01. The limiting value of cant gradient for all gauges is
    (1) 1 in 360   (2) 1 in 720   (3) 1 in 1000   (4) 1 in 2000

Ans: (1)

02. If 'R' is the radius of a circular curve, then the versine on a chord of length 'C' is given by

    (1) $\dfrac{C^2}{4R}$ (2) $\dfrac{C}{8R}$ (3) $\dfrac{C^2}{8R}$ (4) $\dfrac{C}{4R}$

Ans: (3)

03. The correct relation between curve lead (CL), switch lead (SL) and lead of crossing (L) is given by
    (1) CL = L – SL   (2) SL = L + CL
    (3) L = CL – SL   (4) L = (CL + SL)/2

Ans: (3)

04. The grade compensation on a 4^0 curve on a broad gauge railway track is
    (1) 0.20%   (2) 0.16%   (3) 0.12%   (4) 0.08%

Ans: (2)

05. A treadle bar is used for
    (1) interlocking points and single   (2) setting points and crossings
    (3) setting marshalling yard signals   (4) track maintenance

Ans: (1)

06. The background color of the informatory sign board is
    (1) red   (2) yellow   (3) green   (4) white

Ans: (3)

07. Limiting values of Poisson's ratio are
    (1) -1 and 0.5   (2) -1 and – 0.5   (3) 1 and – 0.5   (4) 0 and 0.5

Ans: (4)

08. A beam of square cross-section with side 100 mm is placed with one diagonal, vertical. If the shear force acting on the section is 10 kN, the maximum shear stress is
    (1) 1 N/mm^2 (2) 1.125 N/mm^2 (3) 2 N/mm^2 (4) 2.25 N/mm^2

Ans: (2)

09. Slope at the end of the simply supported beam of span l with uniformly distributed load w/unit length over the entire span is given by

    (1) $\dfrac{wl^2}{16EI}$ (2) $\dfrac{wl^3}{16EI}$ (3) $\dfrac{wl^3}{24EI}$ (4) $\dfrac{wl^2}{24EI}$

Ans: (3)

10. A linear arch has
    (1) normal thrust only   (2) shear force only
    (3) normal thrust and shear force   (4) None of these

Ans: (1)

11. If a circular shaft is subjected to a torque "T" and moment 'M', the ratio of maximum bending stress and maximum shear stress is

(1) $\dfrac{2M}{T}$ (2) $\dfrac{M}{2T}$ (3) $\dfrac{M}{T}$ (4) $\dfrac{2T}{M}$

Ans: (1)

12. If the diameter of a shaft subjected to torque alone is doubled, then horse power P can be increased to

(1) 16 P   (2) 8 P   (3) 4 P   (4) 2 P

Ans: (1)

13. A shaft turns at 150 rpm under a torque of 1500 Nm. Power transmitted is

(1) 15 π kW   (2) 10 π kW   (3) 7.5 π kW   (4) 5 π kW

Ans: (3)

14. In a particular material, if the modulus of rigidity is equal to the bulk modulus, then the Poisson's ratio will be

(1) $\dfrac{1}{8}$ (2) $\dfrac{1}{4}$ (3) $\dfrac{1}{2}$ (4) 1

Ans: (1)

15. The number of independent equations to be satisfied for static equilibrium of a plane structure is

(1) 1   (2) 2   (3) 3   (4) 4

Ans: (3)

16. Castigliano's first theorem is applicable
   (1) for statically determinate structures only
   (2) when the system behaves elastically
   (3) only when principle of superposition is valid
   (4) None of the above

Ans: (2)

17. If one end of the prismatic beam AB with fixed ends is given a transverse displacement 'Δ' without any rotation, then the transverse reactions at A or B due to displacement is

(1) $\dfrac{6EI\Delta}{l^2}$ (2) $\dfrac{6EI\Delta}{l^3}$ (3) $\dfrac{12EI\Delta}{l^2}$ (4) $\dfrac{12EI\Delta}{l^3}$

Ans: (4)

18. In column analogy method, the area of analogous column for a fixed beam of span 'L' and flexural rigidity EI is taken as
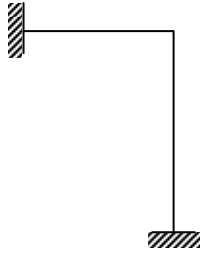
(1) L/EI   (2) L/2EI   (3) L/3EI   (4) L/4EI

Ans: (1)

19. The three moments equation is applicable only when
    (1) the beam is prismatic
    (2) there is no settlement of supports
    (3) there is no discontinuity such as hinges with the span
    (4) the spans are equal

Ans: (3)

20. What is the degree of static indeterminacy of the structure shown in figure?

    (1) 1

    (2) 2

    (3) 3

    (4) 4

Ans: (3)

21. The strain energy of a structure due to bending is given by

    (1) $\int \dfrac{M^2 dx}{EI}$ (2) $\dfrac{1}{2}\int \dfrac{M^2 dx}{EI}$ (3) $\int \dfrac{2M^2 dx}{EI}$ (4) $\dfrac{1}{3}\int \dfrac{M^2 dx}{2EI}$

Ans: (2)

22. In the displacement method of structural analysis, the basic unknowns are
    (1) displacements
    (2) force
    (3) displacements and force
    (4) None of the above

Ans: (1)

23. The deformation of a spring produced by a unit load is called
    (1) Stiffness (2) Flexibility (3) Unit strain (4) None of these

Ans: (2)

24. A fixed beam AB of span L is subjected to a clockwise moment M at a distance 'a' from end 'A'. Fixed end moment at end 'A' will be

    (1) $\dfrac{M}{L^2}(L-a)(L-3a)$

    (2) $\dfrac{M}{L^2}a(2L-3a)$

    (3) $\dfrac{Ma}{L^2}(L-a)$

    (4) $\dfrac{M}{L^2}(L-a)(2L-a)$

Ans: (4)

25. The absolute maximum bending moment in a simply supported beam of span 20 m due to a moving udl of 4 t/m spanning over 5 m is
    (1) 87.5 t-m at the support
    (2) 87.5 t-m near the mid point
    (3) 3.5 t-m at the mid point
    (4) 87.5 t-m at the mid point

Ans: (4)

26. The degree of static indeterminacy of a rigid jointed space frame is
    (1) m + r – 2j   (2) m + r – 3j   (3) 3m + r – 3j   (4) 6m + r – 6j
Ans: (4)

27. A symmetrical parabolic arch of span 20 m and rise 5 m is hinged at the springings. If supports uniformly distributed load of 2 tones per meter run of the span. The horizontal thrust in tones at each of the springings is
    (1) 8   (2) 16   (3) 20   (4) Zero
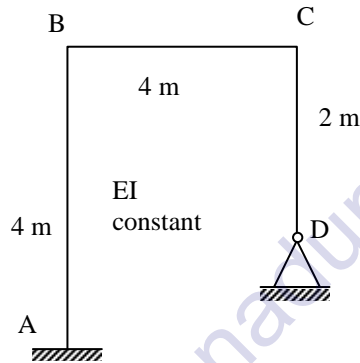**Ans: (3)**

28. The horizontal thrust due to rise in temperature in a semi-circular two hinged arch of radius R is proportional to
    (1) R   (2) R^2 (3) 1/R   (4) $1/R^2$
Ans: (4)

29. In the frame shown in the figure, the support 'D' settles by 'δ'. The fixed end moment in the horizontal member of the frame will be (other symbols have the usual meaning)

    (1) $\dfrac{EI\delta}{8}$

    (2) $\dfrac{6EI\delta}{16}$

    (3) $\dfrac{3EI\delta}{16}$

    (4) $\dfrac{EI\delta}{16}$

Ans: (2)

30. Figure shows a portal frame with one end fixed and other hinged. The ratio of the fixed end moments $\dfrac{M_{BA}}{M_{CD}}$ due to side sway will be

    (1) 1.0

    (2) 2.0

    (3) 2.5
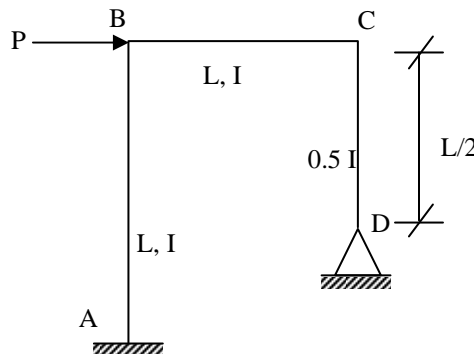
    (4) 3.0
Ans: (1)

31. The amount of irrigation water required to meet the evapotranspiration needs of the crop during its full growth is called
    (1) effective rainfall   (2) consumptive use
    (3) consumptive irrigation requirement   (4) net irrigation requirement
Ans: (3)

32. Hydrograph is the graphical representation of
    (1) runoff and time   (2) surface runoff and time
    (3) ground water flow and time   (4) rainfall and time
Ans: (1)

33. Cyclonic precipitation is caused by lifting of an air mass due to
    (1) Pressure difference   (2) Temperature difference
    (3) Natural topographical barriers   (4) None of these
Ans: (1)

34. If it rains between 2 PM and 3 PM and the entire basin area just starts contributing water at 3 PM to the outlet, then the time of concentration will be
    (1) 15 minutes   (2) 20 minutes   (3) 30 minutes   (4) 60 minutes
Ans: (4)

35. The elementary profile of a dam is
    (1) a rectangle   (2) a trapezoidal
    (3) an equilateral triangle   (4) a right angled triangle
Ans: (4)

36. In a chute spillway, the flow is usually
    (1) uniform   (2) sub critical   (3) critical   (4) supercritical
Ans: (4)

37. Vertical drop fall is satisfactory for a height upto
    (1) 0.5 m   (2) 1.5 m   (3) 3.5 m   (4) 5.0 m
Ans: (2)

38. A land is known as water logged
    (1) When the permanent wilting point is reached
    (2) when the gravity drainage has ceased
    (3) when capillary fringe reaches the root zone of plants
    (4) none of these
Ans: (3)

39. A hyetograph is a graphical representation of
    (1) rainfall intensity and time   (2) rainfall depth and time
    (3) discharge and time   (4) cumulative rainfall and time
Ans: (1)

40. The peak of a 4-hour flood hydrograph is 240 m^3/sec. If the rainfall excess is 80 mm and base flow which is constant is 40 m^3/sec, then the peak of 4-hour unit hydrograph will be
    (1) 20 m^3/sec   (2) 25 m^3/sec   (3) 30 m^3/sec   (4) 35 m^3/sec
Ans: (2)

41. If 'p' is the precipitation, 'a' is the area represented by a rain gauge, and 'n' is the number of rain gauges in a catchment area, then the weighted mean rainfall is

 (1) $\dfrac{\sum ap^3}{\sum a^2}$ (2) $\dfrac{\sum ap}{n}$ (3) $\dfrac{\sum ap}{\sum a}$ (4) $\dfrac{\sum ap^5}{\sum a^3}$

 Ans: (3)

42. For medium silt whose average grain size is 0.16 mm, Lacey's silt factor is likely to be

 (1) 0.30   (2) 0.45   (3) 0.70   (4) 1.32

 Ans: (3)

43. According to Indian standards, the number of raingauge stations for an area of $5200\,\text{km}^2$ in plains should be

 (1) 10   (2) 15   (3) 20   (4) 30

 Ans: (1)

44. The maximum permissible limit for fluoride in drinking water is

 (1) 0.1 mg/litre   (2) 1.5 mg/litre   (3) 5   (4) 10 mg/litre

 Ans: (2)

45. Standard EDTA (ethylene diamine tetra acetic acid) solution is used to determine the

 (1) hardness of water   (2) turbidity of water
 (3) dissolved oxygen in water   (4) residual chlorine in water

 Ans: (1)

46. Turbidity is measured on

 (1) Standard silica scale   (2) Standard cobalt scale
 (3) Standard platinum scale   (4) Platinum cobalt scale

 Ans: (1)

47. The length of rectangular sedimentation tank should not be more than

 (1) B   (2) 2 B   (3) 4 B   (4) 8 B

 Ans: (3)

48. Orthotolidine test is used for determination of

 (1) dissolved oxygen   (2) residual chlorine
 (3) biochemical oxygen demand   (4) None of these

 Ans: (2)

49. The suitable layout of distribution system for a city with roads of rectangular pattern is

 (1) grid iron system   (2) dead end system   (2) ring system   (4) radial system

 Ans: (1)

50. A sewer that receives the discharge of a number of house sewers is called

 (1) house sewer   (2) lateral sewer
 (3) intercepting sewer   (4) submain sewer

 Ans: (2)

51. The correct relation between theoretical oxygen demand (TOD), biochemical oxygen demand (BOD) and chemical oxygen demand (COD) is given by
    (1) TOD > BOD > COD   (2) TOD > COD > BOD
    (3) BOD > COD > TOD   (4) COD > BOD > TOD
Ans: (2)

52. In a BOD test 1.0 ml of raw sewage was diluted to 100 ml and the dissolved oxygen concentration of diluted sample at the beginning was 6 ppm and it was 4 ppm at the end of 5-day incubation at 20°C. The BOD of raw sewage will be
    (1) 100 ppm   (2) 200 ppm   (3) 300 pmm   (4) 400 ppm
Ans: (2)

53. The minimum dissolved oxygen which should always be present in water in order to   save the aquatic life is
    (1) 1 ppm   (2) 4 ppm   (3) 10 ppm   (4) 40 ppm
Ans: (2)

54. Temporary hardness in water is cased by the presence of
    (1) Bicarbonates of Ca and Mg   (2) Sulphates of Ca and Mg
    (3) Chlorides of Ca and Mg   (4) Nitrates of Ca and Mg
Ans: (1)

55. Blue baby disease (methemoglobinemia) in children is caused by the presences of excess
    (1) chlorides   (2) nitrates   (3) fluorides   (4) lead
Ans: (2)

56. Two samples of water, A and B have pH values of 4.4 and 6.4 respectively. How many   times more acidic is sample A than sample B ?
    (1) 0   (2) 50   (3) 100   (4) 200
Ans: (3)

57. Dechlorination of water is achieved by adding
    (1) Sodium thiosulphate   (2) Sodium sulphate
    (3) Sodium biosulphate   (4) None of these
Ans: (1)

58. The efficiency of a sedimentation tank does not depend upon
    (1) depth of the tank   (2) detention time
    (3) length of the tank   (4) horizontal velocity of water
Ans: (1)

59. Which one of the following would contain water with the maximum amount of turbidity?
    (1) lakes   (2) oceans   (3) rivers   (4) wells
Ans: (3)

60. The waste stabilization ponds can be
    (1) aerobic   (2) anaerobic   (3) facultative   (4) all of the above
Ans: (4)

61. For a slab supported on its four edges with corners held down and loaded uniformly, the Marcus correction factor to the moments obtained by Grashoff Rankine's theory
    (1) is always less than 1   (2) is always greater than 1
    (3) is equal to 1   (4) None of the above
Ans: (1)

62. The permissible diagonal tensile stress in the reinforced brick work is
    (1) zero   (2) about 0.1 N/mm^2
    (3) 0.3 N/mm^2 to 0.7 N/mm^2 (4) None of the above
Ans: (1)

63. The limits of percentage P of longitudinal reinforcement in a column are given by
    (1) 0.15 % to 2%   (2) 0.8% to 0.4%   (3) 0.8% to 0.6%   (4) 0.15% to 0.6%
Ans: (3)

64. In a pile of length l, the points of suspension from the ends for lifting it are located at
    (1) 0.207 l (2) 0.25 l (3) 0.293 l (4) 0.333 l
Ans: (1)

65. The partial safety factor for steel as per IS 456 – 1978 is taken as
    (1) 1.15   (2) 1.35   (3) 1.50   (4) 1.65
Ans: (1)

66. According to IS 456 – 1978, the maximum strain in concrete at the outermost compression fibre in the limit state design of flexural members is
    (1) 0.0020   (2) 0.0035   (3) 0.0050   (4) 0.0065
Ans: (2)

67. In a spherical dome subjected to concentrated load at crown or uniformly distributed load, the meridionat force is always
    (1) Zero   (2) Tensile   (3) Compressive   (4) None of these
Ans: (3)

68. In a doubly reinforced rectangular beam, the allowable stress in compression steel is
    (1) equal to the permissible stress in the tension steel
    (2) more than permissible stress in the tension steel
    (3) less than permissible stress in the tension steel
    (4) None of these
**Ans: (3)**

69. Loss of stress with time at constant strain in steel is called
    (1) relaxation   (2) creep   (3) ductility   (4) shrinkage
Ans: (1)

70. In the limit state design of concrete structures, the strain distribution is assumed to be
    (1) linear   (2) non-linear   (3) parabolic   (4) rectangular
Ans: (1)

71. If 'P' is the prestressing force applied at a maximum eccentricity 'g' at mid span (figure), to balance the concentrated load 'W', the balancing load will be
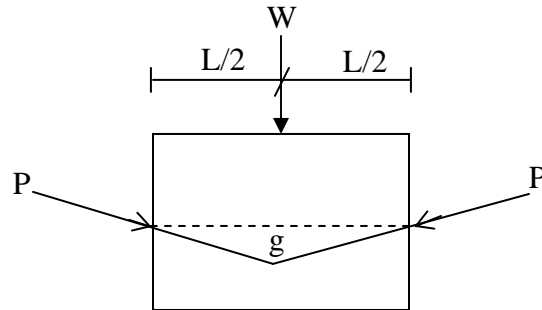
    (1) 2.5 Pg/L   (2) 3.0 Pg/L   (3) 3.5 Pg/L   (4) 4.0 Pg/L

Ans: (4)

72. Yield line theory results in
    (1) elastic solution   (2) upper bound solution
    (3) lower bound solution   (4) unique solution

Ans: (2)

73. For ultimate load design of prestressed concrete girders used girders used for bridges, combination of load factors used is (here L.L. and D.L. are line load and dead load respectively)
    (1) 1.5 D.L. + 2.5 L.L.   (2) 1.0 D.L. + 2.0 L.L.
    (3) 1.0 D.L. + 2.5 L.L.   (4) 2.0 D.L. + 2.0 L.L.

Ans: (1)

74. A reinforced concrete slab is 75 mm thick. The maximum size of reinforcement bar that can be used is
    (1) 12 mm diameter   (2) 10 mm diameter   (3) 8 mm diameter   (4) 6 mm diameter

Ans: (3)

75. In the design of two way slab restrained at all edges, torsional reinforcement required is
    (1) 0.75 times the area of steel provided at mid span in the same direction
    (2) 0.375 time the area of steel provided at mid span in the same direction
    (3) 0.375 times the area of steel provided in the shorter span
    (4) None of these

Ans: (4)

76. PERT technique of network analysis is mainly useful for
    (1) small projects
    (2) large and complex projects
    (3) research and development projects
    (4) deterministic activities

Ans: (3)

77. In PERT analysis, the time estimates of activities and probability of their occurrence follow
    (1) Normal distribution curve   (2) Poission's distribution curve
    (3) β-distribution curve   (4) Binomial distribution curve

Ans: (3)

78.   Critical path
      (1) is always longest   (2) is always shortest
      (3) may be longest   (4) may be shortest
Ans: (1)

79.   The time by which a particular activity can be delayed without affecting the preceding and
      succeeding activities is known as
      (1) free float   (2) Total float
      (3) Independent float   (4) Interfering float
Ans: (3)

80.   Economic saving of time results by crashing
      (1) Cheapest critical activity   (2) Cheapest non – critical activity
      (3) Costliest critical activity   (4) Costliest non – critical activity
Ans: (1)

81.   Slack time refers to
      (1) An activity   (2) An event
      (3) Both event and activity   (4) Non of the above
Ans: (2)

82.   A tractor has purchase price of Rs. 4.7 lacks and could save the organization an amount of Rupees
      one lack per year on operating costs. The salvage value after the amortization period is 10% of the
      purchased price. The capital recovery period will be
      (1) 3.7 years   (2) 4.2 years   (3) 5 years   (4) 7.8 years
Ans: (2)

83.   Site order book is used for recording
      (1) Instructions of the executive engineer   (2) Construction measurements
      (3) requisition of plants and equipments   (4) Indents for materials to be ordered
Ans: (1)

84.   The system of organization introduced by F.W. Taylor is known as
      (1) Effective organization   (2) Functional organization
      (3) Line organization   (4) Line and staff organization
Ans: (2)

85.   The original cost of an equipment is Rs. 10,000. Its salvage value at the end of its total useful life
      of live years is Rs. 1,000. Its book value at the end of two years of its useful life (as per straight
      line method of evaluation of depreciation) will be
      (1) Rs. 8,800   (2) Rs. 7,600   (3) Rs. 6,400   (4) Rs. 5,000
Ans: (3)

86.   Grader is used mainly for
      (1) Trimming and finishing   (2) Shaping and trimming
      (3) Finishing and shaping   (4) Finishing, shaping and trimming
Ans: (1)

87.   The flow net of the activities of a project are shown in the network given in figure indicating the duration of the activities along their arrows. The critical path of the activities is along
      (1) $1 \to 2 \to 4 \to 5 \to 7 \to 8$

      (2) $1 \to 2 \to 3 \to 6 \to 7 \to 8$

      (3) $1 \to 2 \to 3 \to 5 \to 7 \to 8$

      (4) $1 \to 2 \to 4 \to 5 \to 3 \to 6 \to 7 \to 8$
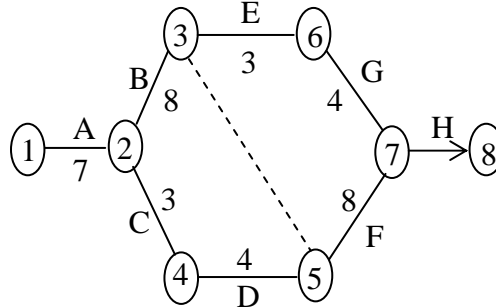
Ans: (3)

88.   Capital recovery factor at 15% p.a. discrete compounding for 4 years is 0.35. Rs. 10,000 deposited now at 15% p.a. discrete compounding will yield an amount 'X' at the end of each 4 – year – period in perpetuity. The value of 'X' is
      (1) Rs. 7,500   (2) Rs. 6,666   (3) Rs. 6,000   (4) Rs. 9,000
Ans: (1)

89.   A machine costs Rs. 16,000. by constant rate of declining balance method of depreciation, its salvage value after an expected life of 3 years is Rs. 2,000. The rate of depreciation is
      (1) 0.25   (2) 0.30   (3) 0.40   (4) 0.50
Ans: (4)

90.   The relation between 'D' in hectares/cumec, depth of water 'Δ' in meters and the base period B in days is given by
      (1) $\Delta = \dfrac{1.98\,B}{D}$ (2) $\Delta = \dfrac{8.64\,B}{D}$ (3) $\Delta = \dfrac{5.68\,B}{D}$ (4) $\Delta = \dfrac{8.64\,D}{B}$
Ans: (2)

91.   If P is the percentage of water required for normal consistency, water to be added for determination of initial setting time is
      (1) 0.75 P   (2) 0.85 P   (3) 0.085 P   (4) 0.075 P
Ans: (1)

92.   According to IS 399 – 1963, the weight of the timber is specified at
      (1) 10% moisture content   (2) 12% moisture content
      (3) 8% moisture content   (4) 14% moisture content
Ans: (2)

93.   Due to attack of dry rot, the timber
      (1) Shrinks   (2) Cracks
      (3) Reduces to powder   (4) Reduces its weight
Ans: (3)

94. Plywood is made from
     (1) Bamboo fibre   (2) Teak wood only
     (3) Common timber   (4) Asbestos sheets
Ans: (3)

95. For a 50 kg bag of cement, water required is
     (1) 22.5 liters   (2) 20.5 liters   (3) 18.5 liters   (4) 23.5 liters
Ans: (1)

96. The standard size of a brick is
     (1) 19.5 cm × 9.5 cm × 9.5 cm   (2) 18 cm × 8 cm × 8 cm
     (3) 19 cm × 9 cm × 9 cm   (4) 18.5 cm × 8.5 × 8.5 cm
Ans: (3)

97. Initial setting cement is caused due to
     (1) $3\ CaO.SiO_2$ (2) $2\ CaO.SiO_2$
     (3) $3\ CaO.Al_2O_3$ (4) $4\ CaO.Al_2O_3.Fe_2O_3$
Ans: (3)

98. Clay and silt content in a good brick earth must be at least
     (1) 25%   (2) 30%   (3) 40%   (4) 50%
Ans: (2)

99. For construction of structures under water the type of lime used is
     (1) Pure lime   (2) Fat lime   (3) Quick lime   (4) Hydraulic lime
Ans: (4)

100. Cement is said to be of good quality if
     (1) It is not smooth when rubbed in between fingers
     (2) It's colour is greenish gray
     (3) A handful of cement thrown into a bucket of water does not float
     (4) None of the above
Ans: (3)

101. The most valuable timber may be obtained from
     (1) Sal   (2) Re Sander   (3) Sandle   (4) Teak
Ans: (4)

102. Soundness test of cement determines
     (1) Durability   (2) Tensile strength
     (3) Quality of free lime   (4) Initial setting
Ans: (3)

103. A badly mixed cement concrete results in
     (1) Bleeding   (2) Honeycombing   (3) Segregations   (4) None of above
Ans: (3)

104. Inner part of a timber log surrounding the pitch is called
    (1) Annual ring   (2) Cambium layer   (3) Medullary sheath   (4) Heart wood
Ans: (4)

105. Portland Pozzolana cement possesses
    (1) Lower heat of hydration   (2) Water tightness
    (3) Lower shrinkage on drying   (4) All the above
Ans: (4)

106. If P, Y and Z are the weights of the cement, fine aggregates, and coarse aggregates respectively and W/C is the water cement ratio, the minimum quantity of water to be added to first batch, is obtained by the equation.
    (1) $0.1\,P + 0.3\,Y + 0.1\,Z = (W/C) \times P$ (2) $0.2\,P + 0.5\,Y + 0.1\,Z = (W/C) \times P$
    (3) $0.3\,P + 0.1\,Y + 0.01\,Z = (W/C) \times P$ (4) $0.5\,P + 0.3\,Y + 0.01\,Z = (W/C) \times P$
Ans: (1)

107. The main advantage of steel member, is
    (1) Its high strength   (2) Its long service life
    (3) Its waterightness   (4) All the above
Ans: (4)

108. As per ISI, rolled steel beam sections are classified into
    (1) Three series   (2) Four series   (3) Five series   (4) Six series
Ans: (3)

109. With a percentage increase of carbon in steel, decreases
    (1) Hardness   (2) Ductility   (3) Brittleness   (4) Strength
Ans: (2)

110. The critical load for a column of length 'l' hinged at both ends and having flexural rigidity EI, is given by
    (1) $P_C = \dfrac{\pi^2\,EI}{\ell^3}$ (2) $P_C = \dfrac{\pi^2\,EI}{\ell^2}$ (3) $P_C = \dfrac{\pi\,(EI)^2}{\ell^2}$ (4) None of these
Ans: (2)

111. Slenderness ratio of compression member is
    (1) $\dfrac{\text{Moment of Inertia}}{\text{Radius of gyration}}$ (2) $\dfrac{\text{Radius of gyration}}{\text{Effective length}}$
    (3) $\dfrac{\text{Radius of gyration}}{\text{Area of cross} - \sec\text{tion}}$ (4) $\dfrac{\text{Moment of Inertia}}{\text{Area of cross} - \sec\text{tion}}$
Ans: (2)

112. The most economical section for a column is
    (1) Hexagonal   (2) Rectangular   (3) Tubular section   (4) Solid round
Ans: (3)

113. If W and L are the total superimposed load and the span of a plate girder in meters, the approximate self weight of the girder, is taken as

(1) $M = \dfrac{WL}{300}$ (2) $M = \dfrac{WL}{100}$ (3) $M = \dfrac{WL}{400}$ (4) $M = \dfrac{WL}{200}$

Ans: (1)

114. According to IS 800 – 71, the minimum thickness of vertically stiffened web plate shall not be less than

(1) d/95 (2) d/250 (3) d/225 (4) d/200

Ans: (4)

115. Stiffness are used in a plate girder
    (1) To reduce compressive strength   (2) To reduce the shear stress
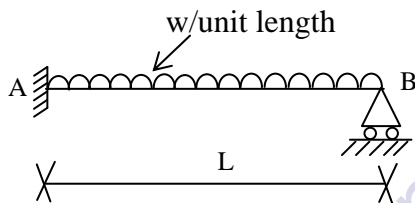   (3) To avoid the buckling of web plate   (4) To take the bearing stress

Ans: (3)

116. The minimum pitch of rivet holes of diameter 'd' should not be less than
    (1) 1.5 d   (2) 2.5 d   (3) d   (4) 2d

Ans: (2)

117. In propped cantilever loaded as shown in figure, the plastic hinge will form at

w/unit length

    (1) 0.414 L from B   (2) 0.414 L from A
    (3) L/2 from B   (4) L/2 from A

Ans: (1)

118. A uniform beam shown in figure has the plastic moment M_p for span AB and 0.9 M_p for span BC. The correct virtual work equation is

(1) $M_P . \theta + M_P \left(\theta + \dfrac{2\theta}{3} \right) = W . 2\theta$

(2) $M_P \theta + M_P \theta + 0.9\, M_P \dfrac{2\theta}{3} = W . 2\theta$

(3) $M_P . \theta + 0.9\, M_P \left(\theta + \dfrac{2\theta}{3} \right) = W . 2\theta$

(4) $M_P \theta + 0.9\, M_P \left(\theta + \dfrac{2\theta}{3} + \dfrac{2\theta}{3} \right) = W . 2\theta$

Ans: (3)

119. A steel beam of rectangular cross – section is clamped at both ends. Plastic deformation is just observed when the udl on the beam is 10 kN/m. At the instant of collapse, the load on the beam will be

    (1) 10 kN/m   (2) 15 kN/m   (3) 20 kN/m   (4) 30 kN/m

No Answer   Nearest option is (2)

120. One of the criteria for the effective width of flange of T – beam is

$$b_f = \frac{\ell_o}{6} + b_w + 6D_f$$

    In the above formula, l_o signifies
    (1) Effective span of T – beam
    (2) distance between points of zero moments in the beam
    (3) Clear span of the beam
    (4) Distance between points of maximum moments in the beam

Ans: (2)

121. The trap used for a water closet is called
    (1) Gully trap   (2) Anti – siphon trap
    (3) Intercepting trap   (4) P – trap

Ans: (4)

122. A soil has a bulk density of 22 kN/m^2 and water content 10%. The dry density of soil is
    (1) 18. 6 kN/m^2 (2) 20.0 kN/m^2 (3) 22.0 kN/m^2 (4) 23.2 kN/m^2

Ans: (2)

123. Which of the following is a measure of particle size range?
    (1) Effective size   (2) Uniformity co – efficient
    (3) Co – efficient of curvature   (4) None of the above

Ans: (2)

124. If the plasticity index of a soil mass is zero the soil is
    (1) Sand   (2) Silt   (3) Clay   (4) Clayey silt

Ans: (1)

125. According to IS – classification, the range of silt size particles is
    (1) 4.75 mm to 2.00 mm   (2) 2.00 mm to 0.425 mm
    (3) 0.425 mm to 0.075 mm   (4) 0.075 mm to 0.002 mm

Ans: (4)

126. Which one of the following clays behaves like dense sand ?
    (1) Over – consolidated clay with a high over – consolidation ratio
    (2) Over – consolidated clay with a low over – consolidation ratio
    (3) Normally consolidated clay   (4) Under - consolidated clay

Ans: (1)

127. Relationship between dry density γ_d, percentage of air voids η_a, water content w and specific gravity G of any soil is

(1) $\gamma_d = \dfrac{(1+\eta_a)G\gamma_w}{1+wG}$

(2) $\gamma_d = \dfrac{(1+\eta_a)G\gamma_w}{1-wG}$

(3) $\gamma_d = \dfrac{(1-\eta_a)G\gamma_w}{1+wG}$

(4) $\gamma_d = \dfrac{(1-\eta_a)G\gamma_w}{1-wG}$

Ans: (3)

128. The ratio of the undisturbed shear strength to the remoulded shear strength, in cohesive soils under undrained conditions is

(1) Zero   (2) 1   (3) Greater than 1   (4) Between 0 and 1

Ans: (3)

129. The critical height of unsupported vertical cut in a cohesive soil is given by

(1) $\dfrac{4c}{\gamma} \tan\left(45^0 + \dfrac{\phi}{2}\right)$

(2) $\dfrac{2c}{\gamma} \tan\left(45^0 + \dfrac{\phi}{2}\right)$

(3) $\dfrac{4c}{\gamma} \cot\left(45^0 + \dfrac{\phi}{2}\right)$

(4) $\dfrac{2c}{\gamma} \cot\left(45^0 + \dfrac{\phi}{2}\right)$

Ans: (1)

130. A plate load test is useful to estimate

(1) Bearing capacity of foundation   (2) Settlement of foundation

(3) Both (1) and (2)   (4) None of these

Ans: (3)

131. The correct increasing order of the surface areas of the given soils is

(1) Silt, sand, colloids, clay   (2) Sand, silt, colloids, clay

(3) Sand, silt, clay colloids   (4) Clay, silt, sand, colloids

Ans: (3)

132. For a given soil sample,

C_c = Co-efficient of gradation

C_u = Co-efficient of uniformity

D_{10} = effective size

D_{30} = diameter through which 30 percent of the total soil mass is passing.

If C_c = 1.0, C_u = 4.0, then the value of D_{30} / D_{10} would be

(1) 2.00   (2) 1.75   (3) 1.50   (4) 1.25

Ans: (1)

133. The total settlement of a compressible soil stratum 2 m deep and having a coefficient of volume compressibility of 0.02 cm^2/kg under a pressure increment of 2 kg/cm^2 will   be

(1) 2 cm   (2) 4 cm   (3) 8 cm   (4) 10 cm

Ans: (3)

134.   The determination of ultimate bearing capacity on eccentrically loaded square footing
        depends upon the concept of useful
        (1) square   (2) width   (3) triangle   (4) circle
Ans: (2)

135.   In consolidation testing, curve fitting method is used to determine
        (1) Compression index   (2) Swelling index
        (3) Co-efficient of consolidation   (4) None of these
Ans: (3)

136.   Westergaard's analysis for stress distribution beneath loaded areas is applicable to
        (1) sandy soils   (2) clayey soils   (3) stratified soils   (4) silty soils
Ans: (3)

137.   If the true bearing of a line AB is 269° 30' then the azimuth of the line AB is
        (1) $0^o30'$ (2) $89^o30'$ (3) $90^o30'$ (4) $269^o30'$
Ans: (4)

138.   in the quadrantal bearing system, a whole circle bearing of $293^o30'$ can be expressed   as
        (1) W $23^o30'$ N   (2) N $66^o30'$ W   (3) S $113^o30'$ N   (4) N $23^o30'$ W
Ans: (2)

139.   Which of the following methods of contouring is most suitable for a hilly terrain?
        (1) Direct method   (2) Square method
        (3) Cross-sections method   (4) Tachometric method
Ans: (4)

140.   If a 30 m length can be taped with a precision of ± 0.01 m, then the standard error in
        measuring 1.08 km with the same precision will be
        (1) $\pm$ 0.54 m   (2) $\pm$ 0.45 m   (3) $\pm$ 0.36 m   (4) $\pm$ 0.06 m
Ans: (3)

141.   If in triangle ABC, b=300 m and angle $\angle ABC = 60^o$, then the radius of the circular curve passing
        through the points A, B and C will be
        (1) 86.6 m   (2) 100.0 m   (3) 173.2 m   (4) 300.6 m
Ans: (3)

142.   Which one of the following specifications for length of base line refers to the "Third order
        triangulation system"?
        (1) 0.5 to 3 km   (2) 1.5 to 5 km   (3) 5 to 15 km   (4) 10 to 20 km
Ans: (4)

143.   If the co-ordinates of A are 100 N and 200 E and those of C are 100 S and 200 E, then the
        length AC is
        (1) 400.00   (2) 282.84   (3) 244.94   (4) 200.00
Ans: (4)

144.　The maximum limit of water absorption for aggregate suitable for road construction is
　　(1) 0.4 %　　　　(2) 0.6 %　　　　(3) 0.8 %　　　　(4) 1.0 %
Ans: (2)

145.　Which of the following represents hardest grade of bitumen?
　　(1) 30/40　　　　(2) 60/70　　　　(3) 80/100　　　　(4) 100/120
Ans: (1)

146.　For the construction of water bound macadam roads, the correct sequence of operations after spreading the coarse aggregate is
　　(1) dry rolling, wet rolling, application of screening and application of filler
　　(2) dry rolling, application of filler, wet rolling and application of screening.
　　(3) dry rolling, application of screening, wet rolling and application of filler
　　(4) dry rolling, application of screening, application of filler and wet rolling
Ans: (2)

147.　The thickness of bituminous carpet varies from
　　(1) 20 to 25 mm　　(2) 50 to 75 mm　　(3) 75 to 100 mm　　(4) 100 to 120 mm
Ans: (2)

148.　Expansion joints in cement concrete pavements are provided at an interval of
　　(1) 10 m　　　　(2) 15 m　　　　(3) 18 m to 21 m　　(4) 25 m to 30 m
Ans: (4)

149.　A summit curve is formed at the intersection of a 3% up gradient and 5% down gradient to provide a stopping distance of 128 m. The length of summit curve needed will be
　　(1) 271 m　　　　(2) 298 m　　　　(3) 322 m　　　　(4) 340 m
Ans: (2)

150.　Which one of the following binders is recommended for a wet and cold climate
　　(1) 80/100 penetration asphalt　　　　(2) tar
　　(3) cut back　　　　　　　　　　　　(4) emulsion
Ans: (3)

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