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1. Stainless steel is an alloy of which among the following?
   - (A) chromium, nickel and iron
   - (B) manganese, copper and iron
   - (C) copper, carbon and iron
   - (D) copper, tin and zinc

2. What is determined by conducting an abrasion test?
   - (A) aggregate crushing value
   - (B) toughness
   - (C) hardness
   - (D) soundness

3. On which of the following, the support for flat slab is provide?
   - (A) beams built monolithically above walls
   - (B) columns built monolithically with slab
   - (C) beams
   - (D) walls

4. What is the width of Broad Gauge?
   - (A) 1.575 m
   - (B) 1.565 m
   - (C) 1.576 m
   - (D) 1.676 m

5. Among which of the following conditions a T-beam becomes identical to a rectangular beam with width equal to that of flange?
   - (A) neutral axis remains within web
   - (B) neutral axis remains within flange
   - (C) neutral axis coinsides with geometrical centre of beam
   - (D) none of these

6. Which among the following is a step used for changing the direction of a stair?
   - (A) flight
   - (B) nosing
   - (C) landing
   - (D) winder

7. By which of the following tests, fineness of cement can be determined?
   - (A) permeability test
   - (B) soundness test
   - (C) vicat apparatus test
   - (D) compression test

8. Among the following, in which type of canal, flow occurs only when there is a rise of flow in river?
   - (A) inundation canal
   - (B) contour canal
   - (C) ridge canal
   - (D) side slope canal

A

3

[P.T.O.]

9. What is defined as the ratio of volume of air voids to the total volume of soil mass and is expressed as percentage?
   (A) void ratio
   (B) porosity
   (C) percentage air voids
   (D) air content

10. What is the side slope of a Cipoletti weir?
   (A) 1 horizontal to 2 vertical
   (B) 2 horizontal to 1 vertical
   (C) 4 horizontal to 1 vertical
   (D) 1 horizontal to 4 vertical

11. How the temporary hardness of water is removed?
   (A) by boiling
   (B) by lime soda process
   (C) by zeolite process
   (D) by aeration

12. In which of the following types of concrete beam section, failure will occur all on a sudden?
   (A) singly reinforced beam
   (B) under reinforced section
   (C) balanced section
   (D) over reinforced section

13. In which condition a doubly reinforced beam is used?
   (A) when extra safety is needed
   (B) when depth and breadth of beam have to be restricted in size
   (C) when large moment is expected
   (D) when depth is more than 1 m

14. In a water supply scheme, for what purpose aeration is carried out?
   (A) to remove taste and odour
   (B) for complete elimination of colloidal matter
   (C) for killing pathogenic bacteria
   (D) for coagulation

15. What is the disadvantage of centrifugal pump compared with reciprocating pump?
   (A) priming required
   (B) pulsatory flow
   (C) low speed
   (D) difficult to handle viscous fluid

16. What is known as the force per unit area required to penetrate into a soil mass with a circular plunger of 50 mm diameter at a rate of 1.25 mm/minute?
   (A) bearing capacity
   (B) modulus of rupture
   (C) CBR
   (D) aggregate crushing value

17. What is floor area ratio?
   (A) ratio of total floor area on all floors to plinth area
   (B) ratio of plinth area to plot area
   (C) ratio of ground floor area to plot area
   (D) ratio of total floor area on all floors to plot area

18. What is azimuth?
    (A) arbitrary meridian
    (B) true meridian
    (C) magnetic meridian
    (D) none of these

19. What will be the hydraulic mean depth for a most economical rectangular section of an open channel, of width B and depth D?
    (A) $D/2$
    (B) $2D$
    (C) $\dfrac{BD^2}{6}$
    (D) $\dfrac{BD^3}{12}$

20. At any point on the magnetic equator what will be the angle of dip?
    (A) 100°
    (B) 0°
    (C) 90°
    (D) 180°

21. What is the area of building, excluding the area occupied by walls?
    (A) net area
    (B) plinth area
    (C) carpet area
    (D) floor area

22. In the case of open channel flow if the flow is laminar, which of the following is correct?
    (A) Reynolds number < 500
    (B) Reynolds number > 500
    (C) Reynolds number < 2000
    (D) Reynolds number > 4000

23. Name the ratio of power available at the shaft of a turbine to the power delivered by water to the runner.
    (A) volumetric efficiency
    (B) overall efficiency
    (C) mechanical efficiency
    (D) hydraulic efficiency

24. What is meant by cambium layer of an exogeneous tree?
    (A) layer between inner bark and sap wood
    (B) outermost layer of the tree
    (C) zone of inner rings surround the pith
    (D) layer between pith and heart wood

25. What is the difference between two measured values of same quantity in surveying?
    (A) variation
    (B) discrepancy
    (C) intentional error
    (D) balancing error

26. A wooden pile is being driven with a drop hammer weighing 18 kN and having a free fall of 1 m. The penetration in the last blow is 5 mm. Determine the load carrying capacity of pile according to the Engineering News formula :
    (A) 100 kN
    (B) 90 kN
    (C) 110 kN
    (D) 180 kN

27. A jet of water, of cross sectional area 0.005 m² strikes a flat plate normally with a velocity of 15 m/s. If the plate is moving with a velocity of 5 m/s in the direction of jet and away from the jet, what is the force exerted by the jet on the plate?

(A) 250 N
(B) 0.50 N
(C) 500 N
(D) 0.25 N

28. Dry density of which sample is expected to be high?

(A) organic clay
(B) dense sand
(C) bentonite
(D) stiff clay

29. Which among the following is the great circle, formed by a plane through the observor's position that is perpendicular to the direction of gravity at that point intercepts the celestial sphere?

(A) observor's meridian
(B) ecliptic
(C) hour circle
(D) horizon

30. What is known as a watertight enclosure made up of sheet pile walls, usually temporary, built around a working area for the purpose of excluding water during construction?

(A) cofferdam
(B) bulkhead
(C) penstock
(D) box caisson

31. What is meant by Froude's number?

(A) ratio of inertia force and viscous force
(B) ratio of square root of inertia force and pressure force
(C) ratio of square root of inertia force and gravity force
(D) ratio of inertia force and pressure force

32. Among which of the following conditions, Darcy's Law is not applicable to seepage of soils?

(A) soil is homogeneous
(B) the flow conditions are turbulant in soil
(C) the soil is incompressible under stress
(D) the soil is isotropic

33. Which of the following is a field test?

(A) vane shear test
(B) direct shear test
(C) triaxial compression test
(D) unconfined compression test

34. For what type of soil unconfined compression test is generally applicable?

(A) saturated clay
(B) sand
(C) silt
(D) poorly graded sandy silt

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35. If C_d = coefficient of discharge, C_v = coefficient of velocity and C_c = coefficient of contraction, then which of the following statement is correct?

    (A) $C_c = C_d \times C_v$ (B) $C_v = C_c \times C_d$

    (C) $C_d = C_v \times C_c$ (D)   None of these

36. Which of the following will have a plasticity index 20?

    (A)   sand   (B)   clay

    (C)   silt   (D)   compacted sand

37. What is a protective barrier constructed to enclose harbours, and to keep the harbour waters undisturbed by the effect of heavy and strong seas?

    (A)   entrance lock   (B)   dock

    (C)   shaft   (D)   break water

38. Determine the total pressure on a circular plate of area of cross section 1 m^2 which is placed vertically in water in such a way that the centre of the plate is 1 m below the free surface of water.

    (A)   981 N   (B)   9.81 N

    (C)   9810 N   (D)   98.1 N

39. Among which of the following tests conducted for measurement of shear strength of soil, no excess pore pressure is set up at any stage of the test?

    (A)   drained test   (B)   undrained test

    (C)   consolidated undrained test   (D)   quick test

40. Which of the following laws gives the diameter of a sphere which will settle at a specific terminal velocity?

    (A)   Darcy's Law   (B)   Stoke's Law

    (C)   Hooke's Law   (D)   Gay – Lussac's Law

41. What is meant by optimum water content?

    (A)   water content corresponding to maximum dry density

    (B)   water content corresponding to zero air voids

    (C)   water content corresponding to minimum dry density

    (D)   water content corresponding to field density

42. What is the function of a fish plate?

    (A)   for fixing rails to sleepers   (B)   for fastening chairs to sleepers

    (C)   for fixing wooden sleepers to rail   (D)   to hold two rails together

43. Which among the following is pressure on a fluid below atmospheric pressure?

    (A)   absolute pressure   (B)   gauge pressure

    (C)   vacuum pressure   (D)   none of these

                                                                     [P.T.O.]

44. Which of the following is the unit of coefficient of consolidation?
   - (A) cm²/sec
   - (B) cm/sec
   - (C) m²/kN
   - (D) none of these

45. A simply supported beam of span 7 m has a point load of 3 kN at a distance of 2 m from left end A and a point load of 2 kN at a distance of 4 m from left end A. What will be the support reaction at B?
   - (A) 3 kN
   - (B) 2.5 kN
   - (C) 2 kN
   - (D) $\frac{19}{7}$ kN

46. Soils with a value of k (coefficient of permeability) ranging from 10^{-5} mm/sec to 10^{-3} mm/sec can be classified as :
   - (A) pervious
   - (B) semi pervious
   - (C) impervious
   - (D) aquiclude

47. Which of the following soil samples will have grains of almost same particle size?
   - (A) well graded
   - (B) good graded
   - (C) gap graded
   - (D) poorly graded

48. Which among the following is the term used for change in volume of soil per unit of initial volume due to a given unit increase in pressure?
   - (A) coefficient of volume change
   - (B) coefficient of compressibility
   - (C) coefficient of settlement
   - (D) swelling index

49. Which of the following values, the voids ratio in soil can have theoretically?
   - (A) < 1 only
   - (B) can be less than or more than 1
   - (C) > 1 only
   - (D) < 0.5

50. For what purpose stiffeners are used in a plate girder?
   - (A) to connect the flange plates to the web
   - (B) to provide web splice
   - (C) to prevent buckling of web
   - (D) to provide splice for flange plates and cover plates

51. Which of the following is a clayey soil that has never been subjected to an effective pressure greater than existing overburden pressure and which is also completely consolidated by the existing overburden pressure?
   - (A) normally consolidated soil
   - (B) pre – consolidated soil
   - (C) under – consolidated soil
   - (D) over consolidated soil

52. By which simple equation the hydrologic cycle may be expressed?
- (A) Precipitation = Evaporation – Run off
- (B) Evaporation = Precipitation + Run off
- (C) Run off = Precipitation + Evaporation
- (D) Precipitation = Evaporation + Run off

53. Which among the following is a functional relation connecting the value of specific gravity, voids ratio, water content and degree of saturation?
- (A) $w = \dfrac{eG}{S_r}$
- (B) $e = \dfrac{wG}{S_r}$
- (C) $S_r = \dfrac{ew}{G}$
- (D) $G = \dfrac{ew}{S_r}$

54. What is an impermeable formation which contain water but are not capable of transmitting or supplying a sufficient quantity?
- (A) aquifer
- (B) aquifuge
- (C) perched aquifer
- (D) aquiclude

55. Coefficient of permeability is inversely proportional to which of the following?
- (A) viscosity
- (B) effective diameter
- (C) unit weight of water
- (D) void ratio

56. If an auditorium has a total surface area of plaster, floor, curtains and seats equal to 160 m² and volume of auditorium is 5000 m³, what is time of reverberation in seconds according to Sabin's equation?
- (A) 3.2 seconds
- (B) 5.12 seconds
- (C) 5 seconds
- (D) 8 seconds

57. According to Indian Standards, specific gravity of soil is the ratio of unit weight of solids to that of water at a temperature of :
- (A) 4°C
- (B) 27°C
- (C) 17°C
- (D) 36°C

58. What is the term used for the degree of disturbance of undisturbed clay sample due to remoulding expressed as ratio of unconfined compression strength in undisturbed state to that in remoulded state, without change in water content?
- (A) sensitivity
- (B) thixotropy
- (C) collapse potential
- (D) coefficient of structural collapse

59. Which among the following is also known as rolled steel joist?
- (A) rolled steel T section
- (B) rolled steel channel section
- (C) rolled steel I section
- (D) rolled steel angle section

60. For shallow foundations if P is the load, γ is the unit weight of soil and Φ is the angle of repose, which of the following is equal to total depth of foundation according to Rankine's formula?

(A) $\dfrac{P}{\gamma}\left(\dfrac{1+\sin\Phi}{1-\sin\Phi}\right)$

(B) $\dfrac{P}{\gamma}\left(\dfrac{1-\sin\Phi}{1+\sin\Phi}\right)$

(C) $\dfrac{P}{\gamma}\left(\dfrac{1-\sin\Phi}{1+\sin\Phi}\right)^2$

(D) $\dfrac{P}{\gamma}\left(\dfrac{1+\sin\Phi}{1-\sin\Phi}\right)^2$

61. Name the level surface to which the elevations are referred :

(A) bench mark

(B) datum

(C) base line

(D) change point

62. For no tension developed in a gravity dam, where the resultant of all forces on dam should always lie?

(A) at toe

(B) near heel

(C) at top

(D) within the middle third of the section

63. Two bodies of masses 5.5 kg and 4.3 kg are hung to the ends of rope, passing over a smooth frictionless pulley. With what acceleration the heavier mass comes down?

(A) 9.8 m/s²

(B) 4.73 m/s²

(C) 80 m/s²

(D) 1.2 m/s²

64. If W_L = liquid limit, W_P = plastic limit, W_S = shrinkage limit then which of the following is equal to plasticity index (I_P)?

(A) $W_L - W_P$

(B) $W_P - W_L$

(C) $W_L - W_S$

(D) $W_P - W_S$

65. Among the following which equipment is not used in chain survey?

(A) ranging rod

(B) offset rod

(C) alidade

(D) plumb bob

66. Name the end supports of the superstructure of a bridge :

(A) abutments

(B) piers

(C) wing walls

(D) deckings

67. A body was thrown vertically down from a tower. What is the distance travelled by the body in the third second of its fall, if its initial velocity was 5.5 m/sec?

(A) 25 m

(B) 60.60 m

(C) 60 m

(D) 30 m

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A

68. Name the structure carrying discharge of a natural stream across a canal intercepting the stream :
    (A) Gallery
    (B) Cut off pile
    (C) Cross drainage work
    (D) Sluice

69. Which among the following is torsional rigidity?
    (A) product of rigidity modulus and moment of inertia
    (B) product of rigidity modulus and polar moment of inertia
    (C) product of rigidity modulus and angle of twist
    (D) product of torque and radius of shaft

70. During setting and hardening of cement concrete, hydration of which among the following contributes to the progressive strength of concrete?
    (A) C_3S
    (B) C_3A
    (C) C_4AF
    (D) C_2S

71. What is the polar moment of inertial of a circle of diameter D?
    (A) $\dfrac{\pi D^4}{64}$
    (B) $\dfrac{\pi D^4}{32}$
    (C) $\dfrac{\pi D^4}{128}$
    (D) $\dfrac{\pi D^4}{16}$

72. What is called, the time in hours taken by rainwater that falls at the farthest point to reach the outlet of a catchment?
    (A) effective duration
    (B) basin lag
    (C) time of concentration
    (D) recession time

73. Name the short sections of wood or steel, which are fixed on principal rafter of trusses to support purlins :
    (A) ridge piece
    (B) wall plate
    (C) eaves board
    (D) cleat

74. Name the area to be irrigated by a dam :
    (A) ayacut
    (B) catchment area
    (C) reservoir
    (D) upstream side

75. Among the following methods for computing average precipitation (or rainfall) in which method the area of the basin is not taken into account?
    (A) Isohyetal method
    (B) Thiesson polygon method
    (C) Arithmetic average method
    (D) None of these

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76. What is the super elevation (expressed in percentage terms) required for a road curve of radius 1000 m if the design speed is 100 km/hour?

    (A) $\dfrac{127}{1000}$ %
          (B) $\dfrac{1000}{127}$ %

    (C) 10%
                (D) $\dfrac{10}{9.81}$ %

77. Which of the following is not included in temporary adjustments of a dumpy level?
    (A) setting up
              (B) levelling up
    (C) elimination of parallax
          (D) centering

78. Among the following which represents the irrigating capacity of a unit of water :
    (A) water application efficiency
          (B) consumptive use efficiency
    (C) duty
                     (D) delta

79. What is the maximum size of the particle of silt?
    (A) 0.02 mm
              (B) 0.002 mm
    (C) 0.2 mm
                (D) 0.06 mm

80. Name the well from which water flows automatically under pressure :
    (A) infiltration well
              (B) artesian well
    (C) flowing well
                (D) tube well

81. Which among the following is the back bearing of N30°E?
    (A) E 30° N
              (B) N 150° E
    (C) S 150° W
             (D) S 30° W

82. Among the following, by which method the efficiency of a sedimentation tank can be increased for a given discharge?
    (A) by increasing the depth of the tank
    (B) by decreasing the depth of the tank
    (C) by increasing the area of the tank
    (D) by decreasing the area of the tank

83. For a cantilever beam of length L, what bending moment at free end would produce a deflection equal to that produced by a concentrated load W at free end?

    (A) WL
              (B) $\dfrac{2}{3}WL$

    (C) $\dfrac{2}{3}W$
           (D) $\dfrac{WL}{EI}$

84. If buckling of sand is not taken into account for volumetric proportioning of concrete, what will be the result?
    (A) no effect
    (B) buckling of concrete product will be the result
    (C) more quantity of concrete per bag of cement will be produced
    (D) less quantity of concrete per bag of cement will be produced

85. In which direction, resultant force will shift by providing a top width for roadway and free board in elementary profile of a gravity dam, for full reservoir condition?
    (A) shift towards top
    (B) shift towards toe
    (C) shift towards heel
    (D) no shift at all

86. Two simply supported beams A and B of same width have identical loading. What is the ratio $\dfrac{strength\ of\ beam\ A}{strength\ of\ beam\ B}$ if beam A has depth double that of beam B?
    (A) 2
    (B) 4
    (C) 1/2
    (D) 1/4

87. What is the least count of a transit theodolite?
    (A) 20 minutes
    (B) 30 minutes
    (C) 60 seconds
    (D) 20 seconds

88. A steel rod of length 20 m at 30°C is heated upto 40°C. What is the temperature stress developed if the expansion is prevented? Given, $\alpha = 12 \times 10^{-6}$ per °C, $E = 2 \times 10^5\,N/mm^2$
    (A) $2.4\,N/mm^2$
    (B) $24\,N/mm^2$
    (C) $240\,N/mm^2$
    (D) $0.24\,N/mm^2$

89. What will be the deflection at the centre of a simply supported beam of rectangular cross section if the depth is doubled, for the same load W?
    (A) $\dfrac{1}{2}$ of first case
    (B) $\dfrac{1}{6}$ of first case
    (C) $\dfrac{1}{8}$ of first case
    (D) $\dfrac{1}{4}$ of first case

90. If K is the bulk modulus, E is the Young's modulus and N is the shear modulus then, which is the relation to find out Poisson's ratio $\left(\dfrac{1}{m}\right)$?
    (A) $\dfrac{9KN}{N+3K}$
    (B) $\dfrac{3K-2N}{6K+2N}$
    (C) $2N\left(1+\dfrac{1}{K}\right)$
    (D) $3K\left(1-\dfrac{2}{N}\right)$

91. If three coplanar, concurrent forces are acting at a point are in equilibrium, of which two of them are collinear, then what is the magnitude of third force which is acting at an angle θ with other two forces?
    (A) zero
    (B) algebraic sum of other two forces
    (C) vector sum of other two forces
    (D) none of the above

92. Where is the keystone of an arch being placed?
   (A) extrados
   (B) crown
   (C) intrados
   (D) springing line

93. What is measured using a venturimeter?
   (A) velocity
   (B) pressure
   (C) viscosity
   (D) discharge

94. What will be the elongation of a prismatic bar of length L, cross sectional area A, hanging vertically under its own weight W?
   (A) $\dfrac{WL}{AE}$
   (B) $\dfrac{WL}{3AE}$
   (C) $\dfrac{WL}{2AE}$
   (D) $\dfrac{WL}{4AE}$

95. In a hydro electric scheme which of the following is used to carry water from storage reservoir to the power house?
   (A) forebay
   (B) intake structure
   (C) draft tube
   (D) penstocks

96. What is the nominal size of standard brick?
   (A) 19 cm × 9 cm × 9 cm
   (B) 20 cm × 10 cm × 10 cm
   (C) 22 cm × 11.5 cm × 7.5 cm
   (D) 20 cm × 10 cm × 5 cm

97. What will be the elementary profile of a gravity dam?
   (A) rectangular in section
   (B) trapezoidal in section
   (C) polygon with six sides
   (D) triangular in section

98. Where the tension steel is provided in a two way slab?
   (A) only at top
   (B) only at bottom
   (C) at top and bottom
   (D) at corners

99. What is a graph showing variations of discharge with time at a particular point of a stream?
   (A) Unit hydrograph
   (B) Hyetograph
   (C) Strange's run off curve
   (D) Hydrograph

100. For a redundant frame if number of members is m and number of joints is j then which of the following relations will be satisfied?
   (A) $m > (2j - 3)$
   (B) $m < (2j - 3)$
   (C) $m < 2(j - 3)$
   (D) $m > 2(j - 3)$