Sl. No.

018116

DICI

Register Number

2012
CIVIL ENGINEERING

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 on side 1 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., 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, 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 :
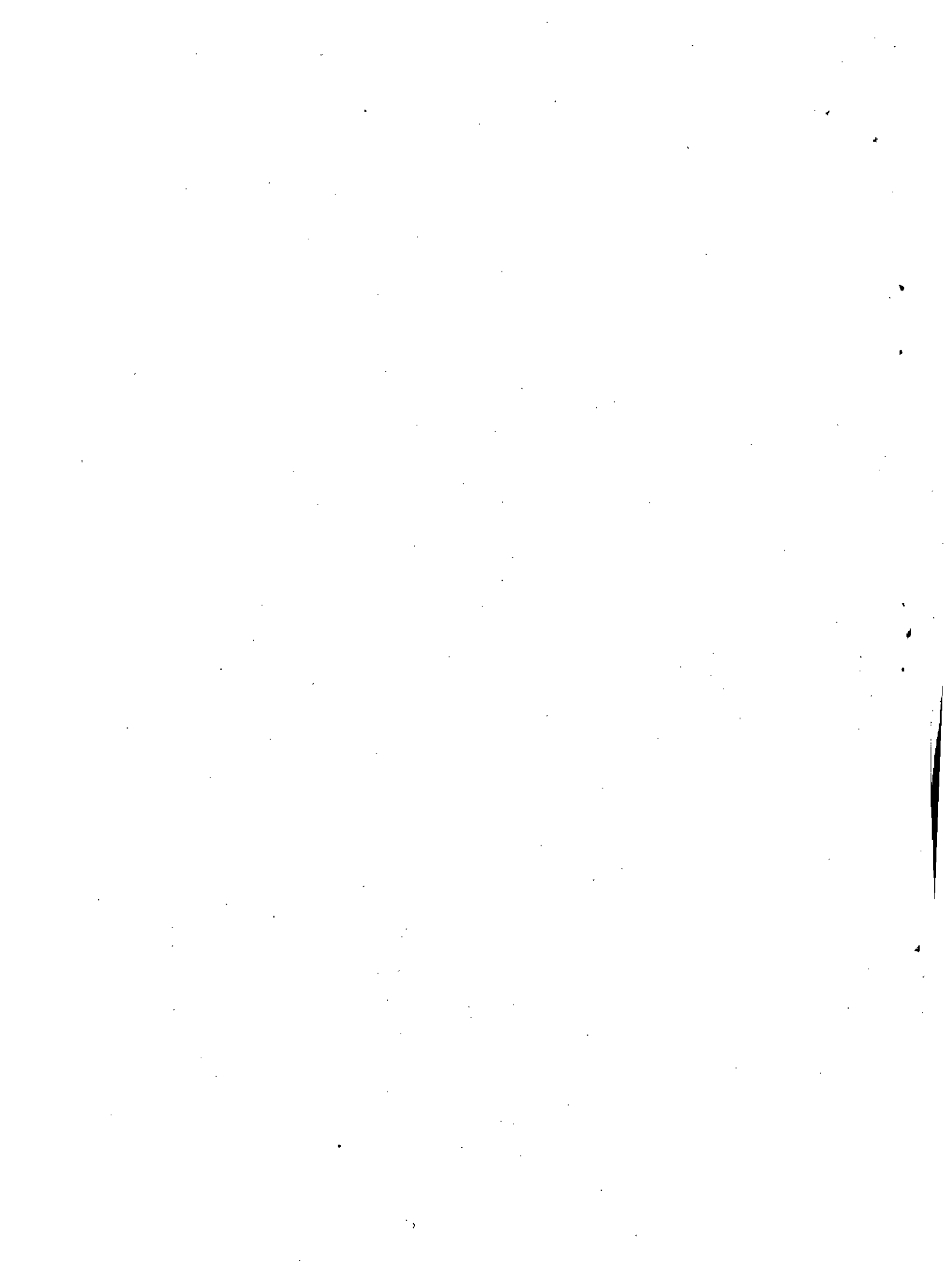
<p align="center">[A]█ [C] [D]</p>

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. 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.

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.

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. 1. A redundant frame satisfies the equation

A) $m = 2j - 3$ B) $m < 2j - 3$

C) $m > 2j - 3$ D) none of these.

2. The polar moment of inertia of a hollow shaft of outer diameter (D) and inner diameter (d) is

A) $\frac{\pi}{16}(D^4 - d^4)$ B) $\frac{\pi}{32}(D^4 - d^4)$

C) $\frac{\pi}{64}(D^4 - d^4)$ D) none of these.

3. The load shared by the member *BC* of the structure shown in figure below is

A) $2\sqrt{3}$ kN   B) $3\sqrt{2}$ kN

C) 4 kN   D) 3 kN.

4. The C. G. of a semicircular lamina lies at a distance of

A) $\frac{4r}{3\pi}$ from base diameter   B) $\frac{3r}{8}$ from base diameter

C) $\frac{8r}{3}$ from base diameter   D) none of these.

5. In the torsion equation $\frac{T}{J} = \frac{\tau_{max}}{R} = \frac{N\theta}{l}$ the term $\frac{J}{R}$ is called

A) shear modulus   B) section modulus

C) polar modulus   D) none of these.

6. The modulus of elasticity for mild steel is approximately equal to

A) 0.1×10^5 N/mm^2 B) 0.8×10^5 N/mm^2

C) 1.0×10^5 N/mm^2 D) 2.1×10^5 N/mm^2.
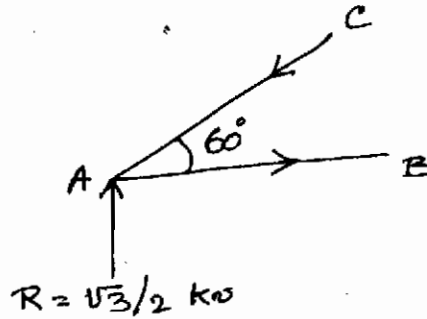
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7. When a body is subjected to three mutually perpendicular like and equal direct, stresses, the ratio of direct stress to the corresponding volumetric strain (within certain limit) is known as

    A) Young's modulus   B) Poisson's ratio

    C) Shear modulus   D) Bulk modulus.

8. Force in the member AC in the figure shown below is

    A) 1 kN   B) – 1 kN

    C) $\sqrt{3}$ kN   D) $-\sqrt{3}$ kN.

9. Radius of gyration of a circular section is

    A) $\dfrac{d}{\sqrt{12}}$ B) $\dfrac{d}{\sqrt{18}}$

    C) $\dfrac{d}{\sqrt{24}}$ D) $\dfrac{d}{4}$.

10. The limit within which Hook's law holds good is known as

    A) Elastic limit   B) Plastic limit

    C) Yield point   D) Euler's limit.

11. The bulk modulus in terms of modulus of Elasticity E and Poisson's ratio μ is given by

    A) $E(1 + \mu)$ B) $\dfrac{3E}{(1 - 2\mu)}$

    C) $\dfrac{E}{3(1 - 2\mu)}$ D) none of these.

12. The effect of external forces or the nature of internal forces developed in a body may be

    A) tension   B) compression

    C) shear   D) all of these.

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13. Poisson's ratio may vary from

   A)   0·52 to 0·60   B)   0·55 to 0·60

   C)   0·25 to 0·40   D)   none of these.

14. The point of contraflexure occurs in

   A)   simply supported beams only   B)   cantilever beams only

   C)   columns only   D)   overhanging beams only.

15. A simple support offers

   A)   only a vertical reaction

   B)   only a horizontal reaction

   C)   a vertical reaction and a horizontal reaction

   D)   a horizontal reaction and a moment reaction.

16. When a rectangular bar of length l, breadth b and thickness t is subjected to a pull of p, then volumetric strain is

   A) $e (1 - 2m)$ B) $e (2m - 1)$

   C) $e (1 - 2/m)$ D) $e (2/m - 1)$.

17. A beam supported on more than two supports is called

   A)   simply supported beam   B)   fixed beam

   C)   cantilever beam   D)   continuous beam.

18. The basic perfect frame is a

   A)   triangle   B)   rectangle

   C)   hexagon   D)   square.

19. A circular steel bar of 2 cm diameter carries a tensile load of 30 kN. If $E = 2 \times 10^5$ N/mm², the elongation in the 30 cm length of bar will be

   A)   0·0143 mm   B)   0·1430 mm

   C)   1·43 mm   D)   14·30 mm.

20. The unit of strain is

   A)   N-mm   B)   N/mm

   C)   no unit   D)   mm.

21. . Modulus of Rigidity is

    A)   axial stress divided by axial strain

    B)   shear stress divided by shear strain

    C)   increase or decrease in volume divided by original volume

    D)   direct stress divided by volumetric strain.

22. The maximum deflection at the free end of a cantilever subjected to a point load at $^l/_2$ from both ends is

    A) $\dfrac{5\,Wl^3}{48\,EI}$

    B) $\dfrac{5\,Wl^3}{46\,EI}$

    C) $\dfrac{5\,Wl^3}{42\,EI}$

    D) $\dfrac{5\,Wl^3}{44\,EI}$.

23. The degree of indeterminacy for a fixed beam is

    A)   1

    B)   zero

    C)   3

    D)   2.

24. A cantilever AB is subjected to a concentrated load at the free end, the slope and deflection at the free end are $WL^2/2EI$ and $WL^3/3EI$. If the same load is applied at mid-span point the deflection at the free end will be

    A) $\dfrac{5}{384}\dfrac{WL^3}{EI}$

    B) $\dfrac{5}{48}\dfrac{WL^3}{EI}$

    C) $\dfrac{WL^3}{6\,EI}$

    D) $\dfrac{WL^3}{16\,EI}$.

25. A simply supported beam is subjected to a central concentrated load. The slope at the two ends is given by

    A) $\dfrac{WL^2}{6\,EI}$

    B) $\dfrac{WL^3}{48\,EI}$

    C) $\dfrac{WL^2}{48\,EI}$

    D) $\dfrac{WL^2}{16\,EI}$.

26. Continuous beams are

   A) stronger and much stiffer than simple beams

   B) weaker and less stiffer than simple beams

   C) subjected to excessive shear strain

   D) with standing double the maximum bending moment on simple beams.

27. Effective span is normally taken as distance between centres of

   A) supports   B) bearing

   C) end plates   D) bed plate.

28. For a circular column section to avoid tension, the limit of eccentricity "e" is (where D is diameter of the column)

   A) $\dfrac{D}{3}$ B) $\dfrac{D}{8}$

   C) $\dfrac{D}{5}$ D) $\dfrac{D}{6}$.

29. A propped cantilever beam of span 'L' is loaded with UDL of intensity W/unit length, all through the span. The BM at the fixed end is

   A) $\dfrac{WL^2}{8}$ B) $\dfrac{WL^2}{2}$

   C) $\dfrac{WL^2}{12}$ D) $\dfrac{WL^2}{24}$.

30. Choose the wrong statement :

   A) Column is a vertical member of a structure which carries an axial compressive force.

   B) The ratio of length of a column to its minimum radius of gyration is called slenderness ratio.

   C) A column tends to buckle in the direction of the minimum moment of inertia.

   D) The equivalent length of a column with one end fixed and other end free, is half of its actual length.

31. For a statically determinant structure, the degree of indeterminacy is equal to

A) one   B) more than one

C) zero   D) none of these.
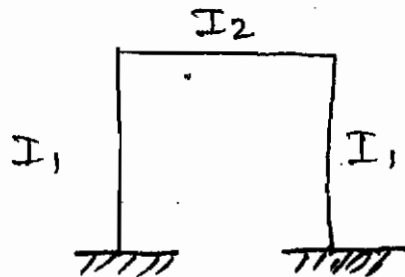
32. The truss can be analysed by the methods of joints when the number of unknowns at a joint is equal to

A) 1   B) 2

C) either (A) or (B)   D) 3.

33. The rigid portal frame shown in figure will not have any sideway, if

(I_1 = the moment of inertia of the column cross-section.

I_2 = the moment of inertia of the beam cross-section)

A) it is subjected to vertical loading only

B) $I_1 = 2I_2$

C) the loading is symmetrical about its centre line

D) loaded in any manner.

34. A column is subjected to an eccentric load of 10 kN at an eccentricity of 50mm. The moment induced is

A) 500 N-mm   B) 500000 N-mm

C) 50 kN-m   D) 50 N-mm.

35. A cantilever beam of span 6 metre with right end fixed carries a uniformly distributed load of 3kN/m throughout its length. The magnitude of maximum shear force is

A) – 24 kN-m   B) – 12 kN

C) – 24 kN   D) – 18 kN.

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36. When a cantilever beam with a UDL is propped at the end, then the prop reaction is

A) $\dfrac{wl^3}{48\,EI}$

B) $\dfrac{wl^2}{8}$

C) $\dfrac{3\,wl}{8}$

D) $\dfrac{5\,wl}{8}$.

37. Static equilibrium equation is

A) algebraic sum of all the vertical forces are equal to zero

B) algebraic sum of all the horizontal forces are equal to zero

C) algebraic sum of all the moments are equal to zero

D) all of these.

38. Slenderness ratio of the column is

A) $\dfrac{\text{Length}}{\text{Minimum side dimension}}$

B) $\dfrac{\text{Effective length}}{\text{Moment of inertia}}$

C) $\dfrac{\text{Effective length}}{\text{Least radius of gyration}}$

D) $\dfrac{\text{Length}}{\text{Area of cross -section}}$.

39. The effective length of a column one end fixed and the other end free, is (where 'L' is actual, unsupported length of column)

A) 0·5 L

B) 1·3 L

C) 2·0 L

D) 3·0 L.

40. According to Euler's column theory, the critical load (P) on the column with both ends fixed condition is

A) $P = \dfrac{\pi^2 E I}{l^2}$

B) $P = \dfrac{4\pi^2 E I}{l^2}$

C) $P = \dfrac{4\pi^2 E I}{4l^2}$

D) $P = \dfrac{2\pi^2 E I}{l^2}$.

41. The seasoning of timber is done to

A) heat the timber

B) expel the moisture from timber

C) make it waterproof

D) increase its strength.

42. Turpentine oil is used in paints as a

    A) base
    B) drier
    C) thinner
    D) vehicle.

43. Mortar is a paste made by mixing

    A) lime, surki and water
    B) lime, sand and water
    C) cement, sand and water
    D) all of these.

44. Vicat's apparatus is used to determine all of the following *except*

    A) normal consistency of cement
    B) fineness modulus of cement
    C) initial setting time of cement
    D) final setting time of cement.

45. The function of a solvent in the paint is

    A) to dilute the base of a paint
    B) to produce desired colour of the paint
    C) to dissolve and hold in suspension the base and pigment
    D) to dilute the vehicle prior to the application of paint on the surface.

46. The foundation which consists of a thick reinforced cement slab covering whole area to support heavy concentrated structural loads, is known as

    A) combined footing
    B) strap footing
    C) raft footing
    D) none of these.

47. The foundations are placed below ground level, to increase

    A) strength
    B) workability
    C) stability of structure
    D) all of these.

48. The portion of a brick cut across the width, is called

    A) closer
    B) half brick
    C) bed
    D) bat.

49. The volume of one bag of cement weighing 50 kg is

    A) 0·05 m³
    B) 0·0345 m³
    C) 0·025 m³
    D) 0·04 m³.

50. Cavity walls

    A) prevent dampness from entering the building
    B) have lesser dead load for given wall thickness
    C) are better insulated against heat and sound
    D) all of these.

51. The width of rebate provided in a door frame is equal to the width of the shutter whereas depth of the rebate provided should be

    A)　50 mm
    B)　20 mm
    C)　12 mm or 13 mm
    D)　5 mm to 8 mm.

52. The best and the common material to be used as damp-proofing material is

    A)　cement concrete
    B)　bitumen
    C)　paraffin wax
    D)　cement solution.

53. A type of bond in a brick masonry consisting of alternate course of headers and stretchers is called

    A)　English bond
    B)　Flemish bond
    C)　Stretcher bond
    D)　none of these.

54. The innermost central portion of a tree is called

    A)　heart wood
    B)　pith
    C)　sap wood
    D)　cambium layer.

55. Damp-proof course should be

    A)　impervious
    B)　horizontal (or) vertical
    C)　continuous
    D)　all of these.

56. According to their movements, doors are classified as

    A)　folding
    B)　swinging
    C)　glazed
    D)　both (A) and (B).

57. The excess alumina in the clay makes the brick

    A)　to crack and warp on drying
    B)　brittle and weak
    C)　to melt and distort during burning
    D)　to absorb moisture from air which on drying leaves powder deposit on the brick.

58. The highest point on the extrados of the arch is known as

    A)　summit
    B)　ridge
    C)　crown
    D)　peak.

[Turn over

59. Dampness causes

A) growth of termites
B) strengthening of concrete
C) strengthening of plaster
D) adhesion of paint to surface.

60. The horizontal member of the frame which divides the window horizontally is

A) rail
B) transit
C) transome
D) divider.

61. Which of the following is a measure of particle size range ?

A) Effective size
B) Uniformity coefficient
C) Coefficient of curvature
D) None of these.

62. Indian Road Congress was established in

A) 1934
B) 1952
C) 1947
D) 1961.

63. As per IRC, the carriageway width for two lane traffic should be

A) 7·5 m
B) 10 m
C) 12·5 m
D) 5 m.

64. A gradient at which a vehicle does not require any tractive effort, to maintain the specified speed is called

A) minimum gradient
B) floating gradient
C) ruling gradient
D) pushing gradient.

65. The portion of a roadway used by vehicular traffic is called

A) Carriageway
B) Right way
C) Expressway
D) Motorway.

66. The rate of rise or fall of a road along its alignment is known as

A) Gradient
B) Camber
C) Side slope
D) Superelevation.

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67. The highest point on a carriageway is known as

   A) Crown   B) Camber

   C) Superelevation   D) Gradient.

68. While testing a soil, thread test is conducted in the field in order to find out

   A) Liquid limit   B) Plastic limit

   C) Shrinkage   D) Bearing limit.

69. Bottom-most layer of pavement is known as

   A) wearing course   B) base course

   C) sub-base course   D) subgrade.

70. A wall constructed for the stability of the excavated portion of the road on the hill side is known as

   A) parapet wall   B) retaining wall

   C) breast wall   D) guide wall.

71. The water content of soil which represents the boundary between plastic state and liquid state is known as

   A) liquid limit   B) plastic limit

   C) shrinkage limit   D) plasticity index.

72. A culvert is a .... structure of less than 6 m span between the faces of abutment.

   A) masonry   B) timber

   C) concrete   D) bridge.

73. The alignment of highway means layout of its

   A) centre line on ground   B) width

   C) superelevation   D) none of these.

74. Specific gravity of the soil particles is needed in determining

   A) void ratio   B) porosity and degree of saturation

   C) particle size distribution   D) all of these.

75. The ratio of the volume of voids to the total volume of the given soil mass is known as

   A) porosity   B) specific gravity

   C) void ratio   D) water content.

76. The liquid limit exists for

   A) sandy soils   B) silty soils

   C) clayey soils   D) none of these.

77. The maximum size of the particles of clay is about

   A) 0·0002 mm   B) 0·002 mm

   C) 0·02 mm   D) 0·2 mm.

78. At the liquid limit the

   A) soil just begins to crumble when rolled into thread

   B) shearing strength against flow is negligible

   C) shearing strength against flow is small but definite

   D) soil is not fully saturated.

79. The void ratio of a soil is defined as the ratio of the

   A) weight of water to the weight of solids

   B) volume of water to the volume of voids in the soil mass

   C) total volume of voids to the volume of soil solids

   D) total volume of voids to the total volume of soil.

80. California Bearing Ratio (CBR) is

   A) a measure of soil strength

   B) a procedure for designing flexible pavements

   C) a method of soil identification

   D) a measure to indicate the relative strengths of paving materials.

81. Reynolds number is the ratio of inertia force to

   A) surface tension   B) gravitational force

   C) viscous force   D) none of these.

82. The principle of Bernoulli's theorem is applied in

    A) venturimeter
    B) orifice meter
    C) both (A) and (B)
    D) none of these.

83. Loss due to sudden enlargement of pipe diameter is given by

    A) $\dfrac{V_1^2 - V_2^2}{g}$
    B) $\dfrac{(V_1 - V_2)^2}{g}$

    C) $\dfrac{(V_1 - V_2)^2}{2g}$
    D) none of these.

84. The yield of a well can be obtained by

    A) a pumping test
    B) recuperating test
    C) a chemical test
    D) either (A) or (B).

85. Maximum velocity and discharge in rectangular channel occurs, when the depth of the channel is .... the breadth.

    A) Equal
    B) Twice
    C) Half
    D) Thrice.

86. Infiltration is the

    A) movement of water through the soil
    B) absorption of water by soil surface
    C) both (A) and (B)
    D) none of these.

87. Method of irrigation in which water is applied in the form of a spray as in ordinary rain is known as

    A) furrow irrigation
    B) sprinkler irrigation
    C) check flooding irrigation
    D) free flooding irrigation.

88. The ratio of area under different crops for a particular channel is known as .... ratio.

    A) discharge
    B) supply
    C) feed
    D) crop.

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[Turn over

89. The average yield from a tubewell is of order of

    A) 20 to 40 lit/sec

    B) 40 to 50 lit/sec

    C) 50 to 100 lit/sec

    D) 100 to 150 lit/sec.

90. The top of the weir or spillway is called

    A) Ridge

    B) Core

    C) Crest

    D) Peak.

91. Bernoulli's theorem deals with the law of conservation of

    A) mass

    B) momentum

    C) energy

    D) all of these.

92. Consider the following conditions :

    I. places having high ground water table

    II. places having impervious soils occurring at a depth of 2 m to 3 m below the ground surface

    III. places with moderate land slope

    The system of sub-surface irrigation can be employed usefully under the conditions

    A) I and II

    B) II and III

    C) III and I

    D) I, II and III.

93. When the bed level of the canal is higher than the H.F.L. of drainage, then the cross drainage work is said to be

    A) aqueduct

    B) superpassage

    C) canal syphon

    D) syphon aqueduct.

94. A diversion head work is constructed to

    A) raise water level in the river

    B) regulate the intake of water into the canal

    C) control the silt entry into the canal

    D) all of these.

95. Manometers are used to measure

    A) pressure in water channels, pipes etc.

    B) difference in pressure at two points

    C) atmospheric pressure

    D) very low pressure

96. Hydraulic radius is equal to

    A) area divided by the square of wetted perimeter

    B) area divided by wetted perimeter

    C) wetted perimeter divided by area

    D) square root of the area.

97. The mercury does not wet the glass. This is due to the property of the liquid known as

    A) cohesion   B) adhesion

    C) viscosity   D) surface tension.

98. The absolute pressure is equal to

    A) gauge pressure + atmospheric pressure

    B) gauge pressure – atmospheric pressure

    C) atmospheric pressure – gauge pressure

    D) gauge pressure – vacuum pressure.

99. A flow through an expanding tube at constant rate is called

    A) steady uniform flow   B) steady non-uniform flow

    C) unsteady uniform flow   D) unsteady non-uniform flow.

100. The velocity of the liquid flowing through the divergent portion of a venturimeter

    A) remains constant   B) increases

    C) decreases   D) depends upon mass of liquid.

101. Reciprocal ranging is adopted when .... is encountered.

    A) a dense forest   B) a hillock

    C) a river   D) a tall building.

[Turn over

102. The last staff reading in any set-up of the instrument and indicates shifting the instrument is

   A)   Back sight   B)   Fore sight

   C)   Change point   D)   Intermediate point.

103. The vertical distance between any two consecutive contours is known as

   A)   horizontal equivalent   B)   vertical equivalent

   C)   contour interval   D)   contour gradient.

104. The representative fraction 1/2500 means that the scale is

   A)   1 cm = 0.25 m   B)   1 cm = 2.5 m

   C)   1 cm = 25 m   D)   1 cm = 250 m.

105. For a closed traverse, the sum of the measured interior angles shall be equal to

   A) $(2n + 4)$ right angles   B) $(2n - 4)$ right angles

   C) $\left(n + \dfrac{n}{4} \right)$ right angles   D) $\left(2n + \dfrac{n}{4} \right)$ right angles.

106. For the computation of areas of irregular planes which rule is most accurate ?

   A)   Mid-ordinate rule   B)   Average ordinate rule

   C)   Trapezoidal rule   D)   Simpson's rule.

107. The contour plan shown in figure indicates
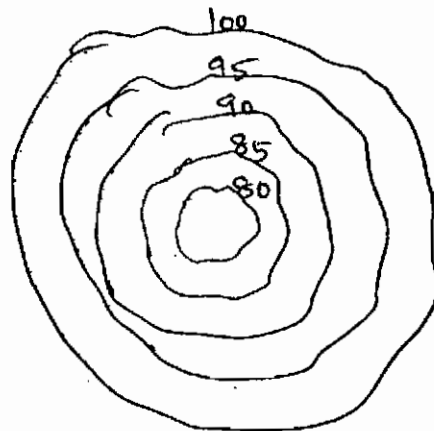
   A)   a hill   B)   a depression

   C)   steep slope   D)   plain ground.

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108. The back bearing of a line having fore bearing of 512° 24′ E will be

    A) N 12° 24′ W
    B) N 77° 36′ W
    C) N 192° 24′ W
    D) N 191° 12′ W.

109. A tie line in a chain surveying

    A) checks the accuracy of the framework
    B) enables the surveyor to locate the interior details which are far away from the main chain lines
    C) fixes up the directions of all other lines
    D) all of these.

110. The error in measured length due to sag of a chain (or) tape is known as

    A) positive error
    B) negative error
    C) compensating error
    D) instrumental error.

111. Direct ranging is possible only when the end stations are

    A) close to each other
    B) not more than 100 m apart
    C) mutually intervisible
    D) none of these.

112. In order to determine the natural features such as valleys, rivers, lakes etc. the surveying preferred is

    A) city surveying
    B) cadastral surveying
    C) location surveying
    D) topographical surveying.

113. In chain surveying, in order to locate the position of a point accurately by perpendicular offsets we should determine the direction of perpendicular by

    A) dumpy level
    B) planimeter
    C) theodolite
    D) optical square.

114. A fixed point of reference of known elevation is known as

    A) datum
    B) change point
    C) bench mark
    D) station point.

115. The process of determining the differences of elevations of stations from vertical angles and known distances is known as

    A) Trigonometric levelling
    B) Geodetic surveying
    C) Field astronomy
    D) Topographic surveying.

[Turn over

116. Tacheometric surveying is particularly adopted where

   A) obstacles, steep and broken ground deep ravines etc. exist

   B) too many curves at the border exist

   C) measurement of bodies of water are involved

   D) limitations of space exist.

117. The length of a line was measured with 20 m chain and found 530·00 m. The chain was 0·04 m too long. The true length is

   A) 531·06 m

   B) 530·04 m

   C) 529·96 m

   D) none of these.

118. The equivalent whole circle bearing to reduced bearing of N 25° 35′ W is

   A) 25° 35′

   B) 205° 35′

   C) 334° 25′

   D) none of these.

119. The correction for sag is given by the formula

   A) $C_s = \dfrac{l\,(wl)^2}{14\,p^2}$

   B) $C_s = \dfrac{p\,(wl)^2}{14\,l^2}$

   C) $C_s = \dfrac{(wl)^2}{24\,p^2 l}$

   D) $C_s = \dfrac{24\,(wl)^2}{p^2\,l}$.

120. If bearing of $OA = 20°$ and bearing of OB is $120°$, then AOB is

   A) 100°

   B) 140°

   C) 280°

   D) 80°.

121. Alum increases

   A) hardness of water

   B) sulphates in water

   C) acidity of water

   D) carbonates of water.

122. A manhole is generally provided at each

   A) bend

   B) junction

   C) change of gradient

   D) all of these.

123. The backwash arrangement is made only in the case of

   A) a rapid sand filter

   B) a slow sand filter

   C) a sedimentation tank

   D) a coagulation tank.

124. Goitre is caused by deficiency of

A) chlorine B) oxygen

C) iodine D) nitrogen.

125. A goose neck is

A) a bent flexible pipe provided between ferrule and stop-cock

B) a T-shaped brass length between water meter and ferrule

C) a straight G.I pipe, service pipe and stop-cock

D) a bent rigid pipe between service pipe and water-meter.

126. The valve which operates automatically when the pressure in the pipe exceeds the set pressure is called

A) Safety valve B) Pressure valve

C) Relief valve D) Reflux valve.

127. The waste water from kitchen, baths etc. is called

A) sewage B) sullage

C) sludge D) none of these.

128. A sanitary sewer is expected to run

A) full B) half full

C) $\frac{2}{3}$ rd full D) 90% full.

129. Consider the correct statements regarding the quantities of sand used for filtration :

I.   Free from dirt and other impurities

II. Uniform size

III. Soft and collective

IV. It loses at least 10% of its weight when immersed in hydrochloric acid for 24 hours.

Of these statements :

A) I alone is correct B) II alone is correct

C) I and II are correct D) III and IV are correct.

[Turn over

130. Alum is chemically

    A) copper sulphate   B) aluminium sulphate

    C) ferrous sulphate   D) ferric sulphate.

131. The maximum depth of sedimentation tank is limited up to

    A) 2m   B) 3m

    C) 4m   D) 6m.

132. Self cleaning velocities in sewers are achieved by

    A) providing large diameter sewer pipes

    B) providing adequate discharge through sewer lines

    C) providing minimum bends in sewer lines

    D) providing smooth surface of sewer pipes.

133. The efficiency of a pumping set is usually assumed as

    A) 100 %   B) 80 %

    C) 65-70 %   D) 50-55 %.

134. Three different types of sewers are

    A) sanitary, storm and conventional

    B) sanitary, storm and combined

    C) sanitary, storm and ground water

    D) conventional, surface and combined.

135. The plumbing system which is commonly used in multistoried building is

    A) single stack system   B) one-pipe system

    C) two-pipe system   D) multi-stack system.

136. In order to design waste water disposal system for a locality the important information to be collected is

    A) record of population and its change

    B) water consumption rate and sewage flow

    C) hydrological data

    D) all of these.

137. The coagulant widely used for sewage treatment is

   A) ferric chloride   B) ferric sulphate

   C) lime   D) alum.

138. Pumping system is best suited when

   A) fire accidents occur frequently

   B) density of population is high and space available is less

   C) source of water is at low level

   D) power failures are mere common.

139. The treatment of water is required mainly for

   A) the removal of germs of diseases   B) the removal of copper sulphate

   C) increasing pH value   D) the removal of chlorides.

140. Hydrogen ion concentration indicates the

   A) presence of bacteria   B) colour

   C) presence of foreign matter   D) acidity or alkalinity.

141. The water is examined physically for

   A) total solid matter   B) the amount of dissolved gases

   C) colour, taste and odour   D) estimation of the organic carbon.

142. The cost of a machine is Rs. 10,000 with a useful life of 10 years. Its depreciated cost, after 5 years, if the salvage value is Rs. 1,000, on straight line basis, will be

   A) Rs. 1,500   B) Rs. 3,500

   C) Rs. 5,500   D) Rs. 7,500.

143. Plinth area normally does not include area covered under

   A) lavatories   B) garage

   C) open courtyard   D) all of these.

144. One cubic metre of Portland cement weighs

   A) 1000 kg   B) 1220 kg

   C) 1440 kg   D) 1660 kg.

610   [Turn over

145. Of the total estimated cost of a building, electrification usualy accounts for

    A)   1 %   B)   2 %

    C)   8 %   D)   15 %.

146. The approximate cost of the complete labour as a percentage of the total cost of the building is

    A)   10 %   B)   25 %

    C)   45 %   D)   60 %.

147. 'Lead and lift' is the term used in

    A)   earthwork   B)   reappropriation of funds

    C)   salvage value   D)   tender notification.

148. The approximate cost of a building can be found out by

    A)   service-unit method   B)   square-metre method

    C)   cubic-metre method   D)   all of these.

149. The specifications define

    A)   the quality of materials   B)   workmanship

    C)   both (A) and (B)   D)   none of these.

150. The volume of course aggregate required to make 100m³ of 1 : 2 : 4 concrete is

    A)   84 m³   B)   88 m³

    C)   92 m³   D)   96 m³.

151. Estimate

    A)   the actual cost of construction of structure

    B)   the probable cost arrived at before commencement of the structure

    C)   a random guess of the cost of the structure

    D)   none of these.

152. In detailed estimate the volumes are worked out to the nearest

A) 0·001 m³   B) 0·005 m³

C) 0·01 m³   D) 0·05 m³.

153. Which of the following is the most correct estimate ?

A) Plinth area estimate   B) Cube rate estimate

C) Analysis of rates   D) Building cost index estimate.

154. Unit of measurements for R.C.C. sunshades (breadth and thickness specified) is

A) running metre   B) square metre

C) cubic metre   D) numbers.

155. When the standard data are not available in the standard data book, the materials and labour requirements are actually observed during the execution called

A) main data   B) sub-data

C) observed data   D) detailed estimate.

156. While estimating for building, the length of long walls and short walls is to be found out at the centre lines of the walls called

A) long wall short wall method   B) crossing method

C) centre line method   D) whole to part.

157. Quantity of earthwork in excavation for foundation of a room size 4·20 m × 3·60 m whose wall thickness is 30 cm, breadth of foundation 90 cm and depth of excavation 1m, is

A) 15·12 m³   B) 14·04 m³

C) 16·20 m³   D) none of these.

158. Pick up the incorrect statement from the following :

    A) The built-up covered area at the floor level of any storey of a building is called plinth area

    B) The usable covered area of the rooms of any storey of a building is called carpet area

    C) The carpet area of a building along unit area of its kitchen, pantry, store, lavatory, bathroom and glazed verandah is called floor area

    D) None of these.

159. Pick up the correct statement regarding the central line method of estimating a building :

    A) Product of the centre line of the walls and area of cross-section of any item, gives total quantity of the item.

    B) The centre line is worked out separation for different sections of walls of a building.

    C) The centre line length is reduced by half the layer of main wall joining the partition wall

    D) All of these.

160. The centre line method is specially adopted for estimating

    A) circular buildings   B) hexagonal buildings

    C) octagonal buildings   D) all of these.

161. In long and short wall method of estimation, the length of long wall is the centre to centre distance between the wall and

    A) breadth of the wall

    B) half breadth of wall on each side

    C) one fourth breadth of wall on each side

    D) none of these.

162. In limit state design, the maximum strain in concrete at the outermost compression fibre is

    A) 0·0020   B) 0·0035

    C) 0·0055   D) none of these.

163. The buckling load of a column will be maximum, if its end conditions are as

   A)   one end is fixed and other end is hinged

   B)   both ends are pin-jointed

   C)   one end is fixed and other end is free

   D)   both ends are fixed.

164. The maximum number of steps in a flight is restricted to

   A)   10   B)   15

   C)   12   D)   20.

165. The spacing of vertical stirrups in a rectangular beam is

   A)   maximum near the support   B)   minimum near the support

   C)   minimum near the centre   D)   none of these.

166. The maximum area of tension reinforcement in beams shall not exceed

   A)   0·15 %   B)   1·50 %

   C)   4·00 %   D)   1·00 %.

167. Diameter of a rivet hole is made larger than the diameter of the rivet by

   A)   1·00 mm for rivet diameter up to 12 mm

   B)   1·50 mm for rivet diameter exceeding 25 mm

   C)   2·00 mm for rivet diameter over 25 mm

   D)   none of these.

168. Slenderness ratio of a compression member is

   A) $\dfrac{\text{Moment of inertia}}{\text{Radius of gyration}}$ B) $\dfrac{\text{Effective length}}{\text{Area of cross-section}}$

   C) $\dfrac{\text{Effective length}}{\text{Radius of gyration}}$ D) $\dfrac{\text{Moment of inertia}}{\text{Area of cross-section}}$.

169. The minimum pitch of rivet holes of diameter 'd' should not be less than

   A) 1·25 d   B) 1·50 d

   C) 2·00 d   D) 2·50 d.

170. For design purposes, the width of one way slab is always taken as

   A) 1 mm   B) 100 mm

   C) 1000 mm   D) 2000 mm.

171. The minimum percentage of longitudinal reinforcement in R.C.C. column is

   A) 0·6   B) 0·8

   C) 0·1   D) 1·2.

172. The factor of safety for

   A) steel and concrete are same

   B) steel is lower than that of concrete

   C) steel is higher than that of concrete

   D) none of these.

173. Poisson's ratio for concrete

   A) remains unchanged   B) increases with richer mixes

   C) decreases with richer mixes   D) none of these.

174. The application of elastic theory to the beams is based on the assumption at

   A) any cross-section, plane sections before bending remain plane after bending

   B) all tensile stresses are taken up by reinforcement above and none by the concrete

   C) steel reinforcement is free from initial stresses when it is embedded in concrete

   D) all of these.

175. In a doubly reinforced beam, steel reinforcement is provided in a

   A) tension zone   B) compression zone

   C) either (A) or (B)   D) both (A) and (B).

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176. The section of the beam having greater width at the top in comparison to the width below neutral axis is known as

A)   Critical section   B)   T-section

C)   L-section   D)   none of these.

177. The breadth of rib in a T-beam should at least be equal to .... the depth of rib.

A)   one-half   B)   one-third

C)   one-fourth   D)   one-sixth.

178. In roof trusses, the most frequently used section is

A)   two-angle sections placed back to back

B)   two-channel sections placed back to back

C)   two-channel sections placed at a distance apart

D)   four-angle sections.

179. The main reinforcement in RCC cantilever members is placed at

A)   top fibre   B)   side fibres

C)   bottom fibre   D)   top and bottom fibres.

180. The most economical section for a column is

A)   I-section   B)   tubular section

C)   solid round section   D)   rectangular section.

181. Effective length of the column whose one end fixed and the other end free is

A)   equal to overall length

B)   less than overall length

C)   greater than overall length

D)   less than or equal to overall length.

[Turn over

182. Match **List I** correctly with **List II** and select your answer using the codes given below :

	List I		List II
a)	Piece work contract	1.	Not practised in government
b)	Lumpsum contract	2.	Payment made by detailed measurement of different items
c)	Item rate contract	3.	Adopted for buildings, roads, bridges and electrical works
d)	Labour contract	4.	Petty works and regular maintenance works.

Codes :

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

183. Pre-tender stage of a project requires

   A)   site selection and acquisition of land

   B)   final alignment of work

   C)   preparation of estimate and final designs

   D)   all of these.

184. The contractor's ledger is maintained in the

   A)   Section office   B)   Division office

   C)   Sub-division office   D)   Circle office.

185. The check measurement certificate should be obtained

   A)   in the site order book   B)   on a separate prescribed form

   C)   in the measurement book itself   D)   in the indent form.

186. Which of the following is an activity ?

   A)   Construction of foundation   B)   Construction of roof

   C)   Construction of retaining wall   D)   All of these.

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187. The field of activities of an engineer includes

    A) estimation

    B) tendering

    C) approval of construction plans by the local authority

    D) all of these.

188. Dummy activity means

    A) neither requires any time nor any resources

    B) a connecting link for control purposes

    C) for maintaining uniqueness of activity

    D) all of these.

189. The conditions of contract include

    A) conditions relating to measurements and payments

    B) conditions relating to settlement of disputes

    C) conditions relating to labour

    D) all of these.

190. The bill to be used for making a single payment for a work is

    A) First and final bill   B) Running account bill

    C) Lumpsum contract bill   D) none of these.

191. Casual Labour Roll (CLR) is used for

    A) emergency work   B) regular work

    C) both (A) & (B)   D) none of these.

192. A project is

    A) a large dam constructed across a river for a single or multipurpose

    B) any job involving many people and large money

    C) a work of major importance involving huge men and material

    D) an organized team work to achieve a set task within the time limit.

193. Which is a right sequencing of processes in overall management system ?

    A) Conception, Time resource analysis, Feasibility study, Monitoring, Updating and Scheduling

    B) Conception, Feasibility study, Scheduling, Time resource analysis, Monitoring and Updating

    C) Conception, Monitoring, Updating, Feasibility study, Time resource analysis and Scheduling

    D) Feasibility study, Conception, Scheduling, Time resource analysis, Monitoring and Updating.

[Turn over

194. Construction team means

    A)   an engineer
    B)   an architect

    C)   an owner
    D)   all of these.

195. The critical activity has

    A)   maximum float
    B)   minimum float

    C)   zero float
    D)   none of these.

196. The difference between the time available to do a job and the time required to do the job, is known as,

    A)   event
    B)   float

    C)   duration
    D)   constraint.

197. PERT is an abbreviation for

    A)   pertinent, equation, rating and timing

    B)   performance, evaluation related to a task

    C)   programme evaluation and review technique

    D)   periodical estimation of resource treasure.

198. A construction schedule indicates

    A)   the rate of progress for each operation

    B)   the actual progress of work

    C)   both the actual progress and the rate of progress

    D)   completion of the project.

199. The Management techniques that are more suitable for application in a construction project are

    A)   PERT
    B)   CPM

    C)   both PERT and CPM
    D)   none of these.

200. In PWD, a tender is called "for and on behalf of the"

    A)   Chief Engineer
    B)   Executive Engineer

    C)   Governor of the State
    D)   Government.

(SPACE FOR ROUGH WORK)

(SPACE FOR ROUGH WORK)

(SPACE FOR ROUGH WORK)