exposed to weather
    (C) brick cut across the width
    (D) brick cut in such a manner that its one long face remains uncut

23. In case of buildings without basement, the best position for D.P.C. lies at
    (A) Plinth level   (B) Ground level
    (C) 15 cm above the plinth level (D) 15 cm above the ground level

24. A type of bond in a brick masonry in which each course consist of alternate leaders and stretchers, is called
    (A) English bond   (B) Flemish bond
    (C) Stretching bond   (D) Heading bond

25. Which one of the following may be classified as personal error in levelling ?
    (A) Error in sighting   (B) Wind vibrations
    (C) Atmospheric refractions   (D) Error due to defective joint

26. The best method of interpellation of contours in direct method of contouring is by
    (A) Graphical method
    (B) Auxiliary contouring
    (C) Computations (Arithmetical calculation)
    (D) Estimation

27. The capability of a telescope of producing a sharp image is called as
    (A) Magnification (B) Sensitivity (C) Definition (D) Brightness

28. The process of moving in or out the eye-piece untill the cross-hairs are clearly visible is called
    (A) Removing the parallax (B) Focussing the objective
    (C) Adjusting the cross-hairs (D) Focussing the eye-piece

29. The method of surveying used for determining the relative height of points on the surface of the earth is called
    (A) levelling (B) traversing
    (C) triangulation (D) plane table surveying

30. A deflection angle in a traverse is equal to the
    (A) difference between the included angle and 180°
    (B) difference between 360° and the included angle
    (C) sum of the included angle and 180°
    (D) none of the above

31. An imaginary line joining points of equal elevation is called
    (A) a horizontal line (B) a level line
    (C) an isogonic line (D) a contour

32. Cross-sectioning and 'longitudinal sectioning' is usually involved in
    (A) check levelling (B) differential levelling
    (C) simple levelling (D) profile levelling

33. The curvature of earth is taken into consideration, if the limit of survey is
    (A) 1 to 10 km² (B) 25 to 55 km²
    (C) 50 to 100 km² (D) More than 250 km²

34. Contour lines cross ridge on valley lines at
    (A) 30° (B) 45° (C) 60° (D) 90°

35. The value of dismantled material are called as
    (A) Salvage value (B) Scrap value (C) Market value (D) All of the above

36. All works are assessed as per schedule of rates, except the one
    (A) Estimates of cost (B) Agreements
    (C) Design (D) Contract

CLEG   4   ☐

37. The book values goes on
    (A) Increasing every year
    (B) Reducing every year
    (C) Increasing once in 5 year
    (D) Decreasing once in 5 year

38. Capitalized value is
    (A) Net annual income × year's purchase
    (B) Monthly income × year's purchase
    (C) 5% interest per annum
    (D) 5% interest per month

39. For mortgage purposes the mortgage value of a property is taken as _____ of the valuation or capitalized value.
    (A) $\frac{1}{3}$ to $\frac{2}{3}$
    (B) $\frac{1}{2}$ to $\frac{2}{3}$
    (C) $\frac{1}{2}$ to $\frac{1}{4}$
    (D) $\frac{1}{3}$ to $\frac{3}{4}$

40. The capital cost for rent fixation may be
    (A) cost of construction
    (B) cost of sanitary and water supply works
    (C) cost of electric installations
    (D) all of the above

41. The Gross rent is
    (A) Net rent + outgoing
    (B) Net rent + 6% of outgoing
    (C) Net rent + 8% of outgoing
    (D) None of the above

42. Along with the preliminary estimate, about _____ is added to it as contingencies charges.
    (A) 10%
    (B) 5%
    (C) 6%
    (D) 8%

43. Accurate estimate is prepared by
    (A) Preliminary estimate
    (B) Revised estimate
    (C) Detailed estimate
    (D) Plinth area estimate

44. Damp proof course is measured in
    (A) kg
    (B) sq. metres
    (C) centimetre
    (D) kilometre

45. A beam which is fixed at one end and free at the other end is called
    (A) Simply supported beam
    (B) Fixed beam
    (C) Overhanging beam
    (D) Cantilever beam

46. Simple bending equation is
    (A) $\frac{M}{I} = \frac{R}{E} = \frac{F}{Y}$
    (B) $\frac{M}{I} = \frac{E}{R} = \frac{F}{Y}$
    (C) $\frac{M}{I} = \frac{E}{R} = \frac{Y}{F}$
    (D) None of these

47. The maximum deflection of a simply supported beam of length L with a central load W is

(A) $\dfrac{WL^2}{48EI}$ (B) $\dfrac{W^2L}{24EI}$ (C) $\dfrac{WL^2}{8EI}$ (D) $\dfrac{WL^3}{48EI}$

48. The ratio of the effective length of a column and maximum radius of gyration of its cross-sectional area, is known as

(A) Buckling factor (B) Slenderness ratio
(C) Crippling factor (D) None of these

49. An arch with three hinges, is structure

(A) statically determinate (B) statically indeterminate
(C) geometrically unstable (D) none of these

50. A simply supported beam of span L, cross-section A carrying a point load W, concentrated at the centre of span L, will have maximum bending moment of

(A) WL (B) $\dfrac{WL}{4}$ (C) $\dfrac{WL}{2}$ (D) $\dfrac{WL}{8}$

51. If P is the internal pressure in a thin cylinder of diameter d and thickness t, the developed Hoop stress, is

(A) $\dfrac{Pd}{4t}$ (B) $\dfrac{Pd}{t}$ (C) $\dfrac{Pd}{2t}$ (D) $\dfrac{2Pd}{t}$

52. In a three hinged arch, the shear force is usually

(A) maximum at crown (B) maximum at springings
(C) maximum at quarter points (D) varies with slope

53. The effect of arching a beam, is

(A) to reduce the bending moment throughout
(B) to increase the bending moment throughout
(C) nothing on the bending throughout
(D) all the above

54. If the beam is supported so that there are only three unknown reactive elements at the supports. These can be determined by using the following fundamental equation of statics :

(A) $\Sigma H = 0$ (B) $\Sigma V = 0$
(C) $\Sigma H = 0, \Sigma V = 0$ (D) $\Sigma H = 0, \Sigma V = 0, \Sigma M = 0$

55. The ratio of Young's modulus to modulus of rigidity for a material having Poisson's ratio 0.2 is

(A) 2 (B) 2.4 (C) 2.8 (D) 3

56. The ratio of maximum load to the original area of cross-section is

(A) Strain (B) Ultimate Stress
(C) Young's Modulus (D) Unit Stress

57. A simply supported beam of span '*l*' carries a udl of W per unit run over the whole span. The maximum bending moment is given by

(A) $\dfrac{Wl}{8}$ (B) $\dfrac{Wl^2}{4}$

(C) $\dfrac{Wl^2}{8}$ (D) None of the above

58. The slope at the mid span of a beam of length L, simply supported at the ends, carrying a concentrated load W at its mid span is

(A) Zero   (B) $\dfrac{WL^2}{4EI}$ (C) $\dfrac{WL^2}{8EI}$ (D) $\dfrac{WL^2}{16EI}$

59. Pick up the correct statement from the following :
   (A) For a uniformly distributed load, the shear force varies linearly.
   (B) For a load varying linearly, the shear force curve is a parabola.
   (C) For a load varying linearly, the B.M. curve is a cubic parabola.
   (D) All of the above

60. The state of stress at a point in a stressed element is shown in the given figure. The maximum tensile stress in the element will be

10 N/mm²

10 N/mm²   10 N/mm²
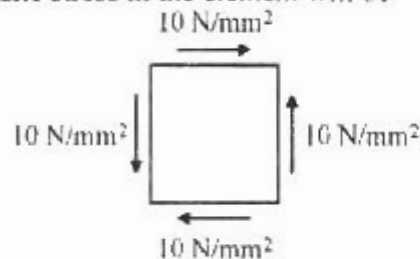
10 N/mm²

(A) 20 N/mm²   (B) $10\sqrt{2}$ N/mm²

(C) 10 N/mm²   (D) Zero

61. If e_1 and e_2 ($e_1 > e_2$) are the maximum and minimum strains in the neighbourhood of a point in a stressed material of Young's modulus 'E' and Poisson's ratio 'μ', then the maximum principal stress will be given by

(A) Ee_1 (B) $E(e_1 + e_2)$

(C) $\dfrac{E(e_1 + \mu e_2)}{(1 - \mu^2)}$ (D) $\dfrac{E(e_2 + \mu e_1)}{(1 - \mu^2)}$

62. The shearing force at the fixed end of a cantilever of length L, carrying uniformly distributed load of 'W' per unit length over the whole length is

(A) $\dfrac{WL}{2}$ (B) WL   (C) 2WL   (D) WL^2

63. Choose the correct answer :
   The ratio of shear stress and shear strain of an elastic material is
   (A) Modulus of rigidity   (B) Shear modulus
   (C) Young's modulus   (D) Both (A) and (B)

64. Point of contraflexure is where
    (A) Bending Moment is zero
    (B) Shear Force is zero
    (C) Sign of Bending Moment changes
    (D) Bending Moment is maximum

65. Main difference in Bonssinesq's and Wester Gaard's theory is due to
    (A) Consideration of different soil modulus value E.
    (B) Poisson's ratio
    (C) Homogeneous nature of soil
    (D) Presence of voids and channels in soil

66. Increase of compaction, effect on a soil causes :
    (A) reduction in O.M.C.
    (B) increases in O.M.C.
    (C) no change in O.M.C.
    (D) increases or decreases in O.M.C. which depends on the nature of soil.

67. The degree of saturation on zero air void line is
    (A) 40%   (B) 45%   (C) 100%   (D) 60%

68. The coefficient of consolidation is used for
    (A) establishing the duration of primary consolidation
    (B) estimating the amount of settlement for a load increment
    (C) determining the depth to which the soil is stressed when loads are applied on the surface of a soil deposit.
    (D) determining the preconsolidation pressure for soil deposit known to be over consolidated.

69. The slope of the e-log p curve for a soil mass gives
    (A) coefficient of permeability, k
    (B) coefficient of consolidation, C_v
    (C) compression index, C_C
    (D) coefficient of volume compressibility, M_v

70. **Assertion (A)** : The water content of a soil remains unchanged during the entire test in unconsolidated undrained test.
    Reason (R) : Drainage is not permitted during the application of stresses.
    Codes :
    (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
    (B) Both (A) and (R) are true and (R) is not a correct explanation of (A).
    (C) (A) is true, but (R) is false.
    (D) (A) is false, but (R) is true.

71. The ratio of unconfined compressive strength of an undistributed sample of soil to that of a remoulded sample, at the same water content, is known as
    (A) activity   (B) damping   (C) plasticity   (D) sensitivity

72. Of the following soils, characterized by their USCS group symbol, which one is most suitable as fill for a road embankment ?
    (A) SM   (B) GC   (C) GW   (D) CL

73. Stability of an infinite slope is lowest for
    (A) Partially saturated soil   (B) Dry soil
    (C) Seepage parallel slope   (D) Horizontal seepage

74. (1) The void ratio of soil can exceed unity.
    (2) The water content of a soil cannot be greater than one hundred percent.
    (3) In the IS classification System 'SM' stands for sandy silt.
    Which of the above statements are TRUE ?
    (A) (2) & (3)   (B) (1), (2) & (3)
    (C) (1) only   (D) (3) only

75. Rankine's theory of earth pressure assumes that the back of the wall is
    (A) Plane and smooth   (B) Plane and rough
    (C) Vertical and smooth   (D) Vertical and rough

76. Due to negative skin friction on a pile, the load carrying capacity of the pile
    (A) increases   (B) decreases   (C) remains same   (D) uncertain

77. The efficiency of a group of piles driven in dense sand is usually
    (A) less than 1   (B) more than 1
    (C) equal to 1   (D) none of the above

78. The load carrying capacity of an individual friction pile is 200 kN. The total load carrying capacity of a group of 9 such piles with group efficiency factor of 0.8 is
    (A) 1800 kN   (B) 1640 kN   (C) 1440 kN   (D) 900 kN

79. The settlement ΔH of a clay layer of thickness H_o is related with the increased stress (over the original stress P_o) as

    (A) $\Delta H = m_v \cdot H_o \cdot \Delta P$ (B) $\Delta H = \dfrac{m_v \cdot H_o}{\Delta P}$

    (C) $\Delta H = \dfrac{H_o}{m_v} \cdot \Delta P$ (D) $\Delta H = \dfrac{\Delta P}{m_v \cdot H_o}$

    where, m_v = modulus of volume change corresponding to the original pressure, P_o.

80. Coulomb's theory of earth pressure is based on
    (A) the theory of elasticity   (B) the theory of plasticity
    (C) empirical rules   (D) wedge theory

81. Bearing capacity should be calculated from the criteria of
    (A) shear only   (B) settlement only
    (C) shear and settlement   (D) none of the above

82. Which type of foundation is preferable on soil of poor bearing capacity ?
    (A) Raft
    (B) Stepped
    (C) Grillage
    (D) None of the above

83. Pile caps are used on a group of piles to
    (A) increase the load bearing capacity of each pile.
    (B) protect the piles from lateral displacement.
    (C) protect in case of offshore structure.
    (D) spread the vertical and horizontal loads to all the piles.

84. As ϕ increases, co-efficient of active earth pressure
    (A) Increases
    (B) Decreases
    (C) Remains same
    (D) None of these

85. Which one of the following is correctly matched ?
    (A) Clay, Silt   –   causes odour
    (B) Bacteria   –   causes colour
    (C) Algae   –   causes odour, coloured turbidity
    (D) Solids   –   causes disease

86. A coagulant generally used is
    (A) Chloride
    (B) Bleaching powder
    (C) Alum
    (D) Ferric chloride

87. The yield of the well is measured in
    (A) Cumec/hr
    (B) litres/hr
    (C) kg/hr
    (D) either (A) or (B)

88. The water bearing strata is called
    (A) An acquifer
    (B) An aquiclude
    (C) An aquifuge
    (D) Zone of Saturations

89. The maximum permissible concentration of sulphates for potable water is
    (A) 150 mg/l (B) 250 mg/l (C) 300 mg/l (D) 500 mg/l

90. Match List – I with List – II :

	List – I		List – II
	(Coagulant)		(Chemical Name)
(a)	$Al_2(SO_4)_3 \cdot 18H_2O$	1.	Copperas
(b)	$FeSO_4 \cdot 7H_2O$	2.	Sodium Aluminate
(c)	$Na_2Al_2O_4$	3.	Alum
(d)	$2Fe_2(SO_4)_3 + 2FeCl_3$	4.	Chlorinated Copperas

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	3	2	4	1
(C)	3	1	2	4
(D)	1	4	2	3

91. The shape of graph of population against time plotted according to the arithmetical increase method is
    (A) A hyperbola
    (B) A parabola
    (C) A straight line
    (D) S type graph

92. The movement of colloidal particles are associated with
    (A) Tyndal effect
    (B) Discrete particle
    (C) Schmutzedecke
    (D) Brownian movement

93. Test for BOD is usually made at a temperature of
    (A) 0 °C
    (B) 10 °C
    (C) 20 °C
    (D) 37 °C

94. Biological action is used in
    (A) Screens
    (B) Sedimentation tanks
    (C) Trickling filters
    (D) All of the above

95. The gases given out of a septic tank are
    (A) $CO_2 + SO_2 + N$
    (B) $CO_2 + PH_3 + NH_3$
    (C) $CO_2 + CH_4 + H_2S$
    (D) $CH_4 + O_2 + H_2$

96. Which of the following is not a biological process for destroying organic compounds ?
    (A) Composting
    (B) Trickling filter
    (C) Calcination
    (D) Activated sludge

97. Presence of SO_2 in air can be detected by
    (A) Ultraviolet pulsed fluorescence
    (B) Flame photometry
    (C) Colorimetric
    (D) Any of the above

98. A single rapid test to determine the pollution status of the river water
    (A) BOD
    (B) COD
    (C) Total organic solids
    (D) D.O.

99. The process of selective killing of infectious agents by chemical or physical means is known as
    (A) Disinfection
    (B) Purification
    (C) Rectification
    (D) Recycling

100. The amount of oxygen consumed by sewage from an oxidising agent like potassium dichromate is termed as
    (A) Bio-chemical oxygen demand
    (B) Chemical oxygen demand
    (C) Relative stability
    (D) None of the above

101. Favourable temperature for rapid sludge digestion is
    (A) 5 to 10 °C   (B) 10 to 15 °C
    (C) 40 to 60 °C   (D) 28 to 38 °C

102. In sewage treatment plants, the oil and grease is removed by
    (A) Oxidation   (B) Filtration   (C) Skimming   (D) Screening

103. Main gas from land fills is
    (A) Oxygen   (B) Nitrogen
    (C) Carbon monoxide   (D) Methane

104. A natural method of disposal of sewage is
    (A) Sewage irrigation   (B) Septic tank
    (C) Composting   (D) Aerated lagooning

105. Hydraulic lime has small quantities of
    (A) silica   (B) alumina
    (C) iron oxide   (D) all of the above

106. Creep in concrete is undesirable particularly in
    (A) RCC columns   (B) Continuous beams
    (C) Prestressed structures   (D) All of the above

107. If the slump of concrete mix is 70 mm, its workability is considered to be
    (A) very low   (B) low   (C) medium   (D) high

108. The separation of coarse aggregates from concrete during its transportation is
    (A) segregation   (B) shrinkage   (C) bleeding   (D) creeping

109. The following compound helps in early strength of cement concrete :
    (A) Tri calcium silicate   (B) Di calcium silicate
    (C) Gypsum   (D) Tri calcium aluminate

110. For repair of road
    (A) low heat cement is used   (B) sulphate resistant cement
    (C) high alumina cement   (D) rapid hardening cement

111. In slump test, in determining workability of concrete, the slump is expressed in
    (A) cubic centimetres/hour   (B) square centimetres/hour
    (C) centimetres   (D) hours

112. A concrete is said to be workable if
    (A) It shows signs of bleeding.
    (B) It shows signs of segregation.
    (C) It can be easily mixed, placed and compacted.
    (D) It is in the form of a paste.

CLEG   12

113. Workability of concrete mix having very low water-cement ratio should be obtained by
    (A) Flexural strength test
    (B) Slump test
    (C) Compaction factor test
    (D) Any one of the above

114. More water should not be added in the concrete mix, as it will increase
    (A) Strength
    (B) Durability
    (C) Water-cement ratio
    (D) All of the above

115. The maximum deflection of a simply supported beam of length 'L' with uniformly distributed load 'W' is
    (A) $\dfrac{5}{384} \dfrac{WL^4}{EI}$
    (B) $\dfrac{WL^2}{48EI}$
    (C) $\dfrac{5}{48} \dfrac{WL^2}{EI}$
    (D) $\dfrac{WL^2}{5EI}$

116. The minimum percentage of steel for HYSD bars as per IS 456-2000 for slab is
    (A) 0.12%
    (B) 0.15%
    (C) 0.1%
    (D) 0.6%

117. The modular ratio between steel and any grade of concrete is given by
    (A) $270/3\sigma_{cbc}$
    (B) $280/3\sigma_{cbc}$
    (C) $380/3\sigma_{cbc}$
    (D) $385/3\sigma_{cbc}$

    Where σ_{cbc} = Permissible compressive stress due to bending in concrete in N/mm^2.

118. With usual notations, for a balanced section the depth of N.A. is given by
    (A) $m\sigma_{cbc} = \dfrac{d-n}{n}$
    (B) $\dfrac{\sigma_{st}}{m\sigma_{cbc}} = \dfrac{d-n}{n}$
    (C) $\dfrac{\sigma_{st}}{m\sigma_{cbc}} = \dfrac{d+n}{n}$
    (D) $\dfrac{m\sigma_{cbc}}{\sigma_{st}} = \dfrac{n}{d-n}$

119. The factor of safety for
    (A) steel and concrete are same
    (B) steel is lower than that for concrete
    (C) steel is higher than that for concrete
    (D) no relation

120. Choose the correct answer :
    In a member subjected to an axial tensile force and bending moment, the maximum allowable stress in axial tension is f_t and the maximum allowable bending stress in tension is f_{ht}. If f_t' and f_{ht}' are their corresponding actual axial tensile and bending stresses, the relationship which holds goods is
    (A) $\dfrac{f_t}{f_t'} + \dfrac{f_{ht}}{f_{ht}'} < 1$
    (B) $\dfrac{f_t'}{f_t} + \dfrac{f_{ht}'}{f_{ht}} < 1$
    (C) $\dfrac{f_t'}{f_t} - \dfrac{f_{ht}'}{f_{ht}} < 1$
    (D) $\dfrac{f_t}{f_t'} + \dfrac{f_{ht}}{f_{ht}'} > 1$

121. The design criterion in R.C.C. walls is very similar to
    (A) Slabs
    (B) Retaining walls
    (C) Plates
    (D) Piers

122. When the eccentricity does not exceed 0.05 times the least lateral dimension the member may be designed by the following equation :
    (A) $P_u = 0.4 f_{ck} A_c + 0.75 f_y A_{sc}$
    (B) $P_u = 0.5 f_{ck} A_c + 0.67 f_y A_{sc}$
    (C) $P_u = 0.4 f_{ck} A_c + 0.67 f_y A_{sc}$
    (D) $P_u = f_{ck} A_c + f_y A_{sc}$

123. All columns shall be designed for an eccentricity not less than
    (A) $\frac{l}{30} + \frac{b}{500}$
    (B) $\frac{l}{500} + \frac{b}{30}$
    (C) $\frac{l+b}{500}$
    (D) $\frac{l+b}{800}$

124. Number of rivets required in a joint is equal to
    (A) $\frac{\text{Load}}{\text{Shear strength of rivet}}$
    (B) $\frac{\text{Load}}{\text{Rivet value}}$
    (C) $\frac{\text{Load}}{\text{Bearing strength of rivet}}$
    (D) $\frac{\text{Load}}{\text{Working strength of plate}}$

125. For a cantilever slab the span to effective depth ratio should not exceed
    (A) 5
    (B) 6
    (C) 7
    (D) 4

126. For economic spacing of trusses, the cost of truss should be equal to
    (A) cost of purlins + cost of roof covering
    (B) cost of purlins + 2 × cost of roof covering
    (C) cost of roof covering
    (D) 2 × cost of purlins + cost of roof covering

127. The deflection of a prismatic beam may be decreased by
    (A) increasing the depth of beam
    (B) increasing the span
    (C) decrease the depth of beam
    (D) decrease the width of beam

128. The minimum cube strength of concrete used for a prestressed member is
    (A) 5 N/mm²
    (B) 15 N/mm²
    (C) 25 N/mm²
    (D) None of the above

129. Consider the statements :
    I. Prestressed concrete structures are most economical.
    II. Prestressed concrete structures suitable for long spans.
    III. Prestressed concrete structures are subjected to heavy loads.
    IV. Prestressed concrete structures are subjected to impact and vibrations.
    Of these statements :
    (A) I alone is correct.
    (B) I and II are correct.
    (C) I, II and III are correct.
    (D) All are correct.

130. The clear cover for a RCC beam is usually
    (A) 20 mm   (B) 25 mm   (C) 30 mm   (D) 35 mm

131. **Assertion (A) :** A stress isobar is a line which connects all points below the ground surface of equal stress.
    Reason (R) : Stress isobar is a stress contour.
    Codes :
    (A) Both (A) and (R) are true and (R) is the correct explanation of (A).
    (B) Both (A) and (R) are true, but (R) is not a correct explanation of (A).
    (C) (A) is true, but (R) is false.
    (D) (A) is false, but (R) is true.

132. For the design of steel stacks, the thickness of the steel plates is increased by
    (A) 1.0 mm   (B) 1.5 mm   (C) 2.0 mm   (D) 2.5 mm

133. Choose the incorrect statement.
    Combined Trapezoidal footing are provided
    1. to avoid eccentricity of loading with respect to the base.
    2. when the space outside the exterior column is limited.
    3. when the exterior column carries the heavier load.
    Of these statements :
    (A) 1 and 2 are correct.
    (B) 1, 2 and 3 are correct.
    (C) 2 and 3 are correct.
    (D) 1 and 3 are correct.

134. A pre-stressed concrete induces artificially _____ stresses in a structure before it is loaded.
    (A) tensile
    (B) shear
    (C) compressive
    (D) all of the above

135. Darcy's Law is for
    (A) Open channel flow
    (B) Diffusion
    (C) Underground motion of water
    (D) Evaporation of surface water

136. pH value of drinking water should be in the range of
    (A) 1 to 2
    (B) 3 to 6
    (C) 6.5 to 8.5
    (D) 8.6 to 10

137. A hydrograph is a plot of
    (A) Precipitation against time
    (B) Direct runoff against time
    (C) Stream flow against time
    (D) Surface runoff against time

138. Geological formations that do not contain ground water at all are called
    (A) aquifuges   (B) aquitards
    (C) aquicludes   (D) aquifers

139. When the base flow is separated from the storm-hydrograph the resulting plot is known as
    (A) excess-runoff hydrograph   (B) excess-rainfall hydrograph
    (C) direct-runoff hydrograph   (D) direct-rainfall hyetograph

140. An ephemeral stream is
    (A) one which always carries some flow.
    (B) one which carries only snowmelt water.
    (C) one which has limited contribution of ground water.
    (D) one which does not have any base flow contribution.

141. **Assertion (A) :** Ground water from artesian wells is a good source.
    Reason (R) : It contains no suspended matter and no bacteria. It requires lesser treatment.
    Codes :
    (A) (A) and (R) both are not correct.
    (B) (A) and (R) both are correct.
    (C) (A) is false and (R) is true.
    (D) (A) is true and (R) is false.

142. An aquiclude is
    (A) a non-artesian aquifer
    (B) an artesian aquifer
    (C) a confined bed of impervious material between aquifers
    (D) a large water body underground

143. Which of the following operation washes out salts from the upper zone of the soil ?
    (A) Evapotranspiration   (B) Separation
    (C) Washing   (D) Leaching

144. An aquifer confined at the bottom but not at the top is known as
    (A) perched aquifer   (B) unconfined aquifer
    (C) confined aquifer   (D) semi-confined aquifer

145. A work which carries one channel over another without the bed level of the lower channel, is called
    (A) Aquaduct   (B) Super passage
    (C) Siphon   (D) Hybrid channel

CLEG   16   ■

146. The top of a weir or spillway, is called
    (A) Peak
    (B) Crest
    (C) Ridge
    (D) Head

147. Which canal is used to drain off water from water logged areas ?
    (A) Ditch canal
    (B) Drain canal
    (C) Perennial canal
    (D) Percolation canal

148. The volume of water which can be extracted by force of gravity from a unit volume of aquifer material is termed as
    (A) porosity
    (B) specific retention
    (C) specific yield
    (D) specific storage

149. The canals constructed for the diversion of flood water of rivers is called
    (A) Flood canal
    (B) Inundation canal
    (C) Drain
    (D) Ridge canal

150. The hydrology is a science which deals with the
    (A) occurrence of water on the earth
    (B) distribution of water on the earth
    (C) movement of water on the earth
    (D) all of the above

151. A Hydraulic jump is formed when
    (A) a sub-critical flow strikes against a super-critical flow.
    (B) a super-critical flow strikes against a sub-critical flow.
    (C) the two flows of super-critical velocity meet each other.
    (D) the two flows of sub-critical velocity meet each other.

152. The salinity in water
    (A) reduces the evaporation
    (B) does not affect evaporation
    (C) increases the evaporation
    (D) first reduces then increases

153. An effective way to conduct "Origin and Destination" study is
    (A) Road side interview
    (B) Licence plate method
    (C) Return post card method
    (D) Tag on car method

154. Traffic density is
    (A) Number of vehicles moving in a specific direction per lane per day.
    (B) Number of vehicles moving in a specific direction per hour.
    (C) Number of vehicles per unit length.
    (D) Maximum number of vehicles passing a given point in one hour.

155. A Channelization Island should have
    (A) small entry radius and large exist radius
    (B) large entry radius and small exit radius
    (C) equal radii for entry and exit
    (D) large entry and exit radii

156. Speed regulation on roads is decided on the basis of
    (A) 60 percentile cumulative frequency
    (B) 75 percentile cumulative frequency
    (C) 80 percentile cumulative frequency
    (D) 85 percentile cumulative frequency

157. At a 4 arm intersection, 16 cross conflict points are serve if
    (A) Both are one way roads.
    (B) Both are two way roads.
    (C) One is two way and other is one way road.
    (D) None of these.

158. The value of maximum gradient for hill roads is
    (A) 1 in 5   (B) 1 in 10
    (C) 1 in 15   (D) 1 in 20

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

	List – I		List – II
(a)	PCU value for car	1.	3°
(b)	Minimum lateral clearance desirable from pavement	2.	10°
(c)	Area of acute vision	3.	1.00
(d)	Traffic sign should be placed within a cone of	4.	1.85

	(a)	(b)	(c)	(d)
(A)	4	3	2	1
(B)	1	2	3	4
(C)	3	4	1	2
(D)	4	1	2	3

160. In case of multi lane road, overtaking is generally permitted from
    (A) left side only   (B) right side only
    (C) both sides   (D) none of the above

161. The purpose of "Divisional Island" is to eliminate
    (A) Nose to Tail collision   (B) Head on Collision
    (C) Side Surpe   (D) Tail to Tail Collision

CLEG   18   □

162. Rotary is ideally suited
   (A) when traffic from more than 4 streams join at the junction
   (B) when traffic is heavy
   (C) when pedestrian traffic is heavy
   (D) for congested areas

163. The Indian Road Congress came into existence in
   (A) 1927   (B) 1934   (C) 1943   (D) 1947

164. The roads connecting one town with another town is designated as
   (A) National Highway   (B) State Highway
   (C) District Roads   (D) Village Roads

165. The widening of a road is not required when its radius will be
   (A) less than 300 m   (B) less than 460 m
   (C) more than 300 m   (D) more than 460 m

166. Which one of the following is correctly matched ?
   (a) Overall length of vehicle   1. Lane width
   (b) Weight of the vehicle   2. Pavement thickness
   (c) Width of the vehicle   3. Clearance of the subway or underpass
   (d) Height of the vehicle   4. Turning radius of curve

	(a)	(b)	(c)	(d)
(A)	4	2	1	3
(B)	3	1	4	2
(C)	2	3	1	4
(D)	1	2	3	4

167. While testing a soil, thread test is conducted in the field in order to find out
   (A) liquid limit   (B) bearing limit
   (C) shrinkage limit   (D) plastic limit

168. The different material used for road construction are
   (A) stone aggregate, soil and binder   (B) sand, soil and binder
   (C) bitumen, soil and binder   (D) cement, soil and binder

169. The value of group index of a soil varies from
   (A) 40 to 50   (B) 0 to 20   (C) 20 to 30   (D) 30 to 40

170. When the coefficient of friction is neglected, the maximum rate of super elevation is given by
   (A) $\dfrac{V^2}{127R}$ (B) $\dfrac{V^2}{227R}$ (C) $\dfrac{V^2}{225R}$ (D) $\dfrac{V^2}{125R}$

171. Match the following :

    (a) Thorough maintenance of earthern road done   1. localized heaving up along pavement portion

    (b) Repairs work of cement concrete road is done   2. after rainy season

    (c) Patching should be done   3. after summer season

    (d) Frost heaving is   4. after rainy season

	(a)	(b)	(c)	(d)
(A)	3	2	1	4
(B)	2	3	4	1
(C)	3	1	2	4
(D)	4	3	2	1

172. At places of heavy rainfall, side drains to be provided on a road should be

   (A) trapezoidal in section   (B) triangular in section

   (C) rectangular in section   (D) circular in section

173. The first railway train in India ran between

   (A) Bombay and Thana   (B) Howrah and Raniganj

   (C) Madras and Bangalore   (D) Calcutta and Delhi

174. Broad Gauge (in Railways) is

   (A) 1676 mm   (B) 1524 mm

   (C) 1435 mm   (D) 1000 mm

175. The object of double headed rail is to

   (A) provide symmetrical section about both horizontal and vertical axes.

   (B) use both the flanges for riding

   (C) employ chairs to hold the rail

   (D) gain more vertical stiffness

176. Coning of wheels is provided

   (A) to give dynamic stability of the rolling stock

   (B) to prevent lateral slip

   (C) to save materials of wheels

   (D) to suit super elevation on curves

177. In railway switch is

   (A) Tongue rail

   (B) Stock rail

   (C) Combination of both tongue and stock rail

   (D) Tongue and stock rail combination but separated by flange way

178. Airport elevation is the reduced level about MSL of
    (A) Control tower
    (B) Highest point of the landing area
    (C) Lowest point of the landing area
    (D) None of these

179. The taxiway is the strip of pavement which connects
    (A) City to the airport   (B) Runway to apron
    (C) Terminal Building to Taxi stand   (D) None of the above

180. Pick out the odd.
    Airport are classified on the basis of
    (A) Runway length   (B) Pavement strength
    (C) Expected Air traffic   (D) None of the above

181. Pick out the incorrect statement :
    (A) Every port is a harbour but the reverse is not true.
    (B) An isolated enclosed area for handling of cargo to be reshipped without the intervention of customs is called free port.
    (C) A location where foreign citizens and goods are cleared through custom house is called entry port.
    (D) The essential requirement of the harbour of refugee is spacious accommodation for the mercantile marine.

182. The traffic volume is equal to
    (A) $\dfrac{\text{Traffic density}}{\text{Traffic speed}}$ (B) $\dfrac{\text{Traffic speed}}{\text{Traffic density}}$
    (C) Traffic density × Traffic speed   (D) None of these

183. Resource smoothening means
    (A) Gradual increase in resources
    (B) Optimisation and economical utilization of resources
    (C) Complete distribution of resources
    (D) None of the above

184. Cost slope of the direct cost curve is given by
    (A) $\dfrac{\text{Crash cost} - \text{Normal cost}}{\text{Crash time}}$ (B) $\dfrac{\text{Normal cost} - \text{Crash cost}}{\text{Normal time}}$
    (C) $\dfrac{\text{Crash cost} - \text{Normal cost}}{\text{Normal time} - \text{Crash time}}$ (D) $\dfrac{\text{Normal cost} - \text{Crash cost}}{\text{Crash time}}$

185. Slack is given as the difference between

    (A) Earliest expected time and latest allowable time.

    (B) Final event time and initial event time.

    (C) Latest allowable time and earliest expected time.

    (D) Final event time and initial event time.

186. What does the following figure indicate ?
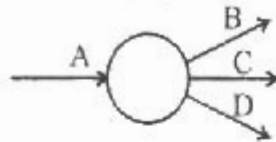
    (A) a merge   (B) a burst

    (C) an activity   (D) none of the above

187. The occurrence of the completion of an activity is called its

    (A) Head event   (B) Tail event

    (C) Dual role event   (D) None of the above

188. A dummy activity

    (A) has no tail event but only a head event

    (B) has only head event but no tail event

    (C) does not require any resources or any time

    (D) consumes time and resources

189. Which of the following statements is true ?

    (A) PERT is activity oriented and adopts probabilistic approach

    (B) CPM is event oriented and adopts deterministic approach

    (C) CPM is activity oriented and adopts probabilistic approach

    (D) PERT is event oriented and adopts probabilistic approach

190. In computer terminology virus is

    (A) Disease affecting computer

    (B) Viral infection caused due to accumulation of dust on computers

    (C) An unsolicitated software programme corrupting the system

    (D) None of the above

191. Microprocessor is an

    (A) Electronic Machine   (B) Electronic Chip

    (C) Electro Magnetic Processor   (D) None of the above

192. A flow chart is _____ of the sequence of the steps to be followed in a solution of a problem.
    (A) Pictorial depiction   (B) Problem formulation
    (C) Testing the program   (D) Documentation

193. The screen image in a Visual Display Unit (VDU), is
    (A) Tiny-dots   (B) Picture elements
    (C) Pixels   (D) All of the above

194. Match the following :

Generation		Basic Electronic Component
(a)	First Generation	1. Transistors
(b)	Second Generation	2. Vacuum tube
(c)	Third Generation	3. Large scale integrated circuits
(d)	Fourth Generation	4. Integrated circuits

	(a)	(b)	(c)	(d)
(A)	2	1	4	3
(B)	1	2	3	4
(C)	2	4	1	3
(D)	3	4	1	2

195. Common output devices are
    (A) Magnetic tape   (B) C.R. Tube
    (C) Printers   (D) All of the above

196. C.P.U. means
    (A) Central Processing Unit   (B) Control Processing Unit
    (C) Computing Processing Unit   (D) All of the above

197. Expansion of ROM is
    (A) Read Only Memories   (B) Read Output Memories
    (C) Random Only Memories   (D) All of the above

198. A standard key board has
    (A) 103 keys   (B) 105 keys   (C) 110 keys   (D) 104 keys

199. Odd one out
    (A) DOS   (B) Windows   (C) Linux   (D) FoxPro

200. In computer terminology WAN refers to
    (A) Wide Area Network   (B) Wide Access Network
    (C) Wavelength Network   (D) None of the above