

Sl. No. :

Register
Number

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2018

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. The applicant will be supplied with Question Booklet 15 minutes before commencement of the examination.
2. This Question Booklet contains 200 questions. Prior to attempting to answer the candidates are requested to check whether all the questions are there in series and ensure there are no blank pages in the question booklet. **In case any defect in the Question Paper is noticed it shall be reported to the Invigilator within first 10 minutes and get it replaced with a complete Question Booklet. If any defect is noticed in the Question Booklet after the commencement of examination it will not be replaced.**
3. Answer all questions. All questions carry equal marks.
4. 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.
5. An answer sheet will be supplied to you, separately by the Room Invigilator to mark the answers.
6. You will also encode your Question Booklet Number with Blue or Black ink Ball point pen 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, action will be taken as per commission's notification.
7. 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.
8. In the Answer Sheet there are four circles (A), (B), (C) and (D) against each question. To answer the questions you are to mark with Blue or Black ink Ball point pen **ONLY ONE** circle 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
9. 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 time of examination. 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.
10. The sheet before the last page of the Question Booklet can be used for Rough Work.
11. Do not tick-mark or mark the answers in the Question Booklet.
12. Applicants have to write and shade the total number of answer fields left blank on the boxes provided at side 2 of OMR Answer Sheet. An extra time of 5 minutes will be given to specify the number of answer fields left blank.
13. 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.

SEAL

1. In angle dozers, usually the blades are attached to the front side of the tractor at an angle of
(A) 30° (B) 90°
(C) 120° (D) 180°
2. Desirable air changes for an effective working of the ventilation system per hour may be
(A) 1 to 60 air changes per hour (B) 10 to 50 air changes per hour
(C) 5 to 10 air changes per hour (D) 5 to 6 air changes per hour
3. The fire resistance characteristics of concrete dependence upon the
(A) Co-efficient of thermal expansion of coarse aggregate
(B) Thermal expansion of sand
(C) Degree of compaction
(D) W/C ratio
4. Low sound intensity causing unsatisfactory hearing for the audience is known as
(A) Insufficient loudness (B) Sound foci
(C) Dead spots (D) Transmission of noise
5. For the given W/C ratio, the higher the maximum size of aggregate the strength of concrete
(A) increases
(B) decreases
(C) remains same
(D) W/C ratio does not have any effect on strength of concrete
6. Which is the most dangerous for decaying the stone?
(A) Efflorescence (B) Water absorption
(C) Incorrect bedding (D) Vegetation growth
7. The split tensile strength of M₂₀ grade concrete when expressed in percentage of its compressive strength is
(A) 10% to 15% (B) 15% to 20%
(C) 20% to 25% (D) 25% to 30%

8. Match List I with List II for mix design of concrete as per Indian Standard and select correct answer :

List I

List II

- | | |
|---------------------------|----------------|
| (a) Cement content | 1. First step |
| (b) Aggregate content | 2. Second step |
| (c) Water content | 3. Third step |
| (d) Water to cement ratio | 4. Fourth step |

- | | (a) | (b) | (c) | (d) |
|---|-----|-----|-----|-----|
| (A) | 1 | 2 | 4 | 3 |
| (B) | 3 | 2 | 4 | 1 |
| (C) | 1 | 4 | 2 | 3 |
| <input checked="" type="checkbox"/> (D) | 3 | 4 | 2 | 1 |

9. Select the incorrect joint considered in stone masonry :

- | | |
|-------------------|---|
| (A) Butt joint | (B) Rebated joint |
| (C) Grooved joint | <input checked="" type="checkbox"/> (D) Contraction joint |

10. The masonry constructed using more than one material to improve the appearance and durability is called as

- | | |
|--------------------|---|
| (A) Stone masonry | (B) Brick masonry |
| (C) Rubble masonry | <input checked="" type="checkbox"/> (D) Composite masonry |

11. Brass handle and chain is connected by

- | | |
|--|------------------|
| (A) Flexible joint | (B) Hinged joint |
| <input checked="" type="checkbox"/> (C) Swivel joint | (D) Rigid joint |

12. Magnetic bearing of a line is 84° and magnetic declination is 2° W, the true bearing of the line is

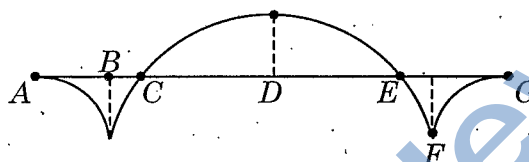
- | | |
|--|----------------|
| <input checked="" type="checkbox"/> (A) 82° | (B) 86° |
| (C) 80° | (D) 83° |

13. G.T.S. stands for
- (A) Great Trigonometrical Station
 - (B) Great Trigonometrical Survey
 - (C) Great Triangle Survey
 - (D) Great Tangential Survey
14. Reduction -to-centre is worked out with
- (A) Barometric levelling
 - (B) Triangulation
 - (C) Rectangulation
 - (D) Precise levelling
15. Contour line is an imaginary line connecting points of
- (A) same R.L.
 - (B) same declination
 - (C) same dip
 - (D) same inverted level
16. G.P.S. stands for
- (A) Global Positioning System
 - (B) Global Positioning Survey
 - (C) Geographical Position Station
 - (D) Geo-Point-Standard
17. One of the factors deciding contour interval is
- (A) Scale of map
 - (B) Skill of surveyor
 - (C) Type of instrument
 - (D) Environment
18. If a composite bar of steel and brass is heated, then the brass bar will be under
- (A) Tension
 - (B) Compression
 - (C) Shear
 - (D) Torsion

19. Bending stress distribution diagram of a beam rectangular cross section, subjected to transverse loading will be



20. The bending moment for an over hanging beam is shown in figure. The point of contraflexure would include



- (A) A and G
- (B) B and F
- (C) C and E
- (D) D
21. 'Core' of a section is the figure within which load may be placed so as
- (A) to produce tensile stress at one end and compressive stress at the other end
- (B) to produce tensile stress at both ends of the section
- (C) to produce tensile stress in the middle of the section
- (D) not to produce tensile stress anywhere in the section
22. Fletched beam means a
- (A) continuous beam
- (B) fixed beam
- (C) propped cantilever beam
- (D) beam of composite section consisting of a wooden beam strengthened by mild steel plates

23. For a simply supported beam with a point load anywhere on the span. The bending moment is maximum on a section where shearing force
- (A) is maximum (B) is minimum
(C) is equal (D) changes sign
24. If E is the Young's modulus and I is moment of inertia then maximum deflection of a cantilever beam of span ' l ' due to pure bending moment ' M ' at its free end is
- (A) $\frac{Ml^2}{3EI}$ (B) $\frac{Ml^2}{4EI}$
(C) $\frac{Ml^2}{6EI}$ (D) $\frac{Ml^2}{2EI}$
25. The failure theory suitable for brittle materials is
- (A) maximum strain energy (B) maximum shear stress energy
 (C) maximum principal stress energy (D) distortion energy theory
26. Maximum principal stress theory was postulated by
- (A) St. Venant (B) Rankine
(C) Mohr (D) Tresca
27. When a tensile or compressive force (P) acts on a body. If E is the Young's modulus, A is cross-sectional area and l is the length, then the change in its length is given by
- (A) $\frac{Pl}{AE}$ (B) $\frac{AE}{Pl}$
(C) $\frac{PE}{Al}$ (D) $\frac{PA}{lE}$
28. If E is Young's modulus and I is moment of inertia, then the expression $EI \frac{d^2y}{dx^2}$ at any section for a beam is equal to
- (A) load intensity at the section (B) shear force at the section
 (C) bending moment at the section (D) slope at the section

29. Euler's critical load for a column of equivalent length l_e , moment of inertia I and modulus of elasticity E is given by

(A) $\frac{\pi^2 EI}{l_e}$

(B) $\frac{\pi EI}{l_e^2}$

(C) $\frac{\pi^2 EI}{l_e^2}$

(D) $\frac{\pi EI}{l_e}$

30. In case of a simply supported rectangular beam of span L and loaded with a central load P , the length of elasto-plastic zone of the plastic hinge is

(A) $\frac{L}{2}$

(B) $\frac{L}{4}$

(C) $\frac{L}{3}$

(D) $\frac{L}{5}$

31. The absolute maximum bending moment in a simply supported beam of span 10 m due to moving udl of 4 kN/m spanning over 6 m is

(A) 42 kN-m at the support

(B) 42 kN-m at the mid point

(C) 42 kN-m near the mid point

(D) 42 kN-m at 1/3rd of the span

32. Slenderness ratio of a column is the ratio of

(A) the minimum radius of gyration to the unsupported length

(B) unsupported length of column to the minimum radius of gyration

(C) minimum radius of gyration to the area of cross-section

(D) area of cross-section of the minimum radius of gyration

33. For a fixed beam of length L , carrying uniformly distributed load ' w ' over the entire span, the plastic moment capacity of the beam, M_p is

(A) $\frac{W_c L}{16}$

(B) $\frac{16}{W_c L}$

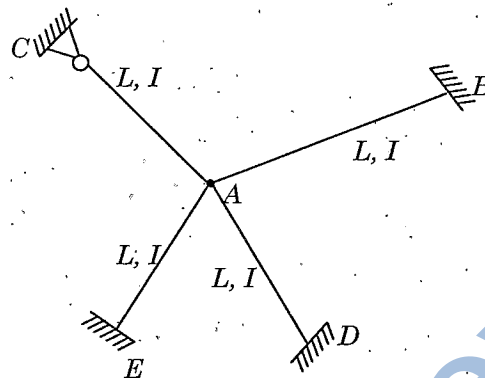
(C) $\frac{W_c L^2}{16}$

(D) $\frac{18}{W_c L^2}$

34. In plastic theory, shape factor is defined as the ratio of

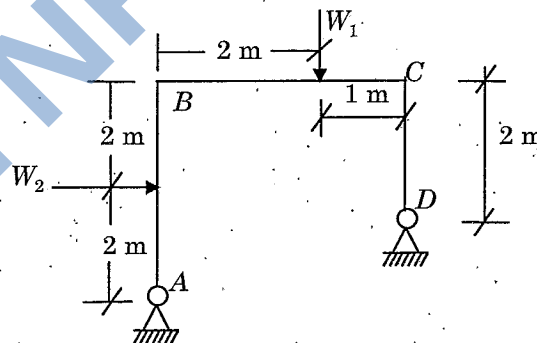
- (A) $\frac{\text{Plastic modulus of section}}{\text{Elastic modulus of section}}$ (B) $\frac{\text{Elastic modulus of section}}{\text{Plastic modulus of section}}$
 (C) $\frac{\text{Shear modulus of section}}{\text{Plastic modulus of section}}$ (D) $\frac{\text{Plastic modulus of section}}{\text{Shear modulus of section}}$

35. For the structure shown in figure, the ratio of relative stiffness for AB and AC is



- (A) $\frac{1}{2}$ (B) $\frac{3}{4}$
 (C) $\frac{4}{3}$ (D) 2

36. A rigid portal frame ABCD carries loads W_1 and W_2 as shown in figure.



The structure is statically

- (A) determinate
 (B) indeterminate to the first degree
 (C) indeterminate to the second degree
 (D) indeterminate to the third degree

37. In a soil mass, the volume of solids is equal to volume of voids. The values of porosity and void ratio
- (A) 1.0 and 0.0 (B) 0.0 and 1.0
 (C) 0.5 and 1.0 (D) 1.0 and 0.5
38. In a partially saturated soil, the air content is 60%. What is the value of degree of saturation?
- (A) 40% (B) 60%
 (C) 50% (D) 100%
39. If the consistency index of a natural soil is zero, then the natural water content of the soil is equal to its
- (A) liquid limit (B) plastic limit
 (C) plasticity index (D) shrinkage limit
40. Inorganic silts with high compressibility are represented as
- (A) MH (B) SL
 (C) ML (D) CH
41. Cohesionless soils are best compacted by
- (A) Vibratory roller
 (B) Sheep foot roller
 (C) Rubber tyred roller
 (D) Drum roller
42. Under load, the void ratio of a submerged saturated clay decreases from 1.00 to 0.92. What will be the ultimate settlement of the 2 m thick clay due to consolidation?
- (A) 20 mm (B) 60 mm
 (C) 80 mm (D) 100 mm

43. A circular area of radius 'a' on the surface of a semi-infinite soil mass is uniformly loaded with a loading intensity of 'q'. The vertical stress σ_z directly below its centre at a depth 'z' is given by

- (A) $\frac{q}{2\pi} \frac{z}{\pi} \left(\frac{1}{1+(a/z)^2} \right)^2$ (B) $q \left(1 - \frac{1}{[1+(a/z)^2]^{3/2}} \right)$
 (C) $\frac{3q}{2\pi z^2} \left(\frac{1}{1+(a/z)^2} \right)^{5/2}$ (D) $\frac{q}{2\pi z} \left(\frac{1}{1+(a/z)^2} \right)^{3/2}$

44. When the average degree of consolidation U is less than 60% the time factor T is given by

- (A) $T = \left(\frac{\pi}{4} \right) U^2$ (B) $T = \left(\frac{4}{\pi} \right) U^2$
 (C) $T = \left(\frac{4}{U} \right) \pi^2$ (D) $T = \left(\frac{U}{4} \right) \pi^2$

45. The bearing capacity factors N_c , N_q and N_γ are functions of

- (A) width and depth of footing (B) density of soil
 (C) cohesion of soil (D) angle of internal friction of soil

46. Negative skin friction occurs when

- (A) the surrounding soil settles more than the pile
 (B) the driving operation begins
 (C) the pile passes continuously through a firm soil
 (D) cast insitu pile was constructed

47. The length to diameter ratio of cylindrical specimens used in triaxial test is generally

- (A) 1 (B) 2
 (C) 1.5 (D) 0.5

48. If ϕ is the angle of internal friction, the flow value N_ϕ is given by

- (A) $\tan^2(45^\circ - \phi/2)$ (B) $\tan(45^\circ - \phi/2)$
 (C) $\tan^2(45^\circ + \phi/2)$ (D) $\tan(45^\circ + \phi/2)$

49. For proceeding with optimum rate of biological activity in composting process, the moisture content should be about
- (A) 25% (B) 45%
(C) 55% (D) 75%
50. BOD₅ refers to five days of decomposition at 20°C. If the temperature is increased to 35°C, then the five day BOD can be obtained in
- (A) 1½ days (B) 2¼ days
(C) 2½ days (D) 3½ days
51. The turbidity produced by one milligram of _____ in one litre of water is the unit of Turbidity.
- (A) Alumina (B) Silica
(C) Feldspar (D) Lime
52. The following process does not help in the removal of permanent hardness from water.
- (A) Lime-soda process (B) Lime-water process
(C) Base exchange process (D) Demineralisation process
53. Among the following industrial wastes which one is having very high BOD.
- (A) Dairy wastes (B) Slaughter house wastes
(C) Tannery wastes (D) Distillery wastes
54. The type of sewage collection pattern preferred when the city is situated near the river
- (A) Radial pattern (B) Interceptor pattern
(C) Fan pattern (D) Zone pattern
55. The type of sewage pumps which have relatively high specific speed
- (A) Axial flow pumps
(B) Mixed flow pumps
(C) Radial flow pumps with single suction
(D) Radial flow pumps with double suction

56. In the design of simply supported rectangular RC beams, the development length, L_d is

- (A) $\frac{0.87f_y\phi}{4\tau_{bd}}$
- (B) $\frac{0.87f_y}{4\phi\tau_{bd}}$
- (C) $\frac{0.78\tau_{bd}}{8f_y}$
- (D) $\frac{0.71f_y\phi}{3\tau_{bd}}$

where ϕ -nominal diameter of bar , f_y -yield stress

57. A flat slab is called a flat plate if

- (A) the span of slab is large and loads are small, omitting both drop and column head
- (B) the span of slab is not large and loads are not excessive, omitting both drop and column head.
- (C) the span of slab is small and loads are small, considering drop
- (D) the span of slab is small and loads are small considering column head

58. For the flexural tension reinforcement, the shear capacity shall be at least _____ times the applied shear at the point of curtailment.

- (A) 2.5
- (B) 3
- (C) 1.5
- (D) 1.75

59. Short compression members at the junction of columns and roof trusses or beams are called as

- (A) boom
- (B) principal rafter
- (C) post
- (D) knee braces

60. Gantry girders are designed as

- (A) Laterally supported beams
- (B) Laterally unsupported beams
- (C) Longitudinally supported beams
- (D) Longitudinally unsupported beams

61. Web buckling occurs when the intensity of vertical compressive stress near the centre of the section becomes

- (A) Lesser than the critical buckling stress for the web acting as a column
- (B) Greater than the critical buckling stress for the web acting as a column
- (C) Equal to the critical buckling stress for the web acting as a column
- (D) Less than the bending stress

62. The sudden failure of a prestressed member without any warning is due to the TNPSC.News
- (A) Fracture of steel in the compression zone
 - (B) Fracture of steel in the tension zone
 - (C) Rupture of concrete in the tension zone
 - (D) Failure of concrete in the compression zone
63. The system suitable for pre-tensioned prestressed concrete members is
- (A) Magnel system
 - (C) Hoyer system
 - (B) Freyssinef system
 - (D) Gifford-Udall system
64. High strength concrete is necessary in prestressed concrete, as the material offers high resistance in
- (A) Tension and bond
 - (C) Tension, shear, bond and bearing
 - (B) Shear, bond and bearing
 - (D) Tension and shear
65. _____ is that property of a fluid by virtue of which it offers resistance to the movement of one layer of fluid over an adjacent layer.
- (A) Viscosity
 - (B) Kinematics
 - (C) Density
 - (D) Specific gravity
66. Differential manometers are used to measure
- (A) Pressure in water channels
 - (B) Pressure in water pipes
 - (C) Difference of pressure between any two points
 - (D) Atmospheric pressure
67. The practical value of upper critical Reynolds number may be considered to lie between
- (A) 12,000 to 14,000
 - (C) 2,700 to 4,000
 - (B) 2,000 to 4,000
 - (D) 2,000 to 3,000
68. A pitot tube is a simple device used for measuring the
- (A) Velocity of flow
 - (B) Discharge of flow
 - (C) Viscosity of flow
 - (D) Pressure of flow

69. The unit hydrograph is the graphical relation between the time distributions of the TNPSC.News
- (A) Effective rainfall and direct run off
 - (B) Effective rainfall and total run off
 - (C) Total rainfall and direct run off
 - (D) Total rainfall and total run off
70. In the process of condensation, the fall in temperature represented by its temperature change is called as
- (A) Adiabatic temperature lapse
 - (B) Condensation lapse
 - (C) Saturation change
 - (D) Adiabatic saturation lapse rate
71. Average approximate value of delta for Rice is
- (A) 120 cm
 - (B) 150 cm
 - (C) 165 cm
 - (D) 135 cm
72. Value of Bligh's coefficient C takes approximately equal to 15 for
- (A) Coarse grained sand
 - (B) Fine sand
 - (C) Sand mixed with gravel
 - (D) Sand mixed with boulder and mud
73. To say an modular pump can form, the Froude no. should be
- (A) $F = 1$
 - (B) $F = 1$ to 1.7
 - (C) $F = 1.7$ to 2.5
 - (D) $F = 2.5$ to 4.5
74. Hydraulic drop is an example of
- (A) Steady flow
 - (B) Uniform flow
 - (C) Varied flow
 - (D) Laminar flow
75. The crest of the under sluice portion of weir is kept at _____ level, when compared to crest of normal portion of the weir.
- (A) Lower
 - (B) Higher
 - (C) Same
 - (D) Any

76. The point of application of the total pressure on the surface is known as
(A) Centre of gravity (B) Centre of pressure
(C) Centroid (D) Centre of volume
77. The value of silt factor depends on
 (A) Size of silt
(B) Depth of water
(C) Side slopes of the channel
(D) Characteristics of channel bed and slopes
78. Fish ladder is provided on the side of
(A) Wing wall (B) Core wall
 (C) Divide wall (D) Diaphragm wall
79. The capillary rise in coarse sand is estimated as
 (A) 20 – 50 cm (B) 50 – 60 cm
(C) 60 – 80 cm (D) Over 80 cm
80. Present concept of transportation network discourages
(A) Industrial development (B) Commercial development
 (C) Ribbon development (D) Infrastructure development
81. The design speed is decided based on
(A) Characteristics of driver
 (B) Over all highway requirements
(C) Vehicular characteristics
(D) Highway users
82. The lag distance traversed by a driver with a speed of 40 kmph and reaction time of 2 seconds is
(A) 12.20 m (B) 22.20 m
(C) 10.50 m (D) 2.22 m

83. The switch lead to set out a B.G. turn-out with outer radius 100 m and a heel divergence of 0.72 m is
 (A) 12 m (B) 15 m
 (C) 18 m (D) 14 m
84. The objective of the minimum turning radius of an air craft is to
 (A) decide the radius of runway
 (B) decide the radius of taxi way
 (C) decide the radius of taxi way and to ascertain its position in the landing aprons and hangers
 (D) decide the location of aprons and hangers
85. The area of land acquired for the road, along its alignment is called as
 (A) Road way (B) Right of way
 (C) Permanent way (D) Carriage way
86. Flexible pavement distribute the wheel load
 (A) Directly to the subgrade
 (B) Through structural action
 (C) Through a set of layers to the subgrade
 (D) Directly to the Base course
87. As per Stevenson's empirical formula, the approximate value of the height of the wave in meter is given by
 (A) $3.4\sqrt{F}$ (B) $1.5\sqrt{F}$
 (C) $0.5\sqrt{F}$ (D) $0.34\sqrt{F}$
 where F is the fetch in km
88. Gauge is the
 (A) Centre to centre distance between rails
 (B) Distance between outer faces of rails
 (C) Clear distance between the running faces of two track rail
 (D) Distance between inner faces of pair of wheels

89. Wharf is
- (A) Space for servicing ships
 - (B) Loading and unloading platform
 - (C) Space for manoeuvrability
 - (D) Space for parking
90. An estimate is
- (A) the actual cost of construction of a structure
 - (B) the random guess of the cost of the structure
 - (C) the probable cost arrived at before commencement of the structure
 - (D) computation of quantities of materials and labour
91. The annual periodic payments of the capital invested is known as
- (A) Sinking fund
 - (B) Annuity
 - (C) Depreciation
 - (D) Years purchase
92. The present value of a property can be determined from the relation
- (A) Original cost – sinking fund
 - (B) Original cost – total amount of depreciation
 - (C) Estimated cost – original cost
 - (D) Original cost – scrap value
93. Choose the wrong statement (or) Which of the following is not a tender documents?
- (A) Tender form
 - (B) Tender notice
 - (C) Bill of quantities or schedule of quantities
 - (D) Detailed rate analysis
94. The gradual decrease in the value of property due to structural depreciation is known as
- (A) Depreciation
 - (B) Annual depreciation
 - (C) Sinking fund
 - (D) Book value

95. If t_o , t_p and t_L represent the optimistic, pessimistic and most likely time estimates, the expected time of completion of the activity is given by

(A) $t_E = \frac{t_p + 4t_o + t_L}{6}$

(B) $t_E = \frac{t_o + 2t_L + t_p}{6}$

(C) $t_E = \frac{t_o + 4t_p + t_L}{6}$

(D) $t_E = \frac{t_o + 4t_L + t_p}{6}$

96. In the absence of detailed design the volume of steel in RCC work (slab) is taken as

(A) 0.7% to 1% of RCC volume

(B) 1% to 2% of RCC volume

(C) 0.3% to 0.5% of RCC volume

(D) 1% to 5% of RCC volume

97. For reinforced bar cranked at both ends the additional length at 30° angle is equal to

(A) 0.4 d

(B) 0.5 d

(C) 0.6 d

(D) 0.7 d

where d – centre to centre vertical distance

98. Which of the following is general overheads?

(A) Losses of advances

(B) Establishment (office staff)

(C) Amenities of labour

(D) Workmen's compensation

99. A record of receipts, issues and running balance of certain articles of stock kept in

(A) M-Book

(B) Stock Account

(C) Road Metal Book

(D) Bin Card

100. What is the time by which completion of an activity can be delayed without affecting the start of succeeding activities?

(A) Total float

(B) Inteferring float

(C) Free float

(D) Independent float

101. According to Indian Standard Institution, the size of Modular Brick excluding mortar thickness is
- (A) 19 cm × 9 cm × 7 cm (B) 19 cm × 9 cm × 9 cm
 (C) 19 cm × 7 cm × 9 cm (D) 20 cm × 10 cm × 10 cm
102. In analysis of rate the quantity of dry cement mortar for 10 cubic metre brick work is taken as
- (A) 0.3 m³ (B) 1.0 m³
 (C) 3.0 m³ (D) 5.0 m³
103. Setting time of cement is determined using
- (A) Vicat apparatus (B) Casagrande apparatus
 (C) Le-Chatelier apparatus (D) Slump Cone apparatus
104. The average tensile strength of cement, after 3 days and 7 days, should not be less than
- (A) 2.0 N/mm² and 2.5 N/mm² respectively
 (B) 2.5 N/mm² and 3.0 N/mm² respectively
 (C) 3.0 N/mm² and 3.5 N/mm² respectively
 (D) 4.0 N/mm² and 5.0 N/mm² respectively
105. Which of the following shape of aggregates gives the maximum strength in concrete?
- (A) Rounded aggregate (B) Elongated aggregate
 (C) Flaky aggregate (D) Angular aggregate
106. Admixtures which are used to lower the permeability of concrete are known as
- (A) Accelerators (B) Water-repellent admixtures
 (C) Air entraining agents (D) Bonding admixtures
107. Which type of the following mix will be produced if the fineness modulus of an aggregate is high?
- (A) Lean concrete (B) Stiff concrete
 (C) Harsh concrete (D) Workable concrete

112. The purpose of 'U' fork in plane tabling is
- (A) to transfer the ground point on to drawing sheet
 - (B) to transfer the ground line on to drawing sheet
 - (C) to fix magnetic meridian
 - (D) to fix the table
113. The sequence of temporary adjustments is
- (A) Centring, setting and elimination of parallax
 - (B) Setting up, levelling up and elimination of parallax
 - (C) Setting, adjusting and focussing
 - (D) Setting, focussing and bisecting
114. In case, theodolite is with four levelling screws, levelling up is done
- (A) in parallel position
 - (B) in perpendicular position
 - (C) diagonally
 - (D) horizontally
115. In tacheometric surveying the focal length of objective and stadia interval is 20 cm and 4 mm. Staff intercept is 1 m. Line of sight is perpendicular to staff. The horizontal distance between instrument and staff by assuming additive constant zero, is
- (A) 60 m
 - (B) 50 m
 - (C) 80 m
 - (D) 100 m
116. In surveying, gross errors occur due to
- (A) atmospheric temperature and pressure
 - (B) curvature and refraction
 - (C) faulty and improper instrument
 - (D) carelessness and inexperience of surveyor
117. Curvature effect reduces the value of
- (A) Horizontal distance
 - (B) Vertical distance
 - (C) Reduced level
 - (D) Vertical angle

123. The rigidity modulus G , in terms of modulus of elasticity E and Poisson's ratio $\frac{1}{m}$ is given by

(A) $G = \frac{E}{2\left(1 + \frac{1}{m}\right)}$

(B) $G = \frac{2E}{\left(1 + \frac{1}{m}\right)}$

(C) $G = \frac{E}{2\left(1 - \frac{1}{m}\right)}$

(D) $G = \frac{E}{\left(1 - \frac{1}{m}\right)}$

124. The shape of the bending moment diagram for simply supported beam carrying a uniformly distributed load over the entire span is

(A) linear

(B) cubical curve

(C) circular curve

(D) parabolic curve

125. For a cantilever beam with a uniformly distributed load " w " per unit run carried for a entire span of length ' l ', then the maximum bending moment will be

(A) $\frac{wl^2}{3}$

(B) $\frac{wl^2}{4}$

(C) $\frac{wl^2}{2}$

(D) $\frac{wl}{2}$

126. If σ_1 and σ_2 are principal stresses, the maximum shear stress τ_{\max} in terms of principal stresses is given by

(A) $\frac{\sigma_1 + \sigma_2}{2}$

(B) $\sigma_1 - \sigma_2$

(C) $\sigma_1 + \sigma_2$

(D) $\frac{\sigma_1 - \sigma_2}{2}$

127. If G is the modulus of rigidity and J is the polar moment of inertia then the torsional rigidity of the shaft is

(A) G/J

(B) GJ

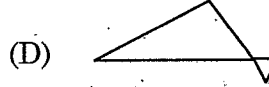
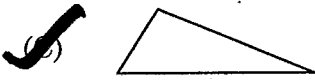
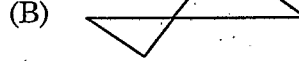
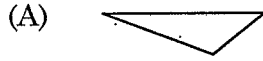
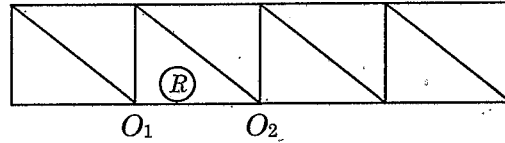
(C) J/G

(D) GJ^2

128. The span and dip of a parabolic cable are L and d respectively. Then the length of the cable(s) is approximately equal to
- (A) $S = L + \frac{3}{8} \frac{d^2}{L}$ (B) $S = L + \frac{8}{3} \frac{d^2}{L}$
- (C) $S = L + \frac{3}{8} d$ (D) $S = L + \frac{8}{3} d$
129. If a beam of length L having Young's modulus ' E ' and moment of inertia ' I '. Sinks at one the support by δ , then sinking moment for beam fixed at both the ends is
- (A) $\frac{3EI\delta}{l^2}$ (B) $\frac{6EI\delta}{l^2}$
- (C) $\frac{4EI\delta}{l^2}$ (D) $\frac{2EI\delta}{l^2}$
130. In the case of a three-hinged parabolic arch carrying a uniformly distributed load on the entire span, then bending moment will be
- (A) equal to that of a simply supported beam loaded in the same manner
- (B) maximum at quarter span
- (C) zero only at the centre
- (D) zero throughout the span
131. If Q is load factor, S is shape factor and F is factor of safety in elastic design. Pick up the correct relation.
- (A) $Q = \frac{S}{F}$ (B) $Q = S \times F$
- (C) $Q = S + F$ (D) $Q = S - F$
132. Which is the most important tool in obtaining influence lines for statically determinate and statically indeterminate structures?
- (A) Eddy's theorem
- (B) Williot Mohr diagram
- (C) Muller Breslau method
- (D) Column Analogy method

133. The reaction locus for a semi-circular arch is
- (A) an ellipse
 (B) a parabolic curve
 (C) a straight line not parallel to $\frac{\pi R}{2}$
 (D) a straight line parallel to $\frac{\pi R}{2}$
134. Euler's formula for a long column hinged at both ends is not valid for slenderness ratio
- (A) less than 80
 (B) greater than 80
 (C) greater than 180
 (D) greater than 120
135. Which one of the following is true example of a statically indeterminate structure?
- (A) Overhanging beam
 (B) Simply supported beam
 (C) Fixed beam
 (D) Cantilever beam
136. A cantilever beam subjected to a uniformly distributed load of intensity "w" kN/m propped at free end by a rigid prop to the same level of fixed support. The reaction in the prop is
- (A) $\frac{3}{8}wl$
 (B) wl
 (C) $\frac{wl}{2}$
 (D) $\frac{5}{8}wl$
137. For a three hinged parabolic arch V_x is sum of the vertical forces on the left hand side of the section, H is the horizontal thrust. If ' θ ' is the angle of tangent at the point on arch with the horizontal, then the radial shear ' R_x ' is given by
- (A) $V_x \cos \theta - H \sin \theta$
 (B) $V_x \sin \theta - H \cos \theta$
 (C) $V_x \sin \theta + H \cos \theta$
 (D) $V_x \cos \theta + H \sin \theta$

138. The given figure shows a portal truss, the influence line diagrams for the member R .



139. The elements of flexibility matrix of a structure

- (A) are independent of the choice of coordinates
- (B) are dependent of the choice of coordinates
- (C) are always dimensionally homogeneous
- (D) both (B) and (C)

140. The three moment equation is applicable only when

- (A) the spans are equal
- (B) the beam is prismatic
- (C) there is no discontinuity such as hinges within the span
- (D) there is no settlement of supports

141. A three hinged parabolic arch has its abutment at depth of h_1 and h_2 below the crown. It is subjected to a uniformly distributed load w /unit length for the whole span. If the span of the arch is l , the horizontal thrust at each support is given by

(A) $\frac{wl}{\sqrt{h_1^2 + h_2^2}}$

(B) $\frac{wl}{h_1 + h_2}$

(C) $\frac{wl^2}{2(\sqrt{h_1} + \sqrt{h_2})^2}$

(D) $\frac{wl^2}{(h_1 + h_2)^2}$

142. Match List I with List II and select the correct answers using the codes given below. TNPSC.News

List I

List II

- | | |
|--------------------------------|---|
| (a) Ultimate bearing capacity | 1. Net loading intensity at which neither soil fails in shear nor is there any excessive settlement |
| (b) Net safe bearing capacity | 2. The maximum pressure which soil can carry safely without risk of shear failure |
| (c) Safe bearing capacity | 3. Net ultimate bearing capacity divided by factor of safety |
| (d) Allowable bearing pressure | 4. Minimum gross pressure intensity at the base of foundation at which soil fails in shear |

(a) (b) (c) (d)

- | |
|---|
| <input checked="" type="checkbox"/> (A) 4 3 2 1 |
| (B) 2 1 4 3 |
| (C) 1 2 4 3 |
| (D) 2 1 3 4 |

143. According to Skempton's formula for a surface footing of square shape, the net ultimate bearing capacity on a purely cohesive soil of cohesion 'C' is

- | | |
|------------|---|
| (A) 1.5 C | <input checked="" type="checkbox"/> (B) 6.0 C |
| (C) 10.0 C | (D) 15 C |

144. A foundation has a depth of embedment less than its width is known as

- | | |
|--|---------------------|
| <input checked="" type="checkbox"/> (A) shallow foundation | (B) deep foundation |
| (C) pile foundation | (D) well foundation |

145. Compression index of a soil helps to determine

- | |
|---|
| (A) total time required for consolidation |
| (B) time required for 50% consolidation |
| <input checked="" type="checkbox"/> (C) consolidation settlement of clay soil |
| (D) pre-consolidation pressure of clay |

146. The following data refer to a sample of soil :

Percent passing 4.75 mm IS sieve – 71

Percent passing .75 μ IS sieve – 4

Uniformity coefficient – 7.5

Coefficient of curvature – 2.7

The soil is classified as

(A) SW

(B) GW

(C) SM

(D) GM

147. Consistency Index of a soil is defined as the ratio of

(A) the difference between liquid limit and the natural water content to the plasticity index of a soil

(B) the difference between natural water content and the liquid limit to the plasticity index of a soil

(C) the difference between plasticity index and the liquid limit to the natural water content of a soil

(D) the difference between plasticity index and the natural water content to the liquid limit of a soil

148. If N_f , N_d and H are total number of flow channels, total number of potential drops and total hydraulic head differences respectively, where K is the coefficient of permeability, the discharge on flow per unit length q is given by

(A) $q = KH^{1/2} \frac{N_f}{N_d}$

(B) $q = KH \frac{N_f}{N_d}$

(C) $q = K^{1/2} H \frac{N_f}{N_d}$

(D) $q = KH \sqrt{\frac{N_f}{N_d}}$

149. For collecting undisturbed samples, the area ratio of sampler is to be

(A) 0

(B) <10%

(C) >10%

(D) 100%

150. One of the following is not related to the common types of collection equipment of aerosols

(A) Settling chambers

(B) Cyclones

(C) Filters

(D) Grit chambers

151. A water-borne disease caused by protozoa
(A) Cholera (B) Paratyphoid
(C) Histoplasmosis (D) Amoebic dysentery
152. The type of coagulant used in sewage treatment is prepared by the Scott Darcy process
(A) Ferric Sulphate (B) Ferrous Sulphate
(C) Ferric Chloride (D) Ferrous Chloride
153. The point of inflexion occurs in an oxygen sag curve when the rate of recovery of oxygen is
(A) Zero (B) Minimum
(C) Maximum (D) Unity
154. The residual chlorine in water for ensuring safety against pathogenic bacteria should remain between
(A) 0.01 to 0.02 ppm (B) 0.02 to 0.04 ppm
(C) 0.05 to 0.20 ppm (D) 0.20 to 0.50 ppm
155. Nature of water corresponding to 3 degree of hardness value
(A) Very soft water (B) Soft water
(C) Hard water (D) Reasonably hard water
156. The minimum diameter of longitudinal bars provided in columns should not be less than
(A) 12 mm (B) 10 mm
(C) 8 mm (D) 6 mm
157. For columns with both ends restrained, the unsupported length shall not be _____ times the least lateral dimension of column section.
(A) Less than 60 (B) Greater than 50
(C) Less than 40 (D) Greater than 60
158. In the design of columns for the longitudinal reinforcement, the spacing of bars measured along the periphery of the column shall not exceed
(A) 200 mm (B) 250 mm
(C) 300 mm (D) 350 mm

159. Bearing stiffeners are provided
- (A) at the end and on both faces of the web
 - (B) at the end of a plate girder
 - (C) at the points of concentrated loads
 - (D) throughout the span
160. The loads to be considered for the design of a gantry girder are :
- (A) Gravity load
 - (B) Lateral load and longitudinal load
 - (C) Gravity load, lateral load and longitudinal load
 - (D) Gravity load, wind load and longitudinal load
161. The provision of intermediate stiffeners is to
- (A) Enhance the bearing capacity of the web
 - (B) Resist the applied loads
 - (C) Provide stiffness to the web
 - (D) Enhance the buckling capacity of the web
162. The high tensile steel tendon in a prestressed concrete member
- (A) Remains under a constant stress
 - (B) Does not remain under a constant condition of either stress or strain
 - (C) Remains under a constant strain
 - (D) Remains under a varying stress
163. If a concrete beam is subjected to an eccentric prestressing force of magnitude P , at an eccentricity e , the stress developed at the bottom fibre of the beam is
- (A) $\frac{P}{A} + \frac{P_e}{z_b}$
 - (B) $\frac{P}{A} - \frac{P_e}{z_b}$
 - (C) $-\frac{P}{A} - \frac{P_e}{z_b}$
 - (D) $-\frac{P}{A} + \frac{P_e}{z_b}$

where A – cross sectional area of the concrete member

z_b -section modulus of the bottom fibre

164. The device which are used for measuring discharge in open channels.
- (A) Orifice meter (B) Orifice
(C) Venturi flume (D) Pitot tube
165. If the velocity of flow of fluid changes from point to point in the flowing fluid at any instant, the flow is said to be
- (A) Non-Uniform (B) Uniform
(C) Steady (D) Unsteady
166. The depth of a uniform flow is called
- (A) Normal depth (B) Minimum depth
(C) Maximum depth (D) Negative depth
167. The time period that elapses from the instant of sowing to the instant of harvesting is called as
- (A) Base period (B) Growth period
(C) Crop period (D) Rotation period
168. The efficiency of sprinkler irrigation in moderate climate is
- (A) 60% (B) 70%
(C) 80% (D) 90%
169. A land is considered to be prone to water logging when the water table is
- (A) within 1.5 m of ground surface (B) within 2 m of ground surface
(C) within 3 m of ground surface (D) within 3.5 m of ground surface
170. A pitot tube is used for measuring
- (A) Velocity of flow (B) Pressure of flow
(C) Flow rate (D) Total energy
171. For most economical trapezoidal section, the best side slope is at
- (A) 30° to the horizontal (B) 45° to the horizontal
(C) 60° to the horizontal (D) 90° to the horizontal

172. A vertical gate closes a horizontal tunnel 6 m high and 3 m wide running full with water. The pressure at the bottom of the gate is 196.2 kN/m^2 . The total pressure on the gate is
- (A) 4 kN (B) $5.008 \times 10^6 \text{ N}$
 (C) 8 MN (D) $3.001 \times 10^6 \text{ N}$
173. Vorticity is given by
- (A) 3.0 times the rotation (B) 3.5 times the rotation
 (C) 2.0 times the rotation (D) 1.5 times the rotation
174. The discharge through a V-notch varies as
- (A) $H^{1/2}$ (B) H
 (C) $H^{3/2}$ (D) $H^{5/2}$
175. Modified Pul's method of reservoir routing is also known as
- (A) Muskingum method
 (B) Storage indication method
 (C) Inflow storage discharge method
 (D) Inflow discharge storage method
176. The total observed run off volume during a 6 hour storm with a uniform intensity of 1.5 cm/hour is $21.6 \times 10^6 \text{ m}^3$. If the area of the basin is 300 km^2 , the average infiltration rate for the basin is
- (A) 7 mm/h (B) 9 mm/h
 (C) 3 mm/h (D) 4 mm/h
177. Orificemeter is used to measure
- (A) average velocity (B) velocity at a point
 (C) discharge (D) pressure at a point
178. The length of all streams per unit area of a watershed is called
- (A) Stream density (B) Drainage density
 (C) Stream coefficient (D) Drainage coefficient

185. Match List I with List II and select the correct answer by using the codes given below the lists :

List I

(Type of road)

- (a) Single lane road
 (b) Two lanes road with out kerbs
 (c) Two lanes road with raised kerbs
 (d) Multi-lane road

List II

(Width of carriage way)

1. 7.0 m
 2. 7.5 m
 3. 3.75 m
 4. 3.5 m per lane

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

186. The grade compensation for a hill road with horizontal curve of radius 60 m is

 (A) 1.5% (B) 2.5% (C) 3% (D) 4%

187. In general requirement in constructing a reinforced concrete road is to place a single layer of reinforcement

 (A) Near the bottom of the slab (B) Near the top of the slab (C) At the middle (D) Only at the joint

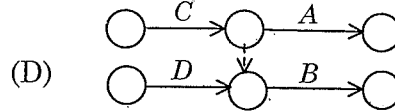
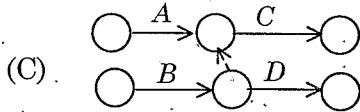
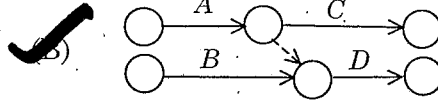
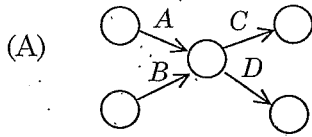
188. The corner wheel load stress for a rigid pavement of 20 cm thick and wheel load of 4000 kg, according to gold beck formula is

 (A) 20 kg/cm² (B) 30 kg/cm² (C) 80 kg/cm² (D) 40 kg/cm²

189. Choose the correct statement

 (A) Take-off is along wind direction (B) Landing is along wind direction (C) Take-off and landing is always opposite to wind direction (D) Take-off and landing is along wind direction

190. Activity 'C' follows activity 'A' and activity 'D' follows activities 'A' and 'B'. The correct network of the project is



191. In the process of determining the quality of large group, reliability is expressed as

(A) Reliability Number = $1 - \left[\frac{\text{No. of defective units}}{\text{No. of units tested}} \times 100 \right]$

(B) Reliability Number = $1 - \left[\frac{\text{No. of units tested}}{\text{No. of defective units}} \times 100 \right]$

(C) Reliability Number = $100 - \left[\frac{\text{No. of defective units}}{\text{No. of units tested}} \times 100 \right]$

(D) Reliability Number = $100 - \left[\frac{\text{No. of units tested}}{\text{No. of defective units}} \times 100 \right]$

192. Lead time in material management means

(A) Elapsed time

(B) Time delay factor

(C) Both (A) and (B)

(D) Time elapsed between ordering, receiving and putting material into use

193. The optimistic, most likely and pessimistic time estimates of an activity are 8, 10, 12 days respectively. What is the expected time?

(A) 9 days

(B) 10 days

(C) 11 days

(D) 12 days

194. Which one of the statement is correct?

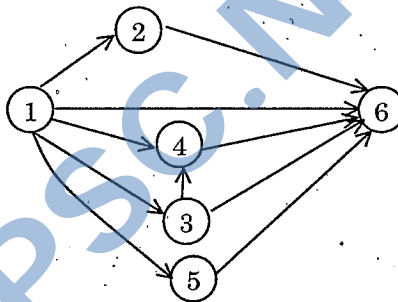
(A) An unconfined compression test is a special case of direct shear test

(B) An unconfined compression test is a special case of vane shear test

(C) An unconfined compression test is a special case of triaxial compression test

(D) The confining pressure is maximum during an unconfined compression test

195. The estimate prepared for technical sanction of the competent authority should be attached with
- (A) Detailed specification (B) Report
 (C) Abstract (D) Both detailed specification and report
196. The person or a firm who undertakes a contract to execute a work or to supply the material is termed as
- (A) Competent authority (B) Contract work
 (C) Contractor (D) Scheduled contractor
197. The brick work is not measured in cu.m in case of
- (A) Brick work in arches (B) Brick work in foundation
 (C) Half brick work (D) Reinforced brick work
198. The number of errors in the given network is



- (A) 1 (B) 2
 (C) 3 (D) 4
199. Bar chart is drawn for
- (A) Time Vs resources (B) Time Vs progress
 (C) Time Vs activity (D) Activity Vs resources
200. The rule of numbering the events is introduced by
- (A) D.R. Fulkerson (B) F.W. Taylor
 (C) Henry Gantt (D) M.R. Kelly