

SEAL

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Question Booklet No.

200353

R/J/E/EXAM

2021

RECRUITMENT TEST

Series

A

Time : 2 Hours

Maximum Marks : 100

ROLL NO.

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R/J/E/EXAM. 2021/118

SEAL

1. _____ are the most common defects in timber caused due to natural forces.
 - (A) Checks
 - (B) Knots
 - (C) Shakes and dry rot
 - (D) Checks and Rind gall

2. Which of the following is **not** a mechanical property of wood?
 - (A) Cleavability
 - (B) Resilience
 - (C) Stiffness
 - (D) Termite resistance

3. In the softening point test of the bitumen with the help of ring and ball apparatus, what is the diameter (in cm) of the steel ball?
 - (A) 0.35
 - (B) 0.65
 - (C) 0.95
 - (D) 1.25

4. Time of concentration is defined as
 - (A) time needed for water to flow from the nearest point in a watershed to the watershed outlet
 - (B) time needed for water to flow from the upstream point in a watershed to the watershed outlet
 - (C) time needed for water to flow from the most remote point in a watershed to the watershed outlet
 - (D) None of the above

5. The accuracy of the predicted strength of concrete using rebound hammer test, is
 - (A) ± 10 percentage
 - (B) ± 25 percentage
 - (C) ± 35 percentage
 - (D) ± 45 percentage

6. Column splice is provided with filler and hearing plates when
 - (A) the depths of two column sections are equal
 - (B) the depths of two column sections are different
 - (C) the depths of two column sections are large and different
 - (D) None of the above

7. The compression members used in roof trusses and bracings are called as
 - (A) rafters
 - (B) booms
 - (C) struts
 - (D) knee braces

8. An RCC short column (with lateral ties) of rectangular cross-section of 300 mm \times 400 mm is reinforced with four numbers of 16 mm diameter longitudinal bars. The grades of steel and concrete are Fe415 and M20 respectively. Neglect eccentricity effect. Considering limit state (IS 456 : 2000), the axial load carrying capacity of column (in kN and decimal place can be neglected), is
 - (A) 917
 - (B) 1323
 - (C) 1800
 - (D) 7800

9. A steel wire is bent into a circular shape of 10 m radius with maximum stress brought in the wire of $2 \times 10^3 \text{ kg/cm}^2$. Find the diameter of steel wire in mm.
(Assume $E = 2 \times 10^6 \text{ kg/cm}^2$)
- (A) 5
(B) 10
(C) 15
(D) 20
10. Which is the formula used to calculate corrections for latitude and departure?
- (A) Bowditch's rule
(B) Negative error
(C) Empirical rule
(D) All of the above
11. Minimum edge distance for rivet/bolt is 1.5 times of
- (A) fastener diameter
(B) bolt diameter
(C) hole diameter
(D) pitch distance
12. _____ is defined as the number of vehicles that pass a point on a highway, or a given lane or direction of a highway, during a specified time interval.
- (A) Highway capacity
(B) Highway traffic volume
(C) Highway density
(D) Highway speed
13. Which method is used for locating the station points?
- (A) Radiation method
(B) Trisection method
(C) Traversing method
(D) Intersection method
14. Theodolite can be used to measure
- (A) the vertical angle
(B) the horizontal angle
(C) Both horizontal and vertical angles
(D) None of the above
15. The Poisson's ratio is
- (A) linear strain/lateral strain
(B) lateral strain/linear strain
(C) shear strain/linear strain
(D) linear strain/shear strain
16. As per IS 456 : 2000, the _____ strength of M25 grade of concrete is 3.5 N/mm^2 .
- (A) compressive
(B) shear
(C) crushing
(D) flexural tensile

17. Based on initial tangent modulus specified in IS : 456-2000, the modulus of elasticity is
- (A) $E = 5000\sqrt{f_{ck}}$
- (B) $E = 500\sqrt{f_{ck}}$
- (C) $E = 2000\sqrt{f_{ck}}$
- (D) $E = 200\sqrt{f_{ck}}$
- (f_{ck} is the characteristic compressive strength of concrete).
18. A certain soil has the following properties :
- $G_s = 2.71$, $S_r = 81.3\%$ and $w = 20\%$. The porosity of the soil is
- (A) 10%
- (B) 20%
- (C) 40%
- (D) 80%
19. The process of adding water to lime to convert it into _____ is known as slaking.
- (A) hydrated lime
- (B) dehydrated lime
- (C) lime water
- (D) None of the above.
20. Resilience in a material is known as
- (A) elastic strain energy stored in a body
- (B) total strain energy stored in a body
- (C) partial strain energy stored in a body
- (D) initial strain energy stored in a body
21. The magnetic bearing of a line is $48^\circ 24'$. Calculate the true bearing if the magnetic declination is $5^\circ 38'$ east.
- (A) $54^\circ 02'$
- (B) $42^\circ 46'$
- (C) $234^\circ 02'$
- (D) $324^\circ 02'$
22. Determine the void ratio of a saturated soil sample that has a mass of 130 g before drying and 100 g after drying in an oven. Assume the specific gravity of the soil solids to be 2.75.
- (A) 0.264
- (B) 0.561
- (C) 0.729
- (D) 0.825
23. Determine the dry density (kg/m^3) of a soil sample having a porosity of 0.32 and a moisture content of 25% ($G_s = 2.70$).
- (A) 2256.5
- (B) 1976.5
- (C) 1836.7
- (D) 2295.9
24. The hydraulic radius and cross-sectional area are given by 250 cm and 31.4 sq.m respectively. What is the wetted perimeter (cm) of the channel?
- (A) 1256
- (B) 7850
- (C) 6521
- (D) 5087

25. The Reynolds number for flowing fluid in a pipe is laminar and is given by 1350. What is the friction factor?
- (A) 0.0215
(B) 0.0474
(C) 0.0235
(D) 0.0744
26. A circular pipe of diameter 0.5 m carries the discharge of 50 litre/s. The head loss due to friction in the pipe is 0.15 m and friction factor for the pipe is given as 0.01. What is the length (m) of the pipe?
- (A) 1150
(B) 1860
(C) 2263
(D) 2785
27. Rivet value can be denoted as
- (A) load/shear strength of a rivet
(B) load/bearing strength of a rivet
(C) load/tearing strength of a rivet
(D) load/number of rivets
28. Vane shear test is applicable for
- (A) dense sand
(B) loose sand
(C) soft clay
(D) silt
29. Local shear failure occurs for
- (A) dense sand or stiff clay
(B) loose sand and soft clay
(C) dense sand and soft clay
(D) loose sand and stiff clay
30. Settlement of foundation can be minimized if
- (A) bearing capacity is improved
(B) void ratio is increased
(C) water content is added
(D) external load is increased
31. The ratio of the yield of water from a rapid sand filter to that from a slow sand filter is
- (A) 10
(B) 20
(C) 30
(D) 60
32. The permissible limits of iron and chlorides in drinking water are ____ mg/l and ____ mg/l respectively.
- (A) 0.8, 800
(B) 1.3, 600
(C) 0.03, 1200
(D) 0.3, 250

33. When the isolated footing is loaded, the clayey soil under the footing
- (A) will be subjected to uniform soil pressure
 - (B) relieves the pressure near the middle of the footing
 - (C) will have minimum pressure near the edges
 - (D) will be subjected to a trapezoidal non-uniform pressure
34. Purlin is _____, structural member in a roof.
- (A) horizontal
 - (B) vertical
 - (C) inclined
 - (D) None of the above
35. The catchment is made of 60% area with run off coefficient 0.4 and remaining 40% area with run off coefficient 0.6. What is the weighted coefficient to be used in rational formula?
- (A) 0.24
 - (B) 0.48
 - (C) 0.5
 - (D) 0.6
36. The minimum width of _____ recommended by the IRC is 2.5 m.
- (A) kerb
 - (B) median
 - (C) shoulder
 - (D) carriageway
37. As per IRC, the recommended value of exceptional gradient for plain or rolling terrain is
- (A) 7.6%
 - (B) 6.7%
 - (C) 3.7%
 - (D) 7.3%
38. The porosity (n) and the degree of saturation (S) of a soil sample are 0.4 and 50% respectively. In a 100 m^3 volume of the soil, the volume (in m^3) of air is
- (A) 20
 - (B) 40
 - (C) 70
 - (D) 72
39. The range of diameter of cast iron sewer is
- (A) 20-100 mm
 - (B) 150-750 mm
 - (C) 40-250 mm
 - (D) 100-250 mm
40. The most widely used coagulant for removing suspended impurities from water is
- (A) aluminum chloride
 - (B) aluminum sulfate
 - (C) ammonium chloride
 - (D) ammonium sulfate

41. Compression members in truss are overloaded, then their failure may take place due to
- direct compression
 - excessive bending
 - bending combined with twisting
 - All of the above
42. When load is acting in longitudinal direction and when a change in length takes place, the strain is known as
- linear strain
 - lateral strain
 - shear strain
 - volumetric strain
43. The deflection of a beam will be reduced if the moment of inertia of the beam is
- decreased
 - increased
 - constant
 - zero
44. Bernoulli's equation is applicable for
- viscous and compressible fluid flow
 - inviscid and compressible fluid flow
 - inviscid and incompressible fluid flow
 - viscous and incompressible fluid flow
45. The contact pressures for a rigid footing resting on top of sand at the center and the edges are respectively
- maximum and zero
 - maximum and minimum
 - zero and maximum
 - minimum and maximum
46. The expression for E in terms of G and K is
- $\frac{9GK}{G+3K}$
 - $\frac{G+3K}{9GK}$
 - $\frac{G-3K}{9GK}$
 - $\frac{9GK}{G-3K}$
- where E =Young's modulus, G =rigidity modulus and K =bulk modulus.
47. The final loss of head in slow sand filter is ____ than rapid sand filter.
- higher
 - lower
 - slightly lower
 - equivalent
48. The source of subsurface water is from
- streams and rivers
 - storage reservoirs
 - springs
 - ponds and lakes

49. _____ wells allow water contribution only through the bottom and deep bearing stratum lies below an impervious layer.
- (A) Strainer
 - (B) Cavity
 - (C) Slotted
 - (D) Perforated pipe
50. The purpose of backwashing is to remove the _____ material that has been deposited in the rapid sand filter bed during the filtration cycle.
- (A) colloidal
 - (B) dissolved solid
 - (C) contaminant
 - (D) suspended solid
51. Which of the following set of terms is related to curve setting in road network?
- (A) Circle, parabola and hyperbola
 - (B) Apex distance, unit chord and tangent length
 - (C) Centre line, angle and chord
 - (D) Cant, bitumen and tangent length
52. The soil compacted on the dry side of optimum has _____ compared to that compacted on the wet side of optimum.
- (A) less permeability and less strength
 - (B) less permeability and more strength
 - (C) more permeability and less strength
 - (D) more permeability and more strength
53. Super elevation on a curved road cannot be provided at
- (A) forward tangent
 - (B) point of tangent
 - (C) point of reverse curvature
 - (D) point of equilibrium
54. Cold water can hold _____ dissolved oxygen than warm water.
- (A) more
 - (B) less
 - (C) same
 - (D) can't say
55. What is the term of rotating telescope in a horizontal plane, about its vertical axis in theodolite?
- (A) Centering
 - (B) Swinging
 - (C) Transiting
 - (D) Plunging
56. Centrifugal pumps are used to transport
- (A) pressure which is accelerated by governor
 - (B) pressure which is accelerated by impeller
 - (C) fluid which is accelerated by governor
 - (D) fluid which is accelerated by impeller

57. Which of the following is **not** a positive displacement pump?

- (A) Emulsion pump
- (B) Plunger pump
- (C) Piston pump
- (D) Diaphragm pump

58. The earthquakes which occur along the boundaries of the tectonic plates are called

- (A) interplate earthquakes
- (B) intraplate earthquakes
- (C) internal earthquakes
- (D) external earthquakes

59. What is the value of angle of response for clay (dry) soil?

- (A) 10°
- (B) 50°
- (C) 30°
- (D) 60°

60. Ridge beam is used to provide end support to the common rafters in a

- (A) king-post truss
- (B) queen-post truss
- (C) purlin
- (D) tie beam

61. Permissible stress of steel in compression due to bending in working stress method is

- (A) $0.4 f_y$
- (B) $0.66 f_y$
- (C) $0.87 f_y$
- (D) $0.75 f_y$

62. _____ is known as the beam provided outside a wall at each floor level to support the wall load.

- (A) Rafter
- (B) Lintel
- (C) Spandrel
- (D) None of the above

63. Which section holds the ratio of the maximum and average shear stresses as 1.5?

- (A) Circular
- (B) Triangular
- (C) I-section
- (D) Rectangular

64. The instrument which is used to measure the earthquake shaking is called

- (A) anemometer
- (B) seismograph
- (C) barometer
- (D) nomograph

65. The depth of deep manholes is
- (A) > 0.5 m
 - (B) > 1.0 m
 - (C) > 1.5 m
 - (D) None of the above
66. Lead pipes have ____ hydraulic coefficient and ____ flexibility.
- (A) high, high
 - (B) low, low
 - (C) high, low
 - (D) low, high
67. ____ is used to measure flows to domestic buildings.
- (A) Rain gauge
 - (B) Water tank
 - (C) Drain pipe
 - (D) Water meter
68. Hydraulically equivalent sections of two sewers are such that they discharge at the same rate laid on same grade when
- (A) running full
 - (B) running half depth
 - (C) running quarter depth
 - (D) running three-fourth depth
69. A water purification work handle 50000 m³/day of water which need a chlorine (chlorine demand) of 0.4 mg/l. The residual chlorine after 15 minutes of contact time is 0.2 mg/l. The chlorine dosage is
- (A) 0.2 mg/l
 - (B) 0.8 mg/l
 - (C) 4000 mg/l
 - (D) 0.6 mg/l
70. In case of volume batching, a smaller mass of sand occupying the fixed volume of the measuring box is due to
- (A) hardening
 - (B) bulking
 - (C) softening
 - (D) texture modification
71. Gypsum (calcium sulphate) acts as a/an ____ in cement.
- (A) mixing agent
 - (B) accelerator
 - (C) retarder
 - (D) None of the above
72. A spread footing for a single column is known as the
- (A) pad footing
 - (B) combine footing
 - (C) strip footing
 - (D) eccentric footing

73. Curing _____ the shrinkage of concrete.

- (A) increases
- (B) reduces
- (C) does not affect
- (D) None of the above

74. The critical section for punching shear in an isolated pad footing of effective depth d will be located at

- (A) the face of the column itself
- (B) d distance from the face of the column
- (C) $d/2$ distance from the face of the column
- (D) $2d$ distance from the face of the column

75. The maximum effective slenderness ratio of a member which is always in tension (other than pre-tensioned member) is

- (A) 180
- (B) 250
- (C) 350
- (D) 400

76. Centrifugal pumps transfer _____ from _____ to fluid.

- (A) pressure, draft
- (B) pressure, rotor
- (C) energy, draft
- (D) energy, rotor

77. The design of structures by limit state method will ensure that they will not reach limit states.

- (A) True
- (B) False
- (C) Can't say
- (D) None of the above

78. The _____ is most liable to corrosion.

- (A) gold
- (B) copper
- (C) steel
- (D) wood

79. _____ may be made of plain concrete if their unsupported lengths do not exceed their least lateral dimensions by four times.

- (A) Columns
- (B) Beams
- (C) Footings
- (D) Slabs

80. The unit weight of cement mortar is generally taken as

- (A) 1800 kg/m^3
- (B) 2000 kg/m^3
- (C) 2200 kg/m^3
- (D) 2400 kg/m^3

81. The maximum deflection of $WL^3/3EI$ is due to a load W acting at the _____ of a cantilever beam of length L and having flexural rigidity EI .
- (A) free end
 - (B) middle
 - (C) support
 - (D) None of the above
82. The slump test is the simplest test to determine _____ of concrete.
- (A) water permeability
 - (B) rapid chloride ion penetration
 - (C) compressive strength
 - (D) workability
83. The size of the vent pipe commonly used in house drainage is
- (A) 30 mm
 - (B) 100 mm
 - (C) 50 mm
 - (D) 75 mm
84. The flushing cistern in the Indian type water closet is normally kept _____ above the closet.
- (A) 2 metres
 - (B) 4 metres
 - (C) 8 metres
 - (D) 10 metres
85. Which category of river training work helps in navigation of the channels?
- (A) Mean water training
 - (B) Training for depth
 - (C) Training for discharge
 - (D) Training for sediment
86. _____ are constructed transverse to the river flow extending from the bank into the river.
- (A) Groynes
 - (B) Spurs
 - (C) Both (A) and (B)
 - (D) None of the above
87. _____ are defined by the speed of flooding, not the source or location of flooding.
- (A) Fluvial floods
 - (B) Coastal floods
 - (C) Pluvial floods
 - (D) None of the above
88. Partially ventilated single stack system is the modified form of
- (A) single stack system and two-pipe system
 - (B) single stack system and one-pipe system
 - (C) one-pipe system and two-pipe system
 - (D) two-pipe system

89. Septic action is produced in the septic tank by

- (A) fungi
- (B) virus
- (C) termites
- (D) anaerobic bacteria

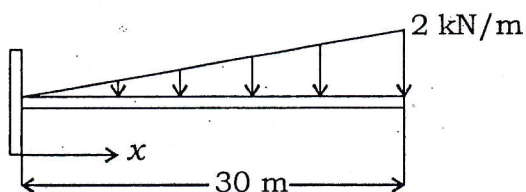
90. Plinth area method is used for preparing _____ estimate.

- (A) preliminary
- (B) detailed
- (C) approximate
- (D) supplementary

91. Trapezoidal weir has another popular name. What is it?

- (A) Cippoletti weir
- (B) Hagen-Poiseuille weir
- (C) Reynolds' weir
- (D) Euler's weir

92. Determine the shear force at 10 m from the fixed support in the given beam below:



- (A) 33.3 kN
- (B) 26.7 kN
- (C) 33.0 kN
- (D) 27.0 kN

93. A wide rectangular channel carries water at a depth of 0.5 m. The bed slope of the channel is 0.0004. Estimate the discharge (m^3/sec) using Manning's equation. Take Manning's $n=0.012$.

- (A) 2.915
- (B) 1.652
- (C) 1.143
- (D) 0.801

94. The _____ of a river is determined by using contour map.

- (A) velocity
- (B) discharge
- (C) catchment area
- (D) None of the above

95. The velocity that would not permit the solids to settle down and even scour the deposited particles of a given size is called as _____ velocity.

- (A) self-cleansing
- (B) maximum
- (C) minimum
- (D) None of the above

96. The width of _____ for a single lane bridge should not be less than 4.25 m.

- (A) tollway
- (B) carriageway
- (C) freeway
- (D) trafficway

97. _____ organization is presently responsible for issuing flood forecasts in India.

- (A) The Central Public Works Department
- (B) Central Water Commission
- (C) Central Ground Water Board
- (D) Department of Water Resources

98. According to the IS code, _____ of the timber is noted at 12% moisture content.

- (A) weight
- (B) strength
- (C) hardness
- (D) elasticity

99. The plasticity index and plastic limit of a soil are given by 25% and 20% respectively. What will be the liquid limit of the soil?

- (A) 0.15
- (B) 0.25
- (C) 0.35
- (D) 0.45

100. Pavements are classified based on _____

- (A) Earth surface
- (B) materials used
- (C) rigidity of pavement
- (D) wheel loads