PPSC
Junior Engineer

Previous Year Paper
(Civil) 6 March 2022

READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

Booklet Sr. No.

Question Booklet Set
A

Candidate's Name _____

Father's Name _____

Date of Birth : | | | | | | | | |

D D M M Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

Total Questions : **120**]
Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time he/she is told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes out of 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.
2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in the OMR sheet. Use of ink pen or any other pen is not allowed.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.
4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet.
5. The question paper booklet has **16** pages.
6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.
7. The serial number of the new Question booklet if issued for some reason should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.
8. The paper consists of total 300 Marks. Each question shall carry 2·5 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.
9. There is negative marking (0·5 marks for each question) for questions wrongly answered by the candidate.
10. Use of Electronic/Manual Calculator is prohibited.
11. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. The two sub-methods adopted for projection technique, via., Visual Ray Method and Vanishing Point Method are for _____.

(a) Isometric Projections

(b) Perspective Projections

(c) Orthographic Projections

(d) Trigonometrical Projections

2. The length-to-height ratio of a closed filled arrowhead is

(a) 2 : 1

(b) 1 : 1

(c) 3 : 1

(d) 1 : 3

3. The coefficient of friction depends on

(a) nature of surfaces only

(b) area of contact only

(c) relative speed of the surfaces

(d) Both (a) and (b)

4. A block resting on a plane just begins to slide when the plane is inclined at 30° to the horizontal. The coefficient of static friction is

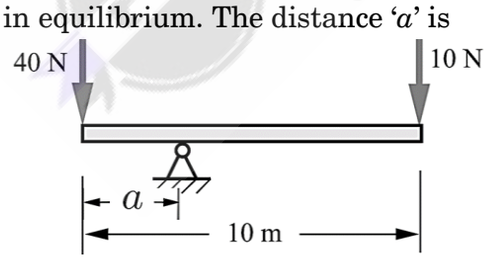
(a) 1/2

(b) $1/\sqrt{3}$

(c) $\sqrt{3}/2$

(d) 1

5. The beam shown in the figure below is in equilibrium. The distance 'a' is



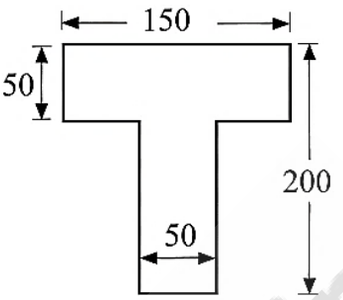
(a) 1 m

(b) 2 m

(c) 3 m

(d) 4 m

6. The centre of gravity of a T-section 150 mm × 200 mm × 50 mm from its bottom is at



(a) 100 mm

(b) 125 mm

(c) 150 mm

(d) 175 mm

7. A floating body is said to be in a state of stable equilibrium

(a) when its metacentric height is zero

(b) when the metacentre is below the centre of gravity

(c) when the metacentre is above the centre of gravity

(d) only when its centre of gravity is below its centre of buoyancy

8. The height of hydraulic jump is equal to

(a) sequent depth

(b) initial depth

(c) difference in conjugate depths

(d) difference in alternating depths

9. Find the actual discharge from an orifice, when the coefficient of discharge is 0·6 and the theoretical discharge is 0·018 cumec.

(a) 0·0108 cumec

(b) 0·00108 cumec

(c) 0·108 cumec

(d) 1·08 cumec

10. When the water surface coincides with the top edge of a rectangular vertical gate of 30 m (wide) × 6 m (depth), then the depth of the centre of pressure is

(a) 1·8 m

(b) 2 m

(c) 3 m

(d) 4 m

11. Venturimeter is used to measure the

(a) velocity of flowing liquid

(b) discharge of flowing liquid

(c) pressure of flowing liquid

(d) pressure difference between two points in a pipeline

12. A flow is called supersonic if the

(a) mach number is between 1 and 6

(b) mach number is between 7 and 9

(c) velocity of flow is very high

(d) discharge is difficult to measure

13. According to Darcy's formula, the loss of head due to friction in the pipe is (where f = Darcy's coefficient, l = Length of the pipe, v = Velocity of the liquid in the pipe, and d = Diameter of the pipe)

(a) $3flv^2/2gd$

(b) $4flv^2/2gd$

(c) $flv^2/2gd$

(d) flv^2/gd

14. If a jet of water is coming out from a nozzle with a velocity 9·81 m/s, the angle of elevation being 30°, then the time to reach the highest point is

(a) 0·25 s

(b) 0·50 s

(c) 1·0 s

(d) 1·5 s

15. The discharge through a 100 mm diameter external mouthpiece fitted to the side of a large vessel is 0·05948 m^3/s. The head over the mouthpiece when coefficient of discharge C_d = 0·855, is _____.

(a) 2 m

(b) 2·5 m

(c) 3·0 m

(d) 4·0 m

16. For two-dimensional flow, the stream function is given by $\psi = 2xy$. The velocity at a point (3, 4) is

(a) 6 m/sec

(b) 8 m/sec

(c) 10 m/sec

(d) 12 m/sec

17. Gauge pressure is

(a) absolute pressure – atmospheric pressure

(b) absolute pressure + atmospheric pressure

(c) atmospheric pressure – absolute pressure

(d) None of the above

18. If the Reduced Level of Bench Mark is 105 m, the back sight is 1·235 m and the foresight is 1·920 m, then what is the Reduced Level of forward station ?

(a) 101·845 m

(b) 108·155 m

(c) 104·315 m

(d) 105·685 m

19. For a distance of 1800 m, what will be the corrections for curvature and refraction ?

(a) 0·254 m; 0·218 m

(b) 0·254 m; 0·036 m

(c) 0·036 m; 0·254 m

(d) 0·036 m; 0·218 m

20. The correction for sag is
(a) always zero
(b) always additive
(c) always subtractive
(d) sometimes additive and sometimes subtractive

21. Closed contours with lower value inwards, represent a
(a) hill
(b) depression
(c) plain surface
(d) None of the above

22. The bearings of the lines AB and BC are 146°30′ and 68°30′. The included angle ABC is
(a) 102°
(b) 78°
(c) 45°
(d) 85°

23. Which of the following methods estimates best the area of an irregular and curved boundary ?
(a) Simpson's method
(b) Trapezoidal method
(c) Mid-ordinate method
(d) Average ordinate method

24. The maximum permissible water absorption (in % by weight) for common burnt clay building bricks of class up to 12·5 is
(a) 10
(b) 15
(c) 20
(d) 25

25. Which of the following does ***not*** have a pozzolanic property ?
(a) Fly Ash
(b) Standard Sand
(c) Ordinary Portland Cement
(d) Silica Fume

26. Distemper is used to coat
(a) interior surfaces not exposed to weather
(b) external concrete surfaces
(c) compound walls
(d) woodwork

27. For a good building stone-crushing strength should be more than
(a) 100 MPa
(b) 150 MPa
(c) 50 MPa
(d) 200 MPa

28. Addition of pozzolana to ordinary Portland cement increases
(a) permeability
(b) heat of hydration
(c) shrinkage
(d) bleeding

29. For the manufacture of Portland cement, the typical proportions of raw materials used, are
(a) lime 63%; silica 22%; other ingredients 15%
(b) lime 22%; silica 63%; other ingredients 15%
(c) silica 40%; lime 40%; other ingredients 20%
(d) silica 70%; lime 20%; other ingredients 10%

30. Seasoning of timber is
(a) a process of removing sap
(b) creosoting
(c) painting with sodium silicate
(d) coating with tar

31. The standard size of masonry bricks is
(a) 18 cm × 8 cm × 8 cm
(b) 19 cm × 9 cm × 9 cm
(c) 20 cm × 10 cm × 10 cm
(d) 21 cm × 11 cm × 11 cm

32. The fineness of the cement and the development of cement strength are
(a) not related
(b) randomly related
(c) directly proportional
(d) inversely proportional

33. A covering of concrete placed on the exposed top of an external wall, is known as
(a) Coping
(b) Lintel
(c) Cornice
(d) Frieze

34. The maximum bending stress in T-section will occur at
(a) neutral axis
(b) extreme fibre in the web
(c) junction of web and flange
(d) extreme fibre in the flange

35. Find the bending moment at the fixed end for a cantilever beam of span 4 m subjected to a concentrated load of 10 KN at centre and a moment of 20 KN-m.
(a) 40 KN-m
(b) 60 KN-m
(c) 30 KN-m
(d) 10 KN-m

36. A system of pre-stressing in which the wires are anchored in layers by wedging sandwich plates is the
(a) Gifford Udall system
(b) Hoyer system
(c) Freyssinet system
(d) Magnel Blaton system

37. The shape factor for an I section is approximately
(a) 3·15
(b) 2·75
(c) 1·75
(d) 1·15

38. The deflection and slope of a uniformly loaded cantilever beam are given as 18 mm and 0·01 radian, respectively. The length of the beam is
(a) 2 m
(b) 2·2 m
(c) 2·4 m
(d) 2·6 m

39. The materials which have the same elastic properties in all directions are called
(a) Isotropic
(b) Homogeneous
(c) Linear elastic material
(d) None of the above

40. The maximum bending moment of a simply supported beam of uniform rectangular cross-section (20 cm wide × 30 cm deep) is calculated as 4·5 t-m. The maximum bending stress included in the beam will be
(a) 100 kg/cm^2
(b) 125 kg/cm^2
(c) 150 kg/cm^2
(d) 200 kg/cm^2

41. As per IS : 456 : 2000, the minimum percentage of reinforcement required for slabs, when mild steel bars are used is
(a) 0·12
(b) 0·15
(c) 0·30
(d) 0·45

42. The capacity of a material to absorb energy when it is deformed elastically and then, upon unloading to have this energy recovered is called
(a) Elasticity
(b) Resilience
(c) Tensile strength
(d) Ductility

43. In an isolated reinforced concrete footing of effective depth "d", the stress in punching shear is checked

(a) at the face of the column

(b) at a distance d/2 away from the face of the column

(c) at a distance d/2 away from the centre of the column

(d) at the centre of the column

44. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is

(a) 3/7

(b) 4/7

(c) 2/7

(d) 1/7

45. At a certain point in a structural member, there are perpendicular stresses 100 N/mm^2 and 60 N/mm^2, both tensile. What is the equivalent stress in simple tension, according to the maximum principal strain theory ? (Poisson's ratio = 0·33)

(a) 75 N/mm^2

(b) 60 N/mm^2

(c) 80 N/mm^2

(d) 120 N/mm^2

46. A steel rod of 20 mm diameter and 3·14 m length is subjected to an axial pull of 100 kN. If E = 200 kN/mm^2, the elongation of the rod will be

(a) 10 mm

(b) 2 mm

(c) 5 mm

(d) 4 mm

47. A truss containing j joints and m members, will be a simple truss if

(a) $m = 2j - 3$

(b) $j = 2m - 3$

(c) $m = 3j - 2$

(d) $j = 3m - 2$

48. A rectangular beam 20 cm wide is subjected to a maximum shearing force of 10,000 kg, the corresponding maximum shearing stress being 30 kg/cm^2. The depth of the beam is

(a) 15 cm

(b) 20 cm

(c) 25 cm

(d) 30 cm

49. The minimum percentage of steel in an RCC long column is

(a) 0·8%

(b) 0·6%

(c) 1·0%

(d) 1·2%

50. The maximum bending moment for a purlin of length L when subjected to a distributed load W, may be taken as

(a) $\frac{WL}{8}$

(b) $\frac{WL}{10}$

(c) $\frac{WL}{12}$

(d) $\frac{WL}{16}$

51. The number of independent elastic constants for homogeneous, isotropic and elastic material that follows Hooke's law is

(a) 1
(b) 2
(c) 3
(d) 9

52. The angle between the plane of maximum shear stress and the principal plane in a two-dimensional stress block is

(a) 30°
(b) 45°
(c) 60°
(d) 90°

53. What is the ratio of flexural strength (f_{cr}) to the characteristic compressive strength of concrete (f_{ck}) of M 25 grade concrete ?

(a) 0·12
(b) 0·17
(c) 0·14
(d) 0·014

54. A column splice is used to increase the

(a) connection with the slab
(b) cross-sectional area of the column
(c) length of the column
(d) strength of the column

55. A simply supported beam is subjected to a concentrated load at the centre. The deflection of the beam will become eight times when the length of the beam is increased by

(a) two times
(b) four times
(c) six times
(d) eight times

56. A rectangular bar of width b and height h is being used as a cantilever. The loading is in a plane parallel to the side b. The section modulus is

(a) $\frac{bh^3}{12}$
(b) $\frac{bh^2}{6}$
(c) $\frac{b^2h}{6}$
(d) None of the above

57. The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(a) moment of inertia
(b) polar moment of inertia
(c) polar modulus
(d) modulus of rigidity

58. Which of the following properties of the building is ***not*** desirable in earthquake-resistant design ?

(a) Strength
(b) Stiffness
(c) Irregularity
(d) Ductility

59. The damping value to be taken into account for the seismic analysis of reinforced concrete buildings according to IS : 1893 (2016) is

(a) 5% of the critical damping
(b) 2% of the critical damping
(c) 10% of the critical damping
(d) 7% of the critical damping

60. If 't_f' is flowing-through period and 't_d' is detention period for a sedimentation tank, then its displacement efficiency is given by _____ .

(a) $\frac{t_d}{t_f}$

(b) $\frac{(t_d - t_f)}{t_d}$

(c) $\frac{t_f}{t_d}$

(d) $\frac{(t_f - t_d)}{t_f}$

61. The type of valve which is provided to control the flow of water in the distribution system at street corners and where the pipelines intersect is _____ .

(a) Reflux Valve

(b) Sluice Valve

(c) Air Valve

(d) Scour Valve

62. Match the contents in Column I and Column II and select the correct option from the following :

	Column I		*Column II*
P.	Grit chamber	1.	Zone settling
Q.	Secondary settling tank	2.	Stoke's law
R.	Activated sludge process	3.	Aerobic
S.	Trickling filter	4.	Contact stabilisation

(a) P-1, Q-2, R-3, S-4

(b) P-1, Q-2, R-4, S-3

(c) P-2, Q-1, R-4, S-3

(d) P-2, Q-1, R-3, S-4

63. Which of the following does ***not*** cause permanent hardness in water ?

(a) Sulphate

(b) Chloride

(c) Nitrate

(d) Bicarbonate

64. The ratio of 5-day BOD to ultimate BOD is about

(a) 1/3

(b) 3/4

(c) 2/3

(d) 5/4

65. The pathogens can be killed by

(a) Nitrification

(b) Chlorination

(c) Oxidation

(d) None of the above

66. The chemical compound which is insoluble in water, formed when alum is added to water is

(a) $Al(OH)_3$

(b) $CaSO_4$

(c) CO_2

(d) $Ca(OH)_3$

67. As per IS : 1498 – 1970, what is the basis for sub-classification of fine-grained soils ?

(a) Mohr's Circle

(b) Newmark's Chart

(c) Plasticity Chart

(d) Webster Chart

68. The seepage pressure always acts in

(a) horizontal direction

(b) vertically downward direction

(c) vertically upward direction

(d) the direction of seepage flow

69. The void ratio of a sand sample in its loosest state is 0·6 and the difference between maximum and minimum void ratio is 0·3. What will be the void ratio of the sand for a relative density of 66·6% ?

(a) 0·3
(b) 0·4
(c) 0·5
(d) 0·6

70. The following data were noted from an irrigation field : Field capacity = 20%, Permanent wilting point = 10%, Permissible depletion of available soil moisture = 50%, Dry unit weight of soil = 15 kN/m^3, Effective rainfall = 50 mm. The net irrigation requirement per metre depth of soil will be

(a) 75 mm
(b) 125 mm
(c) 50 mm
(d) 25 mm

71. The maximum particle size for which Darcy's law is applicable is

(a) 0·1 mm
(b) 0·3 mm
(c) 0·5 mm
(d) 0·8 mm

72. A coarse-grained soil has a void ratio 0·75, and specific gravity as 2·75. The critical gradient at which quick sand condition occurs, is

(a) 0·25
(b) 0·5
(c) 0·75
(d) 1·00

73. The transition curve used in the horizontal alignment of highways as per IRC is

(a) lemniscate
(b) spiral
(c) cubic parabola
(d) All of the above

74. Cant deficiency occurs when a vehicle travels around a curve at

(a) booked speed
(b) speed lower than the equilibrium speed
(c) speed higher than the equilibrium speed
(d) equilibrium speed

75. An Enoscope is used to determine the

(a) space-mean speed
(b) time-mean speed
(c) spot speed
(d) traffic density

76. Composite sleeper index is the index of

(a) hardness and strength
(b) strength and toughness
(c) toughness and wear resistance
(d) wear resistance and hardness

77. A channel with a silt factor of 1·1 has a mean velocity of 0·88 m/s. What will be its hydraulic mean radius as per Lacey's theory ?

(a) 1·95 m
(b) 1·76 m
(c) 1·63 m
(d) 1·50 m

78. Duty on capacity is also known as

(a) Capacity Factor
(b) Time Factor
(c) Root Zone Depth
(d) Full Supply Coefficient

79. A silt control device consisting of a number of rectangular tunnels provided parallel to the axis of head regulator and terminating near the under-sluiced weir to allow the clear water to flow through the head regulator is called

(a) Silt ejector
(b) Silt tunnel
(c) Silt excluder
(d) Under sluice

80. Which of the following pollution-control devices is the most effective ?

(a) Dynamic precipitator
(b) Spray tower
(c) Electrostatic precipitator
(d) Wet cyclonic scrubber

81. The maximum permissible noise level to which a man working in a chemical plant can be exposed for eight hours per day is about _____ decibels.

(a) 60
(b) 90
(c) 105
(d) 120

82. Biodiesel is produced from oils or fats using

(a) fermentation
(b) transesterification
(c) distillation
(d) pasteurization

83. No deduction is made in the quantity estimation for plastering work in cement mortar for openings having size up to

(a) 0·75 m^2
(b) 0·5 m^2
(c) 3 m^2
(d) 1 m^2

84. In an earthwork construction, a mass haul diagram is a diagram showing the

(a) cross-section of the site
(b) longitudinal section of the site
(c) cumulative volume of earthwork and the haulage
(d) amount of cutting and filling along the length

85. Which of the following expressions is used to calculate 'Annual Depreciation' by straight line method ? Where 'C_i' is the original value, 'C_s' is the scrap value and 'N' is the life of structure in years.

(a) $(C_s - C_i)/N$
(b) $(C_i - C_s)/N$
(c) $C_s/(N \times C_i)$
(d) $(C_i + C_s)/N$

86. The most accurate cost for a building project is arrived at through

(a) Typical bay method
(b) Cubical rate method
(c) Unit rate method
(d) Plinth area method

87. The unit of measurement for 'backfilling' in construction is

(a) Running meter
(b) Square meter
(c) Cubic meter
(d) Quintal

88. In the 'Center Line Method' of estimation for T junction, how much length has to be deducted from the total centreline length for a particular item ?

(a) Half-width
(b) Full-width
(c) Quarter-width
(d) Three-quarter-width

89. Shear cracks between the main wall and cross-wall can be corrected using

(a) grouting

(b) rebuilding

(c) guining

(d) toothing

90. If the soil is dry, DPC for ground floor consists of the layer of

(a) metal

(b) coarse sand

(c) fine sand

(d) concrete

91. The main aim of maintaining any structure is to

(a) improve its appearance

(b) utilise the funds provided

(c) stabilise the structure to enable it to carry the functions for which it is constructed

(d) utilise services of incharge maintenance

92. If t_o is the optimistic time, t_p is the pessimistic time, and t_m is the most likely time, then the expected time is calculated as

(a) $(t_o + t_m + t_p)/3$

(b) $(t_o + 2t_m + t_p)/4$

(c) $(t_o + 4t_m + t_p)/5$

(d) $(t_o + 4t_m + t_p)/6$

93. In CPM, the cost slope is determined by

(a) Normal cost/Crash cost

(b) (Normal cost – Crash cost)/ (Normal time – Crash time)

(c) (Crash cost – Normal cost)/ (Normal time – Crash time)

(d) Crash cost/Normal cost

94. The time by which an activity completion time can be delayed without affecting the early start of the succeeding activities is known as

(a) Independent float

(b) Interfering float

(c) Free float

(d) Total float

95. Which of the following statements are ***incorrect*** for Network Critical path ?

(a) The path of critical activities, which links the start and end events is critical path

(b) It is the path of activities having zero float

(c) The sum of the duration of the critical activities along a critical path gives the duration of the project

(d) It is the path of events having non-zero slack

96. If the employee is terminated or removed from employment by the employer, the wage of that employee should be paid within _____ days from the day on which he was removed or terminated.

(a) 7

(b) 15

(c) 30

(d) 2

97. Which of the following is ***not*** included under the definition of wages given under the Payment of Wages Act, 1936 ?

(a) Basic Wage

(b) Dearness Allowance

(c) Incentive

(d) Gratuity

98. Which one of the following does ***not*** contribute to waterlogging and is not a remedial measure for waterlogging ?

(a) Excessive tapping of groundwater and contour bunding

(b) Frequent flooding and good drainage for irrigated land

(c) Seepage from unlined canals and water courses

(d) Inadequate drainage and contour bunding

99. Efflorescence is the ill effect of

(a) dampness

(b) growth of vegetation

(c) action of weathering agents

(d) chemical action of mortar on masonry

100. The minimum water content at which the soil just begins to crumble when rolled into thread 3 mm in diameter is called

(a) Shrinkage limit

(b) Liquid limit

(c) Plastic limit

(d) Shrinkage ratio

101. Match the following :

	Dam		*River*
A.	Nagarjuna Sagar	1.	Kaveri
B.	Mettur	2.	Narmada
C.	Hirakud	3.	Krishna
D.	Indira Sagar	4.	Mahanadi

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

102. For which term has India been elected to the UN Economic and Social Council (ECOSOC) ?

(a) 2021 – 23

(b) 2022 – 24

(c) 2022 – 26

(d) 2021 – 25

103. When does a defeated candidate lose security deposit in elections ?

(a) When a defeated candidate secures less than the number of votes received by the NOTA

(b) When a defeated candidate receives lowest number of votes

(c) When a defeated candidate who fails to secure more than one-sixth of the valid votes polled in the constituency

(d) When a defeated candidate who fails to secure more than the number of invalid votes

104. Lonar Lake, also known as Lonar crater, is a notified National Geo-heritage Monument, saline, soda lake, is located in which of the following States ?

(a) Maharashtra

(b) Madhya Pradesh

(c) Chattisgarh

(d) Odisha

105. Choose the correct option :

When light travels from one medium to another medium

(a) velocity, wavelength and frequency do not change
(b) velocity, wavelength and frequency remains same
(c) velocity and wavelength change and frequency remains same
(d) velocity and frequency change and wavelength remains same

106. Consider the following statements :

Statement I : Rafale fighter jets have the ability to engage any jets from a long distance without the risk of being tracked. In addition, the air-to-ground SCALP missile can precisely track down any target with ease.

Statement II : Rafale features beyond visual range air-to-air missile that is the best today. The aircraft can take out the enemy aircraft from a range of more than 100 kms.

Which of the above statement(s) is/are correct ?

(a) Only II
(b) Only I
(c) Both I and II
(d) Neither I nor II

107. An infected person is less likely to encounter a susceptible person when a large proportion of the members of the group are immune, is called

(a) Active immunity
(b) Passive immunity
(c) Herd immunity
(d) Specific immunity

108. For 2021, The Dadasaheb Phalke award was given to

(a) Puneet Rajkumar
(b) Rajinikanth
(c) Mohanlal
(d) Shah Rukh Khan

109. The name Lovlina Borgohain is associated with which sport in India ?

(a) Archery
(b) Boxing
(c) Cycling
(d) Fencing

110. Which State is the first in India to implement the National Education Policy, 2020 ?

(a) Gujarat
(b) Madhya Pradesh
(c) Karnataka
(d) Assam

Directions (Question Nos. 111 and 112) : *Read the following information carefully to answer the questions :*

I. There are five students Suresh, Mukesh, Vineet, Rahul and Soham, each with different heights.

II. Exactly one person has height in between Soham and Suresh.

III. Mukesh is taller than Suresh.

IV. When arranged in order of heights, Vineet takes the middlemost position.

111. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ?

(a) There are exactly two persons in between Mukesh and Rahul
(b) Rahul is taller than Vineet
(c) Mukesh is taller than Soham
(d) Rahul is the tallest

112. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ? (Tallest to shortest)

(a) Suresh, Vineet, Soham
(b) Soham, Vineet, Suresh
(c) Vineet, Suresh, Rahul
(d) Mukesh, Suresh, Rahul

113. Pointing to a girl, a lady said, "She is the only grandchild to the parents of the person I am married to." How is the lady related to the girl ?

(a) Aunt

(b) Daughter

(c) Mother

(d) Sister

114. In a certain code "LONDON" is written as "OLMWLM". Then how will "BANGALORE" be written ?

(a) YZMOLZTIV

(b) VITZLOMYZ

(c) YZMTZOLIV

(d) VILOZTMZY

115. If 'M' means 'division', 'S' means 'addition', 'A' means 'subtraction', and 'D' means 'multiplication', then what will be the value of the following expression ?

12 M 6 S 5 D 8 A 9 = ?

(a) 28

(b) 33

(c) 36

(d) 54

116. In the following number series, find the missing number ?

7, 5, 9, 8, 13, 17, 21 _____, 37.

(a) 44

(b) 25

(c) 29

(d) 31

117. The price of 2 Jeans and 4 T-shirts is ₹ 1,600. With the same money, one can buy 1 Jeans and 6 T-shirts. If one wants to buy 3 Jeans and 5 T-shirts, how much shall he have to pay ?

(a) ₹ 2,200

(b) ₹ 2,600

(c) ₹ 2,500

(d) ₹ 2,400

118. If South-West becomes North, North-West becomes West and so on, what will East become ?

(a) North-East

(b) South-West

(c) North-West

(d) South-East

119. The height of Rakesh and Rahul is 40% and 80% respectively more than that of Ramesh. What is the ratio of height of Rakesh and Rahul ?

(a) 6 : 7

(b) 5 : 6

(c) 7 : 9

(d) 1 : 2

120. A boatman goes 4 km against the current of the stream in 2 hours and goes 3 km along the current in 30 minutes. How long will it take to go 9 km in stationary water ?

(a) 2 hours 15 minutes

(b) 1 hour 45 minutes

(c) 1 hour 30 minutes

(d) 2 hours

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

Booklet Sr. No.

Question Booklet Set
B

Candidate's Name _____

Father's Name _____

Date of Birth : | | | | | | | | |

D D M M Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

Total Questions : **120**]
Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time he/she is told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes out of 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.
2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in the OMR sheet. Use of ink pen or any other pen is not allowed.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.
4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet.
5. The question paper booklet has **16** pages.
6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.
7. The serial number of the new Question booklet if issued for some reason should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.
8. The paper consists of total 300 Marks. Each question shall carry 2·5 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.
9. There is negative marking (0·5 marks for each question) for questions wrongly answered by the candidate.
10. Use of Electronic/Manual Calculator is prohibited.
11. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. The fineness of the cement and the development of cement strength are
(a) not related
(b) randomly related
(c) directly proportional
(d) inversely proportional

2. A covering of concrete placed on the exposed top of an external wall, is known as
(a) Coping
(b) Lintel
(c) Cornice
(d) Frieze

3. The maximum bending stress in T-section will occur at
(a) neutral axis
(b) extreme fibre in the web
(c) junction of web and flange
(d) extreme fibre in the flange

4. Find the bending moment at the fixed end for a cantilever beam of span 4 m subjected to a concentrated load of 10 KN at centre and a moment of 20 KN-m.
(a) 40 KN-m
(b) 60 KN-m
(c) 30 KN-m
(d) 10 KN-m

5. A system of pre-stressing in which the wires are anchored in layers by wedging sandwich plates is the
(a) Gifford Udall system
(b) Hoyer system
(c) Freyssinet system
(d) Magnel Blaton system

6. The shape factor for an I section is approximately
(a) 3·15
(b) 2·75
(c) 1·75
(d) 1·15

7. The deflection and slope of a uniformly loaded cantilever beam are given as 18 mm and 0·01 radian, respectively. The length of the beam is
(a) 2 m
(b) 2·2 m
(c) 2·4 m
(d) 2·6 m

8. The materials which have the same elastic properties in all directions are called
(a) Isotropic
(b) Homogeneous
(c) Linear elastic material
(d) None of the above

9. The maximum bending moment of a simply supported beam of uniform rectangular cross-section (20 cm wide × 30 cm deep) is calculated as 4·5 t-m. The maximum bending stress included in the beam will be
(a) 100 kg/cm^2
(b) 125 kg/cm^2
(c) 150 kg/cm^2
(d) 200 kg/cm^2

10. As per IS : 456 : 2000, the minimum percentage of reinforcement required for slabs, when mild steel bars are used is
(a) 0·12
(b) 0·15
(c) 0·30
(d) 0·45

11. The capacity of a material to absorb energy when it is deformed elastically and then, upon unloading to have this energy recovered is called
(a) Elasticity
(b) Resilience
(c) Tensile strength
(d) Ductility

12. In an isolated reinforced concrete footing of effective depth "d", the stress in punching shear is checked

(a) at the face of the column

(b) at a distance d/2 away from the face of the column

(c) at a distance d/2 away from the centre of the column

(d) at the centre of the column

13. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is

(a) 3/7

(b) 4/7

(c) 2/7

(d) 1/7

14. At a certain point in a structural member, there are perpendicular stresses 100 N/mm^2 and 60 N/mm^2, both tensile. What is the equivalent stress in simple tension, according to the maximum principal strain theory ? (Poisson's ratio = 0·33)

(a) 75 N/mm^2

(b) 60 N/mm^2

(c) 80 N/mm^2

(d) 120 N/mm^2

15. A steel rod of 20 mm diameter and 3·14 m length is subjected to an axial pull of 100 kN. If E = 200 kN/mm^2, the elongation of the rod will be

(a) 10 mm

(b) 2 mm

(c) 5 mm

(d) 4 mm

16. A truss containing j joints and m members, will be a simple truss if

(a) $m = 2j - 3$

(b) $j = 2m - 3$

(c) $m = 3j - 2$

(d) $j = 3m - 2$

17. A rectangular beam 20 cm wide is subjected to a maximum shearing force of 10,000 kg, the corresponding maximum shearing stress being 30 kg/cm^2. The depth of the beam is

(a) 15 cm

(b) 20 cm

(c) 25 cm

(d) 30 cm

18. The minimum percentage of steel in an RCC long column is

(a) 0·8%

(b) 0·6%

(c) 1·0%

(d) 1·2%

19. The maximum bending moment for a purlin of length L when subjected to a distributed load W, may be taken as

(a) $\frac{WL}{8}$

(b) $\frac{WL}{10}$

(c) $\frac{WL}{12}$

(d) $\frac{WL}{16}$

20. The number of independent elastic constants for homogeneous, isotropic and elastic material that follows Hooke's law is

(a) 1
(b) 2
(c) 3
(d) 9

21. The angle between the plane of maximum shear stress and the principal plane in a two-dimensional stress block is

(a) 30°
(b) 45°
(c) 60°
(d) 90°

22. What is the ratio of flexural strength (f_{cr}) to the characteristic compressive strength of concrete (f_{ck}) of M 25 grade concrete ?

(a) 0·12
(b) 0·17
(c) 0·14
(d) 0·014

23. A column splice is used to increase the

(a) connection with the slab
(b) cross-sectional area of the column
(c) length of the column
(d) strength of the column

24. A simply supported beam is subjected to a concentrated load at the centre. The deflection of the beam will become eight times when the length of the beam is increased by

(a) two times
(b) four times
(c) six times
(d) eight times

25. A rectangular bar of width b and height h is being used as a cantilever. The loading is in a plane parallel to the side b. The section modulus is

(a) $\frac{bh^3}{12}$

(b) $\frac{bh^2}{6}$

(c) $\frac{b^2h}{6}$

(d) None of the above

26. The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(a) moment of inertia
(b) polar moment of inertia
(c) polar modulus
(d) modulus of rigidity

27. Which of the following properties of the building is ***not*** desirable in earthquake-resistant design ?

(a) Strength
(b) Stiffness
(c) Irregularity
(d) Ductility

28. The damping value to be taken into account for the seismic analysis of reinforced concrete buildings according to IS : 1893 (2016) is

(a) 5% of the critical damping
(b) 2% of the critical damping
(c) 10% of the critical damping
(d) 7% of the critical damping

29. If 't_f' is flowing-through period and 't_d' is detention period for a sedimentation tank, then its displacement efficiency is given by _____ .

(a) $\frac{t_d}{t_f}$

(b) $\frac{(t_d - t_f)}{t_d}$

(c) $\frac{t_f}{t_d}$

(d) $\frac{(t_f - t_d)}{t_f}$

30. The type of valve which is provided to control the flow of water in the distribution system at street corners and where the pipelines intersect is _____ .

(a) Reflux Valve

(b) Sluice Valve

(c) Air Valve

(d) Scour Valve

31. Match the contents in Column I and Column II and select the correct option from the following :

	Column I		*Column II*
P.	Grit chamber	1.	Zone settling
Q.	Secondary settling tank	2.	Stoke's law
R.	Activated sludge process	3.	Aerobic
S.	Trickling filter	4.	Contact stabilisation

(a) P-1, Q-2, R-3, S-4

(b) P-1, Q-2, R-4, S-3

(c) P-2, Q-1, R-4, S-3

(d) P-2, Q-1, R-3, S-4

32. Which of the following does ***not*** cause permanent hardness in water ?

(a) Sulphate

(b) Chloride

(c) Nitrate

(d) Bicarbonate

33. The ratio of 5-day BOD to ultimate BOD is about

(a) 1/3

(b) 3/4

(c) 2/3

(d) 5/4

34. The pathogens can be killed by

(a) Nitrification

(b) Chlorination

(c) Oxidation

(d) None of the above

35. The chemical compound which is insoluble in water, formed when alum is added to water is

(a) $Al(OH)_3$

(b) $CaSO_4$

(c) CO_2

(d) $Ca(OH)_3$

36. As per IS : 1498 – 1970, what is the basis for sub-classification of fine-grained soils ?

(a) Mohr's Circle

(b) Newmark's Chart

(c) Plasticity Chart

(d) Webster Chart

37. The seepage pressure always acts in

(a) horizontal direction

(b) vertically downward direction

(c) vertically upward direction

(d) the direction of seepage flow

38. The void ratio of a sand sample in its loosest state is 0·6 and the difference between maximum and minimum void ratio is 0·3. What will be the void ratio of the sand for a relative density of 66·6% ?

(a) 0·3
(b) 0·4
(c) 0·5
(d) 0·6

39. The following data were noted from an irrigation field : Field capacity = 20%, Permanent wilting point = 10%, Permissible depletion of available soil moisture = 50%, Dry unit weight of soil = 15 kN/m^3, Effective rainfall = 50 mm. The net irrigation requirement per metre depth of soil will be

(a) 75 mm
(b) 125 mm
(c) 50 mm
(d) 25 mm

40. The maximum particle size for which Darcy's law is applicable is

(a) 0·1 mm
(b) 0·3 mm
(c) 0·5 mm
(d) 0·8 mm

41. A coarse-grained soil has a void ratio 0·75, and specific gravity as 2·75. The critical gradient at which quick sand condition occurs, is

(a) 0·25
(b) 0·5
(c) 0·75
(d) 1·00

42. The transition curve used in the horizontal alignment of highways as per IRC is

(a) lemniscate
(b) spiral
(c) cubic parabola
(d) All of the above

43. Cant deficiency occurs when a vehicle travels around a curve at

(a) booked speed
(b) speed lower than the equilibrium speed
(c) speed higher than the equilibrium speed
(d) equilibrium speed

44. An Enoscope is used to determine the

(a) space-mean speed
(b) time-mean speed
(c) spot speed
(d) traffic density

45. Composite sleeper index is the index of

(a) hardness and strength
(b) strength and toughness
(c) toughness and wear resistance
(d) wear resistance and hardness

46. A channel with a silt factor of 1·1 has a mean velocity of 0·88 m/s. What will be its hydraulic mean radius as per Lacey's theory ?

(a) 1·95 m
(b) 1·76 m
(c) 1·63 m
(d) 1·50 m

47. Duty on capacity is also known as

(a) Capacity Factor
(b) Time Factor
(c) Root Zone Depth
(d) Full Supply Coefficient

48. A silt control device consisting of a number of rectangular tunnels provided parallel to the axis of head regulator and terminating near the under-sluiced weir to allow the clear water to flow through the head regulator is called

(a) Silt ejector
(b) Silt tunnel
(c) Silt excluder
(d) Under sluice

49. Which of the following pollution-control devices is the most effective ?

(a) Dynamic precipitator
(b) Spray tower
(c) Electrostatic precipitator
(d) Wet cyclonic scrubber

50. The maximum permissible noise level to which a man working in a chemical plant can be exposed for eight hours per day is about _____ decibels.

(a) 60
(b) 90
(c) 105
(d) 120

51. Biodiesel is produced from oils or fats using

(a) fermentation
(b) transesterification
(c) distillation
(d) pasteurization

52. No deduction is made in the quantity estimation for plastering work in cement mortar for openings having size up to

(a) 0·75 m^2
(b) 0·5 m^2
(c) 3 m^2
(d) 1 m^2

53. In an earthwork construction, a mass haul diagram is a diagram showing the

(a) cross-section of the site
(b) longitudinal section of the site
(c) cumulative volume of earthwork and the haulage
(d) amount of cutting and filling along the length

54. Which of the following expressions is used to calculate 'Annual Depreciation' by straight line method ? Where 'C_i' is the original value, 'C_s' is the scrap value and 'N' is the life of structure in years.

(a) $(C_s - C_i)/N$
(b) $(C_i - C_s)/N$
(c) $C_s/(N \times C_i)$
(d) $(C_i + C_s)/N$

55. The most accurate cost for a building project is arrived at through

(a) Typical bay method
(b) Cubical rate method
(c) Unit rate method
(d) Plinth area method

56. The unit of measurement for 'backfilling' in construction is

(a) Running meter
(b) Square meter
(c) Cubic meter
(d) Quintal

57. In the 'Center Line Method' of estimation for T junction, how much length has to be deducted from the total centreline length for a particular item ?

(a) Half-width
(b) Full-width
(c) Quarter-width
(d) Three-quarter-width

58. Shear cracks between the main wall and cross-wall can be corrected using

(a) grouting

(b) rebuilding

(c) guining

(d) toothing

59. If the soil is dry, DPC for ground floor consists of the layer of

(a) metal

(b) coarse sand

(c) fine sand

(d) concrete

60. The main aim of maintaining any structure is to

(a) improve its appearance

(b) utilise the funds provided

(c) stabilise the structure to enable it to carry the functions for which it is constructed

(d) utilise services of incharge maintenance

61. If t_o is the optimistic time, t_p is the pessimistic time, and t_m is the most likely time, then the expected time is calculated as

(a) $(t_o + t_m + t_p)/3$

(b) $(t_o + 2t_m + t_p)/4$

(c) $(t_o + 4t_m + t_p)/5$

(d) $(t_o + 4t_m + t_p)/6$

62. In CPM, the cost slope is determined by

(a) Normal cost/Crash cost

(b) (Normal cost – Crash cost)/ (Normal time – Crash time)

(c) (Crash cost – Normal cost)/ (Normal time – Crash time)

(d) Crash cost/Normal cost

63. The time by which an activity completion time can be delayed without affecting the early start of the succeeding activities is known as

(a) Independent float

(b) Interfering float

(c) Free float

(d) Total float

64. Which of the following statements are ***incorrect*** for Network Critical path ?

(a) The path of critical activities, which links the start and end events is critical path

(b) It is the path of activities having zero float

(c) The sum of the duration of the critical activities along a critical path gives the duration of the project

(d) It is the path of events having non-zero slack

65. If the employee is terminated or removed from employment by the employer, the wage of that employee should be paid within _____ days from the day on which he was removed or terminated.

(a) 7

(b) 15

(c) 30

(d) 2

66. Which of the following is ***not*** included under the definition of wages given under the Payment of Wages Act, 1936 ?

(a) Basic Wage

(b) Dearness Allowance

(c) Incentive

(d) Gratuity

67. Which one of the following does ***not*** contribute to waterlogging and is not a remedial measure for waterlogging ?

(a) Excessive tapping of groundwater and contour bunding

(b) Frequent flooding and good drainage for irrigated land

(c) Seepage from unlined canals and water courses

(d) Inadequate drainage and contour bunding

68. Efflorescence is the ill effect of

(a) dampness

(b) growth of vegetation

(c) action of weathering agents

(d) chemical action of mortar on masonry

69. The minimum water content at which the soil just begins to crumble when rolled into thread 3 mm in diameter is called

(a) Shrinkage limit

(b) Liquid limit

(c) Plastic limit

(d) Shrinkage ratio

70. The two sub-methods adopted for projection technique, via., Visual Ray Method and Vanishing Point Method are for _____.

(a) Isometric Projections

(b) Perspective Projections

(c) Orthographic Projections

(d) Trigonometrical Projections

71. The length-to-height ratio of a closed filled arrowhead is

(a) 2 : 1

(b) 1 : 1

(c) 3 : 1

(d) 1 : 3

72. The coefficient of friction depends on

(a) nature of surfaces only

(b) area of contact only

(c) relative speed of the surfaces

(d) Both (a) and (b)

73. A block resting on a plane just begins to slide when the plane is inclined at 30° to the horizontal. The coefficient of static friction is

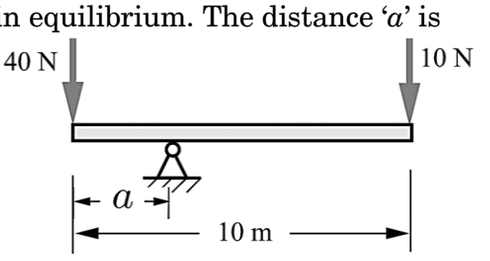
(a) 1/2

(b) $1/\sqrt{3}$

(c) $\sqrt{3}/2$

(d) 1

74. The beam shown in the figure below is in equilibrium. The distance 'a' is



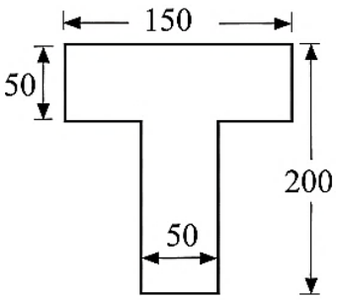
(a) 1 m

(b) 2 m

(c) 3 m

(d) 4 m

75. The centre of gravity of a T-section 150 mm × 200 mm × 50 mm from its bottom is at



(a) 100 mm
(b) 125 mm
(c) 150 mm
(d) 175 mm

76. A floating body is said to be in a state of stable equilibrium
(a) when its metacentric height is zero
(b) when the metacentre is below the centre of gravity
(c) when the metacentre is above the centre of gravity
(d) only when its centre of gravity is below its centre of buoyancy

77. The height of hydraulic jump is equal to
(a) sequent depth
(b) initial depth
(c) difference in conjugate depths
(d) difference in alternating depths

78. Find the actual discharge from an orifice, when the coefficient of discharge is 0·6 and the theoretical discharge is 0·018 cumec.
(a) 0·0108 cumec
(b) 0·00108 cumec
(c) 0·108 cumec
(d) 1·08 cumec

79. When the water surface coincides with the top edge of a rectangular vertical gate of 30 m (wide) × 6 m (depth), then the depth of the centre of pressure is
(a) 1·8 m
(b) 2 m
(c) 3 m
(d) 4 m

80. Venturimeter is used to measure the
(a) velocity of flowing liquid
(b) discharge of flowing liquid
(c) pressure of flowing liquid
(d) pressure difference between two points in a pipeline

81. A flow is called supersonic if the
(a) mach number is between 1 and 6
(b) mach number is between 7 and 9
(c) velocity of flow is very high
(d) discharge is difficult to measure

82. According to Darcy's formula, the loss of head due to friction in the pipe is (where f = Darcy's coefficient, l = Length of the pipe, v = Velocity of the liquid in the pipe, and d = Diameter of the pipe)
(a) $3flv^2/2gd$
(b) $4flv^2/2gd$
(c) $flv^2/2gd$
(d) flv^2/gd

83. If a jet of water is coming out from a nozzle with a velocity 9·81 m/s, the angle of elevation being 30°, then the time to reach the highest point is
(a) 0·25 s
(b) 0·50 s
(c) 1·0 s
(d) 1·5 s

84. The discharge through a 100 mm diameter external mouthpiece fitted to the side of a large vessel is 0·05948 m^3/s. The head over the mouthpiece when coefficient of discharge C_d = 0·855, is _____.

(a) 2 m
(b) 2·5 m
(c) 3·0 m
(d) 4·0 m

85. For two-dimensional flow, the stream function is given by $\psi = 2xy$. The velocity at a point (3, 4) is

(a) 6 m/sec
(b) 8 m/sec
(c) 10 m/sec
(d) 12 m/sec

86. Gauge pressure is

(a) absolute pressure – atmospheric pressure
(b) absolute pressure + atmospheric pressure
(c) atmospheric pressure – absolute pressure
(d) None of the above

87. If the Reduced Level of Bench Mark is 105 m, the back sight is 1·235 m and the foresight is 1·920 m, then what is the Reduced Level of forward station ?

(a) 101·845 m
(b) 108·155 m
(c) 104·315 m
(d) 105·685 m

88. For a distance of 1800 m, what will be the corrections for curvature and refraction ?

(a) 0·254 m; 0·218 m
(b) 0·254 m; 0·036 m
(c) 0·036 m; 0·254 m
(d) 0·036 m; 0·218 m

89. The correction for sag is

(a) always zero
(b) always additive
(c) always subtractive
(d) sometimes additive and sometimes subtractive

90. Closed contours with lower value inwards, represent a

(a) hill
(b) depression
(c) plain surface
(d) None of the above

91. The bearings of the lines AB and BC are 146°30′ and 68°30′. The included angle ABC is

(a) 102°
(b) 78°
(c) 45°
(d) 85°

92. Which of the following methods estimates best the area of an irregular and curved boundary ?

(a) Simpson's method
(b) Trapezoidal method
(c) Mid-ordinate method
(d) Average ordinate method

93. The maximum permissible water absorption (in % by weight) for common burnt clay building bricks of class up to 12·5 is

(a) 10
(b) 15
(c) 20
(d) 25

94. Which of the following does ***not*** have a pozzolanic property ?

(a) Fly Ash
(b) Standard Sand
(c) Ordinary Portland Cement
(d) Silica Fume

95. Distemper is used to coat
(a) interior surfaces not exposed to weather
(b) external concrete surfaces
(c) compound walls
(d) woodwork

96. For a good building stone-crushing strength should be more than
(a) 100 MPa
(b) 150 MPa
(c) 50 MPa
(d) 200 MPa

97. Addition of pozzolana to ordinary Portland cement increases
(a) permeability
(b) heat of hydration
(c) shrinkage
(d) bleeding

98. For the manufacture of Portland cement, the typical proportions of raw materials used, are
(a) lime 63%; silica 22%; other ingredients 15%
(b) lime 22%; silica 63%; other ingredients 15%
(c) silica 40%; lime 40%; other ingredients 20%
(d) silica 70%; lime 20%; other ingredients 10%

99. Seasoning of timber is
(a) a process of removing sap
(b) creosoting
(c) painting with sodium silicate
(d) coating with tar

100. The standard size of masonry bricks is
(a) 18 cm × 8 cm × 8 cm
(b) 19 cm × 9 cm × 9 cm
(c) 20 cm × 10 cm × 10 cm
(d) 21 cm × 11 cm × 11 cm

101. Choose the correct option :

When light travels from one medium to another medium
(a) velocity, wavelength and frequency do not change
(b) velocity, wavelength and frequency remains same
(c) velocity and wavelength change and frequency remains same
(d) velocity and frequency change and wavelength remains same

102. Consider the following statements :

Statement I : Rafale fighter jets have the ability to engage any jets from a long distance without the risk of being tracked. In addition, the air-to-ground SCALP missile can precisely track down any target with ease.

Statement II : Rafale features beyond visual range air-to-air missile that is the best today. The aircraft can take out the enemy aircraft from a range of more than 100 kms.

Which of the above statement(s) is/are correct ?
(a) Only II
(b) Only I
(c) Both I and II
(d) Neither I nor II

103. An infected person is less likely to encounter a susceptible person when a large proportion of the members of the group are immune, is called
(a) Active immunity
(b) Passive immunity
(c) Herd immunity
(d) Specific immunity

104. For 2021, The Dadasaheb Phalke award was given to
(a) Puneet Rajkumar
(b) Rajinikanth
(c) Mohanlal
(d) Shah Rukh Khan

105. The name Lovlina Borgohain is associated with which sport in India ?

(a) Archery

(b) Boxing

(c) Cycling

(d) Fencing

106. Which State is the first in India to implement the National Education Policy, 2020 ?

(a) Gujarat

(b) Madhya Pradesh

(c) Karnataka

(d) Assam

Directions (Question Nos. 107 and 108) : *Read the following information carefully to answer the questions :*

I. There are five students Suresh, Mukesh, Vineet, Rahul and Soham, each with different heights.

II. Exactly one person has height in between Soham and Suresh.

III. Mukesh is taller than Suresh.

IV. When arranged in order of heights, Vineet takes the middlemost position.

107. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ?

(a) There are exactly two persons in between Mukesh and Rahul

(b) Rahul is taller than Vineet

(c) Mukesh is taller than Soham

(d) Rahul is the tallest

108. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ? (Tallest to shortest)

(a) Suresh, Vineet, Soham

(b) Soham, Vineet, Suresh

(c) Vineet, Suresh, Rahul

(d) Mukesh, Suresh, Rahul

109. Pointing to a girl, a lady said, "She is the only grandchild to the parents of the person I am married to." How is the lady related to the girl ?

(a) Aunt

(b) Daughter

(c) Mother

(d) Sister

110. In a certain code "LONDON" is written as "OLMWLM". Then how will "BANGALORE" be written ?

(a) YZMOLZTIV

(b) VITZLOMYZ

(c) YZMTZOLIV

(d) VILOZTMZY

111. If 'M' means 'division', 'S' means 'addition', 'A' means 'subtraction', and 'D' means 'multiplication', then what will be the value of the following expression ?

12 M 6 S 5 D 8 A 9 = ?

(a) 28

(b) 33

(c) 36

(d) 54

112. In the following number series, find the missing number ?

7, 5, 9, 8, 13, 17, 21 _____, 37.

(a) 44

(b) 25

(c) 29

(d) 31

113. The price of 2 Jeans and 4 T-shirts is ₹ 1,600. With the same money, one can buy 1 Jeans and 6 T-shirts. If one wants to buy 3 Jeans and 5 T-shirts, how much shall he have to pay ?

(a) ₹ 2,200

(b) ₹ 2,600

(c) ₹ 2,500

(d) ₹ 2,400

114. If South-West becomes North, North-West becomes West and so on, what will East become ?

(a) North-East

(b) South-West

(c) North-West

(d) South-East

115. The height of Rakesh and Rahul is 40% and 80% respectively more than that of Ramesh. What is the ratio of height of Rakesh and Rahul ?

(a) 6 : 7

(b) 5 : 6

(c) 7 : 9

(d) 1 : 2

116. A boatman goes 4 km against the current of the stream in 2 hours and goes 3 km along the current in 30 minutes. How long will it take to go 9 km in stationary water ?

(a) 2 hours 15 minutes

(b) 1 hour 45 minutes

(c) 1 hour 30 minutes

(d) 2 hours

117. Match the following :

	Dam		*River*
A.	Nagarjuna Sagar	1.	Kaveri
B.	Mettur	2.	Narmada
C.	Hirakud	3.	Krishna
D.	Indira Sagar	4.	Mahanadi

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

118. For which term has India been elected to the UN Economic and Social Council (ECOSOC) ?

(a) 2021 – 23

(b) 2022 – 24

(c) 2022 – 26

(d) 2021 – 25

119. When does a defeated candidate lose security deposit in elections ?

(a) When a defeated candidate secures less than the number of votes received by the NOTA

(b) When a defeated candidate receives lowest number of votes

(c) When a defeated candidate who fails to secure more than one-sixth of the valid votes polled in the constituency

(d) When a defeated candidate who fails to secure more than the number of invalid votes

120. Lonar Lake, also known as Lonar crater, is a notified National Geo-heritage Monument, saline, soda lake, is located in which of the following States ?

(a) Maharashtra

(b) Madhya Pradesh

(c) Chattisgarh

(d) Odisha

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

Booklet Sr. No.

Question Booklet Set
C

Candidate's Name _____

Father's Name _____

Date of Birth : | | | | | | | | |

D D M M Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

Total Questions : **120**]
Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time he/she is told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes out of 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.
2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in the OMR sheet. Use of ink pen or any other pen is not allowed.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.
4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet.
5. The question paper booklet has **16** pages.
6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.
7. The serial number of the new Question booklet if issued for some reason should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.
8. The paper consists of total 300 Marks. Each question shall carry 2·5 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.
9. There is negative marking (0·5 marks for each question) for questions wrongly answered by the candidate.
10. Use of Electronic/Manual Calculator is prohibited.
11. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. In an isolated reinforced concrete footing of effective depth "d", the stress in punching shear is checked

(a) at the face of the column

(b) at a distance d/2 away from the face of the column

(c) at a distance d/2 away from the centre of the column

(d) at the centre of the column

2. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is

(a) 3/7

(b) 4/7

(c) 2/7

(d) 1/7

3. At a certain point in a structural member, there are perpendicular stresses 100 N/mm^2 and 60 N/mm^2, both tensile. What is the equivalent stress in simple tension, according to the maximum principal strain theory ? (Poisson's ratio = 0·33)

(a) 75 N/mm^2

(b) 60 N/mm^2

(c) 80 N/mm^2

(d) 120 N/mm^2

4. A steel rod of 20 mm diameter and 3·14 m length is subjected to an axial pull of 100 kN. If E = 200 kN/mm^2, the elongation of the rod will be

(a) 10 mm

(b) 2 mm

(c) 5 mm

(d) 4 mm

5. A truss containing j joints and m members, will be a simple truss if

(a) $m = 2j - 3$

(b) $j = 2m - 3$

(c) $m = 3j - 2$

(d) $j = 3m - 2$

6. A rectangular beam 20 cm wide is subjected to a maximum shearing force of 10,000 kg, the corresponding maximum shearing stress being 30 kg/cm^2. The depth of the beam is

(a) 15 cm

(b) 20 cm

(c) 25 cm

(d) 30 cm

7. The minimum percentage of steel in an RCC long column is

(a) 0·8%

(b) 0·6%

(c) 1·0%

(d) 1·2%

8. The maximum bending moment for a purlin of length L when subjected to a distributed load W, may be taken as

(a) $\frac{WL}{8}$

(b) $\frac{WL}{10}$

(c) $\frac{WL}{12}$

(d) $\frac{WL}{16}$

9. The number of independent elastic constants for homogeneous, isotropic and elastic material that follows Hooke's law is

(a) 1
(b) 2
(c) 3
(d) 9

10. The angle between the plane of maximum shear stress and the principal plane in a two-dimensional stress block is

(a) 30°
(b) 45°
(c) 60°
(d) 90°

11. What is the ratio of flexural strength (f_{cr}) to the characteristic compressive strength of concrete (f_{ck}) of M 25 grade concrete ?

(a) 0·12
(b) 0·17
(c) 0·14
(d) 0·014

12. A column splice is used to increase the

(a) connection with the slab
(b) cross-sectional area of the column
(c) length of the column
(d) strength of the column

13. A simply supported beam is subjected to a concentrated load at the centre. The deflection of the beam will become eight times when the length of the beam is increased by

(a) two times
(b) four times
(c) six times
(d) eight times

14. A rectangular bar of width b and height h is being used as a cantilever. The loading is in a plane parallel to the side b. The section modulus is

(a) $\frac{bh^3}{12}$
(b) $\frac{bh^2}{6}$
(c) $\frac{b^2h}{6}$
(d) None of the above

15. The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(a) moment of inertia
(b) polar moment of inertia
(c) polar modulus
(d) modulus of rigidity

16. Which of the following properties of the building is ***not*** desirable in earthquake-resistant design ?

(a) Strength
(b) Stiffness
(c) Irregularity
(d) Ductility

17. The damping value to be taken into account for the seismic analysis of reinforced concrete buildings according to IS : 1893 (2016) is

(a) 5% of the critical damping
(b) 2% of the critical damping
(c) 10% of the critical damping
(d) 7% of the critical damping

18. If 't_f' is flowing-through period and 't_d' is detention period for a sedimentation tank, then its displacement efficiency is given by _____ .

(a) $\frac{t_d}{t_f}$

(b) $\frac{(t_d - t_f)}{t_d}$

(c) $\frac{t_f}{t_d}$

(d) $\frac{(t_f - t_d)}{t_f}$

19. The type of valve which is provided to control the flow of water in the distribution system at street corners and where the pipelines intersect is _____ .

(a) Reflux Valve

(b) Sluice Valve

(c) Air Valve

(d) Scour Valve

20. Match the contents in Column I and Column II and select the correct option from the following :

	Column I		*Column II*
P.	Grit chamber	1.	Zone settling
Q.	Secondary settling tank	2.	Stoke's law
R.	Activated sludge process	3.	Aerobic
S.	Trickling filter	4.	Contact stabilisation

(a) P-1, Q-2, R-3, S-4

(b) P-1, Q-2, R-4, S-3

(c) P-2, Q-1, R-4, S-3

(d) P-2, Q-1, R-3, S-4

21. Which of the following does ***not*** cause permanent hardness in water ?

(a) Sulphate

(b) Chloride

(c) Nitrate

(d) Bicarbonate

22. The ratio of 5-day BOD to ultimate BOD is about

(a) 1/3

(b) 3/4

(c) 2/3

(d) 5/4

23. The pathogens can be killed by

(a) Nitrification

(b) Chlorination

(c) Oxidation

(d) None of the above

24. The chemical compound which is insoluble in water, formed when alum is added to water is

(a) $Al(OH)_3$

(b) $CaSO_4$

(c) CO_2

(d) $Ca(OH)_3$

25. As per IS : 1498 – 1970, what is the basis for sub-classification of fine-grained soils ?

(a) Mohr's Circle

(b) Newmark's Chart

(c) Plasticity Chart

(d) Webster Chart

26. The seepage pressure always acts in

(a) horizontal direction

(b) vertically downward direction

(c) vertically upward direction

(d) the direction of seepage flow

27. The void ratio of a sand sample in its loosest state is 0·6 and the difference between maximum and minimum void ratio is 0·3. What will be the void ratio of the sand for a relative density of 66·6% ?

(a) 0·3
(b) 0·4
(c) 0·5
(d) 0·6

28. The following data were noted from an irrigation field : Field capacity = 20%, Permanent wilting point = 10%, Permissible depletion of available soil moisture = 50%, Dry unit weight of soil = 15 kN/m^3, Effective rainfall = 50 mm. The net irrigation requirement per metre depth of soil will be

(a) 75 mm
(b) 125 mm
(c) 50 mm
(d) 25 mm

29. The maximum particle size for which Darcy's law is applicable is

(a) 0·1 mm
(b) 0·3 mm
(c) 0·5 mm
(d) 0·8 mm

30. A coarse-grained soil has a void ratio 0·75, and specific gravity as 2·75. The critical gradient at which quick sand condition occurs, is

(a) 0·25
(b) 0·5
(c) 0·75
(d) 1·00

31. The transition curve used in the horizontal alignment of highways as per IRC is

(a) lemniscate
(b) spiral
(c) cubic parabola
(d) All of the above

32. Cant deficiency occurs when a vehicle travels around a curve at

(a) booked speed
(b) speed lower than the equilibrium speed
(c) speed higher than the equilibrium speed
(d) equilibrium speed

33. An Enoscope is used to determine the

(a) space-mean speed
(b) time-mean speed
(c) spot speed
(d) traffic density

34. Composite sleeper index is the index of

(a) hardness and strength
(b) strength and toughness
(c) toughness and wear resistance
(d) wear resistance and hardness

35. A channel with a silt factor of 1·1 has a mean velocity of 0·88 m/s. What will be its hydraulic mean radius as per Lacey's theory ?

(a) 1·95 m
(b) 1·76 m
(c) 1·63 m
(d) 1·50 m

36. Duty on capacity is also known as

(a) Capacity Factor
(b) Time Factor
(c) Root Zone Depth
(d) Full Supply Coefficient

37. A silt control device consisting of a number of rectangular tunnels provided parallel to the axis of head regulator and terminating near the under-sluiced weir to allow the clear water to flow through the head regulator is called

(a) Silt ejector
(b) Silt tunnel
(c) Silt excluder
(d) Under sluice

38. Which of the following pollution-control devices is the most effective ?

(a) Dynamic precipitator
(b) Spray tower
(c) Electrostatic precipitator
(d) Wet cyclonic scrubber

39. The maximum permissible noise level to which a man working in a chemical plant can be exposed for eight hours per day is about _____ decibels.

(a) 60
(b) 90
(c) 105
(d) 120

40. Biodiesel is produced from oils or fats using

(a) fermentation
(b) transesterification
(c) distillation
(d) pasteurization

41. No deduction is made in the quantity estimation for plastering work in cement mortar for openings having size up to

(a) 0·75 m^2
(b) 0·5 m^2
(c) 3 m^2
(d) 1 m^2

42. In an earthwork construction, a mass haul diagram is a diagram showing the

(a) cross-section of the site
(b) longitudinal section of the site
(c) cumulative volume of earthwork and the haulage
(d) amount of cutting and filling along the length

43. Which of the following expressions is used to calculate 'Annual Depreciation' by straight line method ? Where 'C_i' is the original value, 'C_s' is the scrap value and 'N' is the life of structure in years.

(a) $(C_s - C_i)/N$
(b) $(C_i - C_s)/N$
(c) $C_s/(N \times C_i)$
(d) $(C_i + C_s)/N$

44. The most accurate cost for a building project is arrived at through

(a) Typical bay method
(b) Cubical rate method
(c) Unit rate method
(d) Plinth area method

45. The unit of measurement for 'backfilling' in construction is

(a) Running meter
(b) Square meter
(c) Cubic meter
(d) Quintal

46. In the 'Center Line Method' of estimation for T junction, how much length has to be deducted from the total centreline length for a particular item ?

(a) Half-width
(b) Full-width
(c) Quarter-width
(d) Three-quarter-width

47. Shear cracks between the main wall and cross-wall can be corrected using

(a) grouting

(b) rebuilding

(c) guining

(d) toothing

48. If the soil is dry, DPC for ground floor consists of the layer of

(a) metal

(b) coarse sand

(c) fine sand

(d) concrete

49. The main aim of maintaining any structure is to

(a) improve its appearance

(b) utilise the funds provided

(c) stabilise the structure to enable it to carry the functions for which it is constructed

(d) utilise services of incharge maintenance

50. If t_o is the optimistic time, t_p is the pessimistic time, and t_m is the most likely time, then the expected time is calculated as

(a) $(t_o + t_m + t_p)/3$

(b) $(t_o + 2t_m + t_p)/4$

(c) $(t_o + 4t_m + t_p)/5$

(d) $(t_o + 4t_m + t_p)/6$

51. In CPM, the cost slope is determined by

(a) Normal cost/Crash cost

(b) (Normal cost – Crash cost)/ (Normal time – Crash time)

(c) (Crash cost – Normal cost)/ (Normal time – Crash time)

(d) Crash cost/Normal cost

52. The time by which an activity completion time can be delayed without affecting the early start of the succeeding activities is known as

(a) Independent float

(b) Interfering float

(c) Free float

(d) Total float

53. Which of the following statements are ***incorrect*** for Network Critical path ?

(a) The path of critical activities, which links the start and end events is critical path

(b) It is the path of activities having zero float

(c) The sum of the duration of the critical activities along a critical path gives the duration of the project

(d) It is the path of events having non-zero slack

54. If the employee is terminated or removed from employment by the employer, the wage of that employee should be paid within _____ days from the day on which he was removed or terminated.

(a) 7

(b) 15

(c) 30

(d) 2

55. Which of the following is ***not*** included under the definition of wages given under the Payment of Wages Act, 1936 ?

(a) Basic Wage

(b) Dearness Allowance

(c) Incentive

(d) Gratuity

56. Which one of the following does ***not*** contribute to waterlogging and is not a remedial measure for waterlogging ?

(a) Excessive tapping of groundwater and contour bunding

(b) Frequent flooding and good drainage for irrigated land

(c) Seepage from unlined canals and water courses

(d) Inadequate drainage and contour bunding

57. Efflorescence is the ill effect of

(a) dampness

(b) growth of vegetation

(c) action of weathering agents

(d) chemical action of mortar on masonry

58. The minimum water content at which the soil just begins to crumble when rolled into thread 3 mm in diameter is called

(a) Shrinkage limit

(b) Liquid limit

(c) Plastic limit

(d) Shrinkage ratio

59. The two sub-methods adopted for projection technique, via., Visual Ray Method and Vanishing Point Method are for _____.

(a) Isometric Projections

(b) Perspective Projections

(c) Orthographic Projections

(d) Trigonometrical Projections

60. The length-to-height ratio of a closed filled arrowhead is

(a) 2 : 1

(b) 1 : 1

(c) 3 : 1

(d) 1 : 3

61. The coefficient of friction depends on

(a) nature of surfaces only

(b) area of contact only

(c) relative speed of the surfaces

(d) Both (a) and (b)

62. A block resting on a plane just begins to slide when the plane is inclined at 30° to the horizontal. The coefficient of static friction is

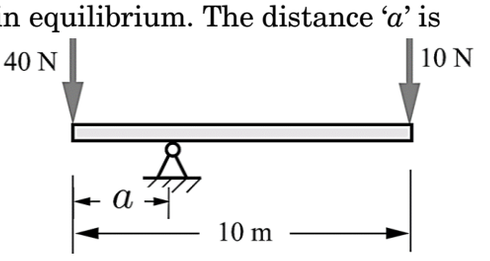
(a) 1/2

(b) $1/\sqrt{3}$

(c) $\sqrt{3}/2$

(d) 1

63. The beam shown in the figure below is in equilibrium. The distance 'a' is



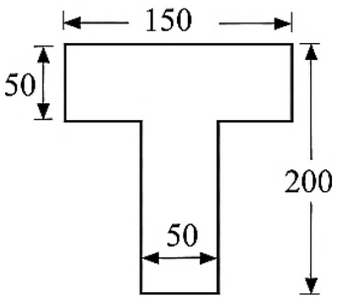
(a) 1 m

(b) 2 m

(c) 3 m

(d) 4 m

64. The centre of gravity of a T-section 150 mm × 200 mm × 50 mm from its bottom is at



(a) 100 mm
(b) 125 mm
(c) 150 mm
(d) 175 mm

65. A floating body is said to be in a state of stable equilibrium
(a) when its metacentric height is zero
(b) when the metacentre is below the centre of gravity
(c) when the metacentre is above the centre of gravity
(d) only when its centre of gravity is below its centre of buoyancy

66. The height of hydraulic jump is equal to
(a) sequent depth
(b) initial depth
(c) difference in conjugate depths
(d) difference in alternating depths

67. Find the actual discharge from an orifice, when the coefficient of discharge is 0·6 and the theoretical discharge is 0·018 cumec.
(a) 0·0108 cumec
(b) 0·00108 cumec
(c) 0·108 cumec
(d) 1·08 cumec

68. When the water surface coincides with the top edge of a rectangular vertical gate of 30 m (wide) × 6 m (depth), then the depth of the centre of pressure is
(a) 1·8 m
(b) 2 m
(c) 3 m
(d) 4 m

69. Venturimeter is used to measure the
(a) velocity of flowing liquid
(b) discharge of flowing liquid
(c) pressure of flowing liquid
(d) pressure difference between two points in a pipeline

70. A flow is called supersonic if the
(a) mach number is between 1 and 6
(b) mach number is between 7 and 9
(c) velocity of flow is very high
(d) discharge is difficult to measure

71. According to Darcy's formula, the loss of head due to friction in the pipe is (where f = Darcy's coefficient, l = Length of the pipe, v = Velocity of the liquid in the pipe, and d = Diameter of the pipe)
(a) $3flv^2/2gd$
(b) $4flv^2/2gd$
(c) $flv^2/2gd$
(d) flv^2/gd

72. If a jet of water is coming out from a nozzle with a velocity 9·81 m/s, the angle of elevation being 30°, then the time to reach the highest point is
(a) 0·25 s
(b) 0·50 s
(c) 1·0 s
(d) 1·5 s

73. The discharge through a 100 mm diameter external mouthpiece fitted to the side of a large vessel is 0·05948 m^3/s. The head over the mouthpiece when coefficient of discharge C_d = 0·855, is _____.

(a) 2 m
(b) 2·5 m
(c) 3·0 m
(d) 4·0 m

74. For two-dimensional flow, the stream function is given by $\psi = 2xy$. The velocity at a point (3, 4) is

(a) 6 m/sec
(b) 8 m/sec
(c) 10 m/sec
(d) 12 m/sec

75. Gauge pressure is

(a) absolute pressure – atmospheric pressure
(b) absolute pressure + atmospheric pressure
(c) atmospheric pressure – absolute pressure
(d) None of the above

76. If the Reduced Level of Bench Mark is 105 m, the back sight is 1·235 m and the foresight is 1·920 m, then what is the Reduced Level of forward station ?

(a) 101·845 m
(b) 108·155 m
(c) 104·315 m
(d) 105·685 m

77. For a distance of 1800 m, what will be the corrections for curvature and refraction ?

(a) 0·254 m; 0·218 m
(b) 0·254 m; 0·036 m
(c) 0·036 m; 0·254 m
(d) 0·036 m; 0·218 m

78. The correction for sag is

(a) always zero
(b) always additive
(c) always subtractive
(d) sometimes additive and sometimes subtractive

79. Closed contours with lower value inwards, represent a

(a) hill
(b) depression
(c) plain surface
(d) None of the above

80. The bearings of the lines AB and BC are 146°30′ and 68°30′. The included angle ABC is

(a) 102°
(b) 78°
(c) 45°
(d) 85°

81. Which of the following methods estimates best the area of an irregular and curved boundary ?

(a) Simpson's method
(b) Trapezoidal method
(c) Mid-ordinate method
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(a) 10
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(a) Fly Ash
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(a) interior surfaces not exposed to weather
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86. Addition of pozzolana to ordinary Portland cement increases
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(b) heat of hydration
(c) shrinkage
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87. For the manufacture of Portland cement, the typical proportions of raw materials used, are
(a) lime 63%; silica 22%; other ingredients 15%
(b) lime 22%; silica 63%; other ingredients 15%
(c) silica 40%; lime 40%; other ingredients 20%
(d) silica 70%; lime 20%; other ingredients 10%

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(a) a process of removing sap
(b) creosoting
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(a) 18 cm × 8 cm × 8 cm
(b) 19 cm × 9 cm × 9 cm
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100. The capacity of a material to absorb energy when it is deformed elastically and then, upon unloading to have this energy recovered is called

(a) Elasticity

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(c) Tensile strength

(d) Ductility

101. The name Lovlina Borgohain is associated with which sport in India ?

(a) Archery

(b) Boxing

(c) Cycling

(d) Fencing

102. Which State is the first in India to implement the National Education Policy, 2020 ?

(a) Gujarat

(b) Madhya Pradesh

(c) Karnataka

(d) Assam

***Directions (Question Nos. 103 and 104)** : Read the following information carefully to answer the questions :*

I. There are five students Suresh, Mukesh, Vineet, Rahul and Soham, each with different heights.

II. Exactly one person has height in between Soham and Suresh.

III. Mukesh is taller than Suresh.

IV. When arranged in order of heights, Vineet takes the middlemost position.

103. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ?

(a) There are exactly two persons in between Mukesh and Rahul

(b) Rahul is taller than Vineet

(c) Mukesh is taller than Soham

(d) Rahul is the tallest

104. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ? (Tallest to shortest)

(a) Suresh, Vineet, Soham

(b) Soham, Vineet, Suresh

(c) Vineet, Suresh, Rahul

(d) Mukesh, Suresh, Rahul

105. Pointing to a girl, a lady said, "She is the only grandchild to the parents of the person I am married to." How is the lady related to the girl ?

(a) Aunt

(b) Daughter

(c) Mother

(d) Sister

106. In a certain code "LONDON" is written as "OLMWLM". Then how will "BANGALORE" be written ?

(a) YZMOLZTIV

(b) VITZLOMYZ

(c) YZMTZOLIV

(d) VILOZTMZY

107. If 'M' means 'division', 'S' means 'addition', 'A' means 'subtraction', and 'D' means 'multiplication', then what will be the value of the following expression ?

12 M 6 S 5 D 8 A 9 = ?

(a) 28

(b) 33

(c) 36

(d) 54

108. In the following number series, find the missing number ?

7, 5, 9, 8, 13, 17, 21 _____, 37.

(a) 44

(b) 25

(c) 29

(d) 31

109. The price of 2 Jeans and 4 T-shirts is ₹ 1,600. With the same money, one can buy 1 Jeans and 6 T-shirts. If one wants to buy 3 Jeans and 5 T-shirts, how much shall he have to pay ?

(a) ₹ 2,200

(b) ₹ 2,600

(c) ₹ 2,500

(d) ₹ 2,400

110. If South-West becomes North, North-West becomes West and so on, what will East become ?

(a) North-East

(b) South-West

(c) North-West

(d) South-East

111. The height of Rakesh and Rahul is 40% and 80% respectively more than that of Ramesh. What is the ratio of height of Rakesh and Rahul ?

(a) 6 : 7

(b) 5 : 6

(c) 7 : 9

(d) 1 : 2

112. A boatman goes 4 km against the current of the stream in 2 hours and goes 3 km along the current in 30 minutes. How long will it take to go 9 km in stationary water ?

(a) 2 hours 15 minutes

(b) 1 hour 45 minutes

(c) 1 hour 30 minutes

(d) 2 hours

113. Match the following :

Dam		*River*
A.	Nagarjuna Sagar	1. Kaveri
B.	Mettur	2. Narmada
C.	Hirakud	3. Krishna
D.	Indira Sagar	4. Mahanadi

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

114. For which term has India been elected to the UN Economic and Social Council (ECOSOC) ?

(a) 2021 – 23
(b) 2022 – 24
(c) 2022 – 26
(d) 2021 – 25

115. When does a defeated candidate lose security deposit in elections ?

(a) When a defeated candidate secures less than the number of votes received by the NOTA
(b) When a defeated candidate receives lowest number of votes
(c) When a defeated candidate who fails to secure more than one-sixth of the valid votes polled in the constituency
(d) When a defeated candidate who fails to secure more than the number of invalid votes

116. Lonar Lake, also known as Lonar crater, is a notified National Geo-heritage Monument, saline, soda lake, is located in which of the following States ?

(a) Maharashtra
(b) Madhya Pradesh
(c) Chattisgarh
(d) Odisha

117. Choose the correct option :

When light travels from one medium to another medium

(a) velocity, wavelength and frequency do not change
(b) velocity, wavelength and frequency remains same
(c) velocity and wavelength change and frequency remains same
(d) velocity and frequency change and wavelength remains same

118. Consider the following statements :

Statement I : Rafale fighter jets have the ability to engage any jets from a long distance without the risk of being tracked. In addition, the air-to-ground SCALP missile can precisely track down any target with ease.

Statement II : Rafale features beyond visual range air-to-air missile that is the best today. The aircraft can take out the enemy aircraft from a range of more than 100 kms.

Which of the above statement(s) is/are correct ?

(a) Only II
(b) Only I
(c) Both I and II
(d) Neither I nor II

119. An infected person is less likely to encounter a susceptible person when a large proportion of the members of the group are immune, is called

(a) Active immunity
(b) Passive immunity
(c) Herd immunity
(d) Specific immunity

120. For 2021, The Dadasaheb Phalke award was given to

(a) Puneet Rajkumar
(b) Rajinikanth
(c) Mohanlal
(d) Shah Rukh Khan

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

READ INSTRUCTIONS BEFORE FILLING ANY DETAILS OR ATTEMPTING TO ANSWER THE QUESTIONS.

Booklet Sr. No.

Question Booklet Set
D

Candidate's Name _____

Father's Name _____

Date of Birth : | | | | | | | | |

D D M M Y Y Y Y

OMR Response Sheet No. _____ **Roll No.** _____

Candidate's Signature :
(Please sign in the box)

Total Questions : **120**]
Time Allowed : **2** Hours]

INSTRUCTIONS

1. The candidate shall NOT open this booklet till the time he/she is told to do so by the Invigilation Staff. However, in the meantime, the candidate can read these instructions carefully and subsequently fill the appropriate columns given above in CAPITAL letters. The candidate may also fill the relevant boxes out of 1 to 9 of the Optical Mark Reader (OMR) response sheet, supplied separately.
2. Use only blue or black **ball point pen** to fill the relevant columns on this page as well as in the OMR sheet. Use of ink pen or any other pen is not allowed.
3. The candidate shall be liable for any adverse effect if the information given above is wrong or illegible or incomplete.
4. Each candidate is required to attempt 120 questions in 120 minutes, except for orthopedically/visually impaired candidates, who would be given 40 extra minutes, by marking correct responses on the OMR sheet.
5. The question paper booklet has **16** pages.
6. The candidates, when allowed to open the question paper booklet, must first check the entire booklet to confirm that the booklet has complete number of pages, the pages printed correctly and there are no blank pages. In case there is any such error in the question paper booklet then the candidate should IMMEDIATELY bring this fact to the notice of the Invigilation Staff and obtain a new booklet of the same series as given earlier.
7. The serial number of the new Question booklet if issued for some reason should be entered in the relevant column of the OMR. The Invigilation Staff must make necessary corrections in their record regarding the change in the serial no. of Question booklet.
8. The paper consists of total 300 Marks. Each question shall carry 2·5 marks. There are four options for each question and the candidate has to mark the MOST APPROPRIATE answer on the OMR response sheet.
9. There is negative marking (0·5 marks for each question) for questions wrongly answered by the candidate.
10. Use of Electronic/Manual Calculator is prohibited.
11. The candidate **MUST READ INSTRUCTIONS BEHIND THE OMR SHEET** before answering the questions and check that two carbon copies attached to the OMR sheet are intact.

1. A silt control device consisting of a number of rectangular tunnels provided parallel to the axis of head regulator and terminating near the under-sluiced weir to allow the clear water to flow through the head regulator is called

(a) Silt ejector
(b) Silt tunnel
(c) Silt excluder
(d) Under sluice

2. Which of the following pollution-control devices is the most effective ?

(a) Dynamic precipitator
(b) Spray tower
(c) Electrostatic precipitator
(d) Wet cyclonic scrubber

3. The maximum permissible noise level to which a man working in a chemical plant can be exposed for eight hours per day is about _____ decibels.

(a) 60
(b) 90
(c) 105
(d) 120

4. Biodiesel is produced from oils or fats using

(a) fermentation
(b) transesterification
(c) distillation
(d) pasteurization

5. No deduction is made in the quantity estimation for plastering work in cement mortar for openings having size up to

(a) 0·75 m^2
(b) 0·5 m^2
(c) 3 m^2
(d) 1 m^2

6. In an earthwork construction, a mass haul diagram is a diagram showing the

(a) cross-section of the site
(b) longitudinal section of the site
(c) cumulative volume of earthwork and the haulage
(d) amount of cutting and filling along the length

7. Which of the following expressions is used to calculate 'Annual Depreciation' by straight line method ? Where 'C_i' is the original value, 'C_s' is the scrap value and 'N' is the life of structure in years.

(a) $(C_s - C_i)/N$
(b) $(C_i - C_s)/N$
(c) $C_s/(N \times C_i)$
(d) $(C_i + C_s)/N$

8. The most accurate cost for a building project is arrived at through

(a) Typical bay method
(b) Cubical rate method
(c) Unit rate method
(d) Plinth area method

9. The unit of measurement for 'backfilling' in construction is

(a) Running meter
(b) Square meter
(c) Cubic meter
(d) Quintal

10. In the 'Center Line Method' of estimation for T junction, how much length has to be deducted from the total centreline length for a particular item ?

(a) Half-width
(b) Full-width
(c) Quarter-width
(d) Three-quarter-width

11. Shear cracks between the main wall and cross-wall can be corrected using

(a) grouting

(b) rebuilding

(c) guining

(d) toothing

12. If the soil is dry, DPC for ground floor consists of the layer of

(a) metal

(b) coarse sand

(c) fine sand

(d) concrete

13. The main aim of maintaining any structure is to

(a) improve its appearance

(b) utilise the funds provided

(c) stabilise the structure to enable it to carry the functions for which it is constructed

(d) utilise services of incharge maintenance

14. If t_o is the optimistic time, t_p is the pessimistic time, and t_m is the most likely time, then the expected time is calculated as

(a) $(t_o + t_m + t_p)/3$

(b) $(t_o + 2t_m + t_p)/4$

(c) $(t_o + 4t_m + t_p)/5$

(d) $(t_o + 4t_m + t_p)/6$

15. In CPM, the cost slope is determined by

(a) Normal cost/Crash cost

(b) (Normal cost – Crash cost)/ (Normal time – Crash time)

(c) (Crash cost – Normal cost)/ (Normal time – Crash time)

(d) Crash cost/Normal cost

16. The time by which an activity completion time can be delayed without affecting the early start of the succeeding activities is known as

(a) Independent float

(b) Interfering float

(c) Free float

(d) Total float

17. Which of the following statements are ***incorrect*** for Network Critical path ?

(a) The path of critical activities, which links the start and end events is critical path

(b) It is the path of activities having zero float

(c) The sum of the duration of the critical activities along a critical path gives the duration of the project

(d) It is the path of events having non-zero slack

18. If the employee is terminated or removed from employment by the employer, the wage of that employee should be paid within _____ days from the day on which he was removed or terminated.

(a) 7

(b) 15

(c) 30

(d) 2

19. Which of the following is ***not*** included under the definition of wages given under the Payment of Wages Act, 1936 ?

(a) Basic Wage

(b) Dearness Allowance

(c) Incentive

(d) Gratuity

20. Which one of the following does ***not*** contribute to waterlogging and is not a remedial measure for waterlogging ?

(a) Excessive tapping of groundwater and contour bunding

(b) Frequent flooding and good drainage for irrigated land

(c) Seepage from unlined canals and water courses

(d) Inadequate drainage and contour bunding

21. Efflorescence is the ill effect of

(a) dampness

(b) growth of vegetation

(c) action of weathering agents

(d) chemical action of mortar on masonry

22. The minimum water content at which the soil just begins to crumble when rolled into thread 3 mm in diameter is called

(a) Shrinkage limit

(b) Liquid limit

(c) Plastic limit

(d) Shrinkage ratio

23. The two sub-methods adopted for projection technique, via., Visual Ray Method and Vanishing Point Method are for _____.

(a) Isometric Projections

(b) Perspective Projections

(c) Orthographic Projections

(d) Trigonometrical Projections

24. The length-to-height ratio of a closed filled arrowhead is

(a) 2 : 1

(b) 1 : 1

(c) 3 : 1

(d) 1 : 3

25. The coefficient of friction depends on

(a) nature of surfaces only

(b) area of contact only

(c) relative speed of the surfaces

(d) Both (a) and (b)

26. A block resting on a plane just begins to slide when the plane is inclined at 30° to the horizontal. The coefficient of static friction is

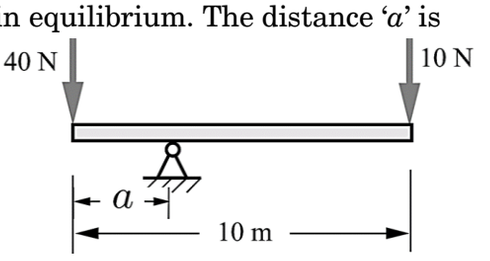
(a) 1/2

(b) $1/\sqrt{3}$

(c) $\sqrt{3}/2$

(d) 1

27. The beam shown in the figure below is in equilibrium. The distance 'a' is



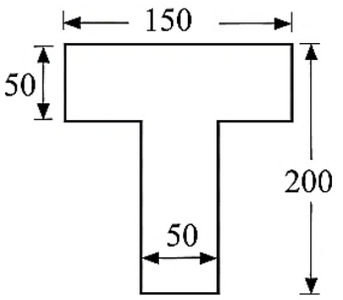
(a) 1 m

(b) 2 m

(c) 3 m

(d) 4 m

28. The centre of gravity of a T-section 150 mm × 200 mm × 50 mm from its bottom is at



(a) 100 mm
(b) 125 mm
(c) 150 mm
(d) 175 mm

29. A floating body is said to be in a state of stable equilibrium
(a) when its metacentric height is zero
(b) when the metacentre is below the centre of gravity
(c) when the metacentre is above the centre of gravity
(d) only when its centre of gravity is below its centre of buoyancy

30. The height of hydraulic jump is equal to
(a) sequent depth
(b) initial depth
(c) difference in conjugate depths
(d) difference in alternating depths

31. Find the actual discharge from an orifice, when the coefficient of discharge is 0·6 and the theoretical discharge is 0·018 cumec.
(a) 0·0108 cumec
(b) 0·00108 cumec
(c) 0·108 cumec
(d) 1·08 cumec

32. When the water surface coincides with the top edge of a rectangular vertical gate of 30 m (wide) × 6 m (depth), then the depth of the centre of pressure is
(a) 1·8 m
(b) 2 m
(c) 3 m
(d) 4 m

33. Venturimeter is used to measure the
(a) velocity of flowing liquid
(b) discharge of flowing liquid
(c) pressure of flowing liquid
(d) pressure difference between two points in a pipeline

34. A flow is called supersonic if the
(a) mach number is between 1 and 6
(b) mach number is between 7 and 9
(c) velocity of flow is very high
(d) discharge is difficult to measure

35. According to Darcy's formula, the loss of head due to friction in the pipe is (where f = Darcy's coefficient, l = Length of the pipe, v = Velocity of the liquid in the pipe, and d = Diameter of the pipe)
(a) $3flv^2/2gd$
(b) $4flv^2/2gd$
(c) $flv^2/2gd$
(d) flv^2/gd

36. If a jet of water is coming out from a nozzle with a velocity 9·81 m/s, the angle of elevation being 30°, then the time to reach the highest point is
(a) 0·25 s
(b) 0·50 s
(c) 1·0 s
(d) 1·5 s

37. The discharge through a 100 mm diameter external mouthpiece fitted to the side of a large vessel is 0·05948 m^3/s. The head over the mouthpiece when coefficient of discharge C_d = 0·855, is _____.

(a) 2 m
(b) 2·5 m
(c) 3·0 m
(d) 4·0 m

38. For two-dimensional flow, the stream function is given by $\psi = 2xy$. The velocity at a point (3, 4) is

(a) 6 m/sec
(b) 8 m/sec
(c) 10 m/sec
(d) 12 m/sec

39. Gauge pressure is

(a) absolute pressure – atmospheric pressure
(b) absolute pressure + atmospheric pressure
(c) atmospheric pressure – absolute pressure
(d) None of the above

40. If the Reduced Level of Bench Mark is 105 m, the back sight is 1·235 m and the foresight is 1·920 m, then what is the Reduced Level of forward station ?

(a) 101·845 m
(b) 108·155 m
(c) 104·315 m
(d) 105·685 m

41. For a distance of 1800 m, what will be the corrections for curvature and refraction ?

(a) 0·254 m; 0·218 m
(b) 0·254 m; 0·036 m
(c) 0·036 m; 0·254 m
(d) 0·036 m; 0·218 m

42. The correction for sag is

(a) always zero
(b) always additive
(c) always subtractive
(d) sometimes additive and sometimes subtractive

43. Closed contours with lower value inwards, represent a

(a) hill
(b) depression
(c) plain surface
(d) None of the above

44. The bearings of the lines AB and BC are 146°30′ and 68°30′. The included angle ABC is

(a) 102°
(b) 78°
(c) 45°
(d) 85°

45. Which of the following methods estimates best the area of an irregular and curved boundary ?

(a) Simpson's method
(b) Trapezoidal method
(c) Mid-ordinate method
(d) Average ordinate method

46. The maximum permissible water absorption (in % by weight) for common burnt clay building bricks of class up to 12·5 is

(a) 10
(b) 15
(c) 20
(d) 25

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(d) 10 KN-m

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(b) 125 kg/cm^2

(c) 150 kg/cm^2

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63. As per IS : 456 : 2000, the minimum percentage of reinforcement required for slabs, when mild steel bars are used is

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(c) 0·30

(d) 0·45

64. The capacity of a material to absorb energy when it is deformed elastically and then, upon unloading to have this energy recovered is called

(a) Elasticity

(b) Resilience

(c) Tensile strength

(d) Ductility

65. In an isolated reinforced concrete footing of effective depth "d", the stress in punching shear is checked

(a) at the face of the column

(b) at a distance d/2 away from the face of the column

(c) at a distance d/2 away from the centre of the column

(d) at the centre of the column

66. The bulk modulus of elasticity of a material is twice its modulus of rigidity. The Poisson's ratio of the material is

(a) 3/7

(b) 4/7

(c) 2/7

(d) 1/7

67. At a certain point in a structural member, there are perpendicular stresses 100 N/mm^2 and 60 N/mm^2, both tensile. What is the equivalent stress in simple tension, according to the maximum principal strain theory ? (Poisson's ratio = 0·33)

(a) 75 N/mm^2

(b) 60 N/mm^2

(c) 80 N/mm^2

(d) 120 N/mm^2

68. A steel rod of 20 mm diameter and 3·14 m length is subjected to an axial pull of 100 kN. If E = 200 kN/mm^2, the elongation of the rod will be

(a) 10 mm

(b) 2 mm

(c) 5 mm

(d) 4 mm

69. A truss containing j joints and m members, will be a simple truss if

(a) $m = 2j - 3$

(b) $j = 2m - 3$

(c) $m = 3j - 2$

(d) $j = 3m - 2$

70. A rectangular beam 20 cm wide is subjected to a maximum shearing force of 10,000 kg, the corresponding maximum shearing stress being 30 kg/cm^2. The depth of the beam is

(a) 15 cm

(b) 20 cm

(c) 25 cm

(d) 30 cm

71. The minimum percentage of steel in an RCC long column is

(a) 0·8%

(b) 0·6%

(c) 1·0%

(d) 1·2%

72. The maximum bending moment for a purlin of length L when subjected to a distributed load W, may be taken as

(a) $\frac{WL}{8}$

(b) $\frac{WL}{10}$

(c) $\frac{WL}{12}$

(d) $\frac{WL}{16}$

73. The number of independent elastic constants for homogeneous, isotropic and elastic material that follows Hooke's law is

(a) 1

(b) 2

(c) 3

(d) 9

74. The angle between the plane of maximum shear stress and the principal plane in a two-dimensional stress block is

(a) 30°

(b) 45°

(c) 60°

(d) 90°

75. What is the ratio of flexural strength (f_{cr}) to the characteristic compressive strength of concrete (f_{ck}) of M 25 grade concrete ?

(a) 0·12

(b) 0·17

(c) 0·14

(d) 0·014

76. A column splice is used to increase the

(a) connection with the slab

(b) cross-sectional area of the column

(c) length of the column

(d) strength of the column

77. A simply supported beam is subjected to a concentrated load at the centre. The deflection of the beam will become eight times when the length of the beam is increased by

(a) two times

(b) four times

(c) six times

(d) eight times

78. A rectangular bar of width b and height h is being used as a cantilever. The loading is in a plane parallel to the side b. The section modulus is

(a) $\frac{bh^3}{12}$

(b) $\frac{bh^2}{6}$

(c) $\frac{b^2h}{6}$

(d) None of the above

79. The maximum twisting moment a shaft can resist, is the product of the permissible shear stress and

(a) moment of inertia

(b) polar moment of inertia

(c) polar modulus

(d) modulus of rigidity

80. Which of the following properties of the building is ***not*** desirable in earthquake-resistant design ?

(a) Strength

(b) Stiffness

(c) Irregularity

(d) Ductility

81. The damping value to be taken into account for the seismic analysis of reinforced concrete buildings according to IS : 1893 (2016) is

(a) 5% of the critical damping

(b) 2% of the critical damping

(c) 10% of the critical damping

(d) 7% of the critical damping

82. If 't_f' is flowing-through period and 't_d' is detention period for a sedimentation tank, then its displacement efficiency is given by _____ .

(a) $\frac{t_d}{t_f}$

(b) $\frac{(t_d - t_f)}{t_d}$

(c) $\frac{t_f}{t_d}$

(d) $\frac{(t_f - t_d)}{t_f}$

83. The type of valve which is provided to control the flow of water in the distribution system at street corners and where the pipelines intersect is _____ .

(a) Reflux Valve

(b) Sluice Valve

(c) Air Valve

(d) Scour Valve

84. Match the contents in Column I and Column II and select the correct option from the following :

	Column I		*Column II*
P.	Grit chamber	1.	Zone settling
Q.	Secondary settling tank	2.	Stoke's law
R.	Activated sludge process	3.	Aerobic
S.	Trickling filter	4.	Contact stabilisation

(a) P-1, Q-2, R-3, S-4

(b) P-1, Q-2, R-4, S-3

(c) P-2, Q-1, R-4, S-3

(d) P-2, Q-1, R-3, S-4

85. Which of the following does ***not*** cause permanent hardness in water ?

(a) Sulphate
(b) Chloride
(c) Nitrate
(d) Bicarbonate

86. The ratio of 5-day BOD to ultimate BOD is about

(a) 1/3
(b) 3/4
(c) 2/3
(d) 5/4

87. The pathogens can be killed by

(a) Nitrification
(b) Chlorination
(c) Oxidation
(d) None of the above

88. The chemical compound which is insoluble in water, formed when alum is added to water is

(a) $Al(OH)_3$
(b) $CaSO_4$
(c) CO_2
(d) $Ca(OH)_3$

89. As per IS : 1498 – 1970, what is the basis for sub-classification of fine-grained soils ?

(a) Mohr's Circle
(b) Newmark's Chart
(c) Plasticity Chart
(d) Webster Chart

90. The seepage pressure always acts in

(a) horizontal direction
(b) vertically downward direction
(c) vertically upward direction
(d) the direction of seepage flow

91. The void ratio of a sand sample in its loosest state is 0·6 and the difference between maximum and minimum void ratio is 0·3. What will be the void ratio of the sand for a relative density of 66·6% ?

(a) 0·3
(b) 0·4
(c) 0·5
(d) 0·6

92. The following data were noted from an irrigation field : Field capacity = 20%, Permanent wilting point = 10%, Permissible depletion of available soil moisture = 50%, Dry unit weight of soil = 15 kN/m^3, Effective rainfall = 50 mm. The net irrigation requirement per metre depth of soil will be

(a) 75 mm
(b) 125 mm
(c) 50 mm
(d) 25 mm

93. The maximum particle size for which Darcy's law is applicable is

(a) 0·1 mm
(b) 0·3 mm
(c) 0·5 mm
(d) 0·8 mm

94. A coarse-grained soil has a void ratio 0·75, and specific gravity as 2·75. The critical gradient at which quick sand condition occurs, is

(a) 0·25
(b) 0·5
(c) 0·75
(d) 1·00

95. The transition curve used in the horizontal alignment of highways as per IRC is

(a) lemniscate
(b) spiral
(c) cubic parabola
(d) All of the above

96. Cant deficiency occurs when a vehicle travels around a curve at

(a) booked speed

(b) speed lower than the equilibrium speed

(c) speed higher than the equilibrium speed

(d) equilibrium speed

97. An Enoscope is used to determine the

(a) space-mean speed

(b) time-mean speed

(c) spot speed

(d) traffic density

98. Composite sleeper index is the index of

(a) hardness and strength

(b) strength and toughness

(c) toughness and wear resistance

(d) wear resistance and hardness

99. A channel with a silt factor of 1·1 has a mean velocity of 0·88 m/s. What will be its hydraulic mean radius as per Lacey's theory ?

(a) 1·95 m

(b) 1·76 m

(c) 1·63 m

(d) 1·50 m

100. Duty on capacity is also known as

(a) Capacity Factor

(b) Time Factor

(c) Root Zone Depth

(d) Full Supply Coefficient

101. Pointing to a girl, a lady said, "She is the only grandchild to the parents of the person I am married to." How is the lady related to the girl ?

(a) Aunt

(b) Daughter

(c) Mother

(d) Sister

102. In a certain code "LONDON" is written as "OLMWLM". Then how will "BANGALORE" be written ?

(a) YZMOLZTIV

(b) VITZLOMYZ

(c) YZMTZOLIV

(d) VILOZTMZY

103. If 'M' means 'division', 'S' means 'addition', 'A' means 'subtraction', and 'D' means 'multiplication', then what will be the value of the following expression ?

12 M 6 S 5 D 8 A 9 = ?

(a) 28

(b) 33

(c) 36

(d) 54

104. In the following number series, find the missing number ?

7, 5, 9, 8, 13, 17, 21 _____, 37.

(a) 44

(b) 25

(c) 29

(d) 31

105. The price of 2 Jeans and 4 T-shirts is ₹ 1,600. With the same money, one can buy 1 Jeans and 6 T-shirts. If one wants to buy 3 Jeans and 5 T-shirts, how much shall he have to pay ?

(a) ₹ 2,200

(b) ₹ 2,600

(c) ₹ 2,500

(d) ₹ 2,400

106. If South-West becomes North, North-West becomes West and so on, what will East become ?

(a) North-East

(b) South-West

(c) North-West

(d) South-East

107. The height of Rakesh and Rahul is 40% and 80% respectively more than that of Ramesh. What is the ratio of height of Rakesh and Rahul ?

(a) 6 : 7

(b) 5 : 6

(c) 7 : 9

(d) 1 : 2

108. A boatman goes 4 km against the current of the stream in 2 hours and goes 3 km along the current in 30 minutes. How long will it take to go 9 km in stationary water ?

(a) 2 hours 15 minutes

(b) 1 hour 45 minutes

(c) 1 hour 30 minutes

(d) 2 hours

109. Match the following :

	Dam		*River*
A.	Nagarjuna Sagar	1.	Kaveri
B.	Mettur	2.	Narmada
C.	Hirakud	3.	Krishna
D.	Indira Sagar	4.	Mahanadi

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

110. For which term has India been elected to the UN Economic and Social Council (ECOSOC) ?

(a) 2021 – 23

(b) 2022 – 24

(c) 2022 – 26

(d) 2021 – 25

111. When does a defeated candidate lose security deposit in elections ?

(a) When a defeated candidate secures less than the number of votes received by the NOTA

(b) When a defeated candidate receives lowest number of votes

(c) When a defeated candidate who fails to secure more than one-sixth of the valid votes polled in the constituency

(d) When a defeated candidate who fails to secure more than the number of invalid votes

112. Lonar Lake, also known as Lonar crater, is a notified National Geo-heritage Monument, saline, soda lake, is located in which of the following States ?

(a) Maharashtra

(b) Madhya Pradesh

(c) Chattisgarh

(d) Odisha

113. Choose the correct option :

When light travels from one medium to another medium

(a) velocity, wavelength and frequency do not change
(b) velocity, wavelength and frequency remains same
(c) velocity and wavelength change and frequency remains same
(d) velocity and frequency change and wavelength remains same

114. Consider the following statements :

Statement I : Rafale fighter jets have the ability to engage any jets from a long distance without the risk of being tracked. In addition, the air-to-ground SCALP missile can precisely track down any target with ease.

Statement II : Rafale features beyond visual range air-to-air missile that is the best today. The aircraft can take out the enemy aircraft from a range of more than 100 kms.

Which of the above statement(s) is/are correct ?

(a) Only II
(b) Only I
(c) Both I and II
(d) Neither I nor II

115. An infected person is less likely to encounter a susceptible person when a large proportion of the members of the group are immune, is called

(a) Active immunity
(b) Passive immunity
(c) Herd immunity
(d) Specific immunity

116. For 2021, The Dadasaheb Phalke award was given to

(a) Puneet Rajkumar
(b) Rajinikanth
(c) Mohanlal
(d) Shah Rukh Khan

117. The name Lovlina Borgohain is associated with which sport in India ?

(a) Archery
(b) Boxing
(c) Cycling
(d) Fencing

118. Which State is the first in India to implement the National Education Policy, 2020 ?

(a) Gujarat
(b) Madhya Pradesh
(c) Karnataka
(d) Assam

Directions (Question Nos. 119 and 120) : *Read the following information carefully to answer the questions :*

I. There are five students Suresh, Mukesh, Vineet, Rahul and Soham, each with different heights.
II. Exactly one person has height in between Soham and Suresh.
III. Mukesh is taller than Suresh.
IV. When arranged in order of heights, Vineet takes the middlemost position.

119. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ?

(a) There are exactly two persons in between Mukesh and Rahul
(b) Rahul is taller than Vineet
(c) Mukesh is taller than Soham
(d) Rahul is the tallest

120. Which of the following statements is definitely correct, when the students are arranged in descending order of their heights according to the information given above ? (Tallest to shortest)

(a) Suresh, Vineet, Soham
(b) Soham, Vineet, Suresh
(c) Vineet, Suresh, Rahul
(d) Mukesh, Suresh, Rahul

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JOINT COMPETITIVE EXAMINATION FOR VARIOUS POSTS OF JUNIOR ENGINEER [CIVIL / PUBLIC HEALTH] / SECTION OFFICER [CIVIL] IN VARIOUS DEPARTMENTS, GOVERNMENT OF PUNJAB.

COMPETITIVE EXAM DATE: 06-MARCH-2022

ANSWER KEY SET - [A]

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	B	25	B	49	A	73	B	97	D
2	C	26	A	50	B	74	C	98	A
3	A	27	A	51	B	75	C	99	A
4	B	28	C	52	B	76	A	100	C
5	B	29	A	53	C	77	B	101	C
6	B	30	A	54	C	78	D	102	B
7	C	31	B	55	A	79	C	103	C
8	C	32	C	56	C	80	C	104	A
9	A	33	A	57	C	81	B	105	C
10	D	34	B	58	C	82	B	106	C
11	B	35	A	59	A	83	B	107	C
12	A	36	D	60	C	84	C	108	B
13	B	37	D	61	B	85	B	109	B
14	B	38	C	62	D	86	B	110	C
15	D	39	A	63	D	87	C	111	C
16	C	40	C	64	C	88	A	112	D
17	A	41	B	65	B	89	D	113	C
18	C	42	B	66	A	90	B	114	C
19	B	43	B	67	C	91	C	115	B
20	C	44	C	68	D	92	D	116	A
21	B	45	C	69	B	93	C	117	A
22	A	46	C	70	D	94	C	118	D
23	A	47	A	71	C	95	D	119	C
24	C	48	C	72	D	96	D	120	A

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COMPETITIVE EXAM DATE: 06-MARCH-2022

ANSWER KEY SET - [B]

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	C	25	C	49	C	73	B	97	C
2	A	26	C	50	B	74	B	98	A
3	B	27	C	51	B	75	B	99	A
4	A	28	A	52	B	76	C	100	B
5	D	29	C	53	C	77	C	101	C
6	D	30	B	54	B	78	A	102	C
7	C	31	D	55	B	79	D	103	C
8	A	32	D	56	C	80	B	104	B
9	C	33	C	57	A	81	A	105	B
10	B	34	B	58	D	82	B	106	C
11	B	35	A	59	B	83	B	107	C
12	B	36	C	60	C	84	D	108	D
13	C	37	D	61	D	85	C	109	C
14	C	38	B	62	C	86	A	110	C
15	C	39	D	63	C	87	C	111	B
16	A	40	C	64	D	88	B	112	A
17	C	41	D	65	D	89	C	113	A
18	A	42	B	66	D	90	B	114	D
19	B	43	C	67	A	91	A	115	C
20	B	44	C	68	A	92	A	116	A
21	B	45	A	69	C	93	C	117	C
22	C	46	B	70	B	94	B	118	B
23	C	47	D	71	C	95	A	119	C
24	A	48	C	72	A	96	A	120	A

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COMPETITIVE EXAM DATE: 06-MARCH-2022

ANSWER KEY SET - [C]

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	B	25	C	49	C	73	D	97	A
2	C	26	D	50	D	74	C	98	C
3	C	27	B	51	C	75	A	99	B
4	C	28	D	52	C	76	C	100	B
5	A	29	C	53	D	77	B	101	B
6	C	30	D	54	D	78	C	102	C
7	A	31	B	55	D	79	B	103	C
8	B	32	C	56	A	80	A	104	D
9	B	33	C	57	A	81	A	105	C
10	B	34	A	58	C	82	C	106	C
11	C	35	B	59	B	83	B	107	B
12	C	36	D	60	C	84	A	108	A
13	A	37	C	61	A	85	A	109	A
14	C	38	C	62	B	86	C	110	D
15	C	39	B	63	B	87	A	111	C
16	C	40	B	64	B	88	A	112	A
17	A	41	B	65	C	89	B	113	C
18	C	42	C	66	C	90	C	114	B
19	B	43	B	67	A	91	A	115	C
20	D	44	B	68	D	92	B	116	A
21	D	45	C	69	B	93	A	117	C
22	C	46	A	70	A	94	D	118	C
23	B	47	D	71	B	95	D	119	C
24	A	48	B	72	B	96	C	120	B

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COMPETITIVE EXAM DATE: 06-MARCH-2022

ANSWER KEY SET - [D]

Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer	Q.No.	Answer
1	C	25	A	49	A	73	B	97	C
2	C	26	B	50	C	74	B	98	A
3	B	27	B	51	A	75	C	99	B
4	B	28	B	52	A	76	C	100	D
5	B	29	C	53	B	77	A	101	C
6	C	30	C	54	C	78	C	102	C
7	B	31	A	55	A	79	C	103	B
8	B	32	D	56	B	80	C	104	A
9	C	33	B	57	A	81	A	105	A
10	A	34	A	58	D	82	C	106	D
11	D	35	B	59	D	83	B	107	C
12	B	36	B	60	C	84	D	108	A
13	C	37	D	61	A	85	D	109	C
14	D	38	C	62	C	86	C	110	B
15	C	39	A	63	B	87	B	111	C
16	C	40	C	64	B	88	A	112	A
17	D	41	B	65	B	89	C	113	C
18	D	42	C	66	C	90	D	114	C
19	D	43	B	67	C	91	B	115	C
20	A	44	A	68	C	92	D	116	B
21	A	45	A	69	A	93	C	117	B
22	C	46	C	70	C	94	D	118	C
23	B	47	B	71	A	95	B	119	C
24	C	48	A	72	B	96	C	120	D

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