

080/2025

Question Booklet
Alpha Code

A

Question Booklet
Serial Number

Total No. of questions : 100

Time : 1 Hour 30 Minutes

Maximum : 100 Marks

INSTRUCTIONS TO CANDIDATES

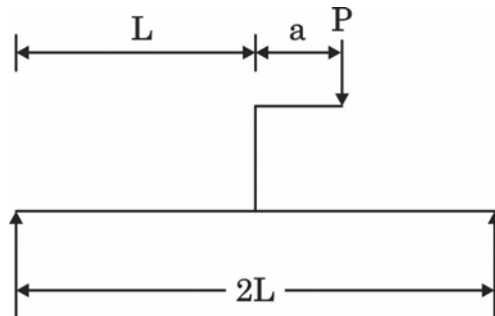
1. The question paper will be given in the form of a Question Booklet. There will be four versions of question booklets with question booklet alpha code viz. A, B, C & D.
2. The Question Booklet Alpha Code will be printed on the top left margin of the facing sheet of the question booklet.
3. The Question Booklet Alpha Code allotted to you will be noted in your seating position in the Examination Hall.
4. If you get a question booklet where the alpha code does not match to the allotted alpha code in the seating position, please draw the attention of the Invigilator IMMEDIATELY.
5. The Question Booklet Serial Number is printed on the top right margin of the facing sheet. If your question booklet is un-numbered, please get it replaced by new question booklet with same alpha code.
6. The question booklet will be sealed at the middle of the right margin. Candidate should not open the question booklet, until the indication is given to start answering.
7. Immediately after the commencement of the examination, the candidate should check that the question booklet supplied to him contains all the 100 questions in serial order. The question booklet does not have unprinted or torn or missing pages and if so he/she should bring it to the notice of the Invigilator and get it replaced by a complete booklet with same alpha code. This is most important.
8. A blank sheet of paper is attached to the question booklet. This may be used for rough work.
9. **Please read carefully all the instructions on the reverse of the Answer Sheet before marking your answers.**
10. Each question is provided with four choices (A), (B), (C) and (D) having one correct answer. Choose the correct answer and darken the bubble corresponding to the question number using Blue or Black Ball-Point Pen in the OMR Answer Sheet.
11. **Each correct answer carries 1 mark and for each wrong answer 1/3 mark will be deducted. No negative mark for unattended questions.**
12. No candidate will be allowed to leave the examination hall till the end of the session and without handing over his/her Answer Sheet to the Invigilator. Candidates should ensure that the Invigilator has verified all the entries in the Register Number Coding Sheet and that the Invigilator has affixed his/her signature in the space provided.
13. Strict compliance of instructions is essential. Any malpractice or attempt to commit any kind of malpractice in the Examination will result in the disqualification of the candidate.

080/2025

Maximum : 100 marks

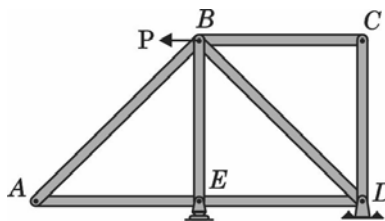
Time : 1 hour and 30 minutes

1. The maximum bending moment for the simply supported beam shown in Fig. below, is equal to :



- (A) PL (B) $Pa + (PL/2)$
(C) $(PL/2) + (Pa/2)$ (D) $(PL) - Pa$
2. The ratio of critical buckling load for a column with fixed ends to that of a column with same cross-section and material, but with pinned ends is :
- (A) 0.5 (B) 1.0
(C) 2.0 (D) 4.0
3. Two beams of the same span, one with circular cross-section and other of square cross-section when subjected to a bending moment M , develops the same peak bending stress. The ratio of the weight of beam with circular section to that with square section is :
- (A) 1.117 (B) 1
(C) 0.794 (D) 3.14
4. The angle between major principal plane and minor principal plane for a strained body is :
- (A) 45° (B) 30°
(C) 180° (D) 90°
5. If the depth of a simply supported beam carrying a central concentrated load, is doubled, the mid-span deflection will :
- (A) become one-fourth (B) become half
(C) remain unchanged (D) become one-eighth

6. The ratio of maximum shear stress to average shear stress for a circular cross-section is :
- (A) $3/2$ (B) $1/2$
(C) $4/3$ (D) $3/4$
7. The conjugate beam has the same span as the real beam and is loaded with the _____ diagram.
- (A) Shear Force (V) (B) Bending Moment (M)
(C) V/EI (D) M/EI
8. The force in the member BC of the simply supported truss loaded as shown in Fig. below, is :



- (A) 0 (B) $P/2$
(C) P (D) $-P$
9. Influence line for bending moment represents the :
- (A) BMD for beam for different positions of load
(B) Bending moment at a specified section of beam for different positions of load
(C) Bending moment along the beam for fixed position of load
(D) All of the above
10. Clapeyron's three moments equation is applicable only when :
- (A) the beam is prismatic
(B) there is no settlement of supports
(C) there is no discontinuity such as hinges within a span
(D) the spans are equal
11. A plane area in the form of a right angled triangle of height 3 m and base 2 m is immersed vertically in water with its vertex at the water surface. Considering the density of water and acceleration due to gravity to be 1000 kg/m^3 and 9.81 m/s^2 , the hydrostatic force (in kN) exerted on one side of the triangular plate is :
- (A) 29430 (B) 39.24
(C) 58.86 (D) 58860

12. If the stream function $\psi = 2x^2 - 2y^2$, the velocity at a point (1, 2) is :
- (A) 4 (B) $4\sqrt{5}$
(C) $4\sqrt{2}$ (D) 2
13. In a turbine having a flow of 2.0 m³/s, the net head is 40 m and the efficiency of the turbine is 75%. Considering the density of water and acceleration due to gravity to be 1000 kg/m³ and 9.81 m/s² the shaft power developed in kW is :
- (A) 10464 (B) 10.464
(C) 784.8 (D) 588.6
14. In a boundary layer on a flat plate the laminar sublayer exists :
- (A) Only in smooth turbulent boundary layers
(B) Only in laminar boundary layers
(C) Only in rough fully developed turbulent boundary layers
(D) In all turbulent boundary layers
15. If v is the velocity of flow, y is the depth of water, the equation for Froude's number for a triangular channel with side slope, 2 horizontal : 1 vertical is :
- (A) $\frac{v}{\sqrt{gy}}$ (B) $\frac{v}{\sqrt{\frac{gy}{2}}}$
(C) $\frac{v}{\sqrt{2gy}}$ (D) $\frac{2v}{\sqrt{gy}}$
16. A well-drained soil's ability to retain moisture against gravity drainage through surface tension between soil particles and water droplets is known as :
- (A) Capillary water (B) Hygroscopic water
(C) Field capacity water (D) Water of adhesion
17. If the capacity factor and time factor are 0.8 and 0.5, respectively, and the discharge needed for various crops cultivated in a field is 0.8 cumecs, the design discharge for the distributary will be :
- (A) 1 cumecs (B) 2 cumecs
(C) 0.5 cumecs (D) 0.8 cumecs

18. When a new dam is constructed, the river reach upstream of the dam may act as :
- (A) Aggrading River (B) Degrading River
(C) Virgin River (D) Stable River
19. The piezometric surface in the case of a flowing well is always :
- (A) Above the ground level (B) At the ground level
(C) Below the ground level (D) None of the above
20. Over time, the reservoir's capacity decreases, and the trap efficiency :
- (A) Decreases
(B) Remains unaffected
(C) Increases
(D) May increase or decrease, depending upon the properties of reservoir
21. Which of the following cause errors in theodolite work?
- (A) Instrumental errors (B) Personal errors
(C) Natural errors (D) All of the above
22. The spire test is done as a permanent adjustment for theodolite surveying for :
- (A) Adjustment of horizontal axis (B) Adjustment of crosshairs
(C) Adjustment of plate levels (D) Adjustment of line of sight
23. The degree of precision in the measurement of areas can be increased by :
- (A) Reducing the number of ordinates
(B) Having more complex zig zag contours
(C) Increasing the number of ordinates
(D) Increasing the area to be measured
24. The first remote sensing weather satellite was :
- (A) INSAT 3D (B) INSAT 3DR
(C) TIROS-1 (D) SCATSAT-1

25. A person needs to recoup total amount of Rs. 10 lakh at the end of 60 years life of a building at 4% rate of compound interest. How much amount should he set aside every year as sinking fund for this purpose :
- (A) Rs. 42,000 (B) Rs. 4,200
(C) Rs. 3,652 (D) Rs. 8,333
26. How much is the CPOH percentage provisions of DSR 2021?
- (A) 10% (B) 12.5%
(C) 15% (D) 17.5%
27. How much is the extra length to be provided for a reinforcement bar with one 45° bend-up (d' is center to center distance of bend up bar):
- (A) 0.30d' (B) 0.42d'
(C) 0.62d' (D) 0.75d'
28. As per IS1200 - "Method of measurement of building and Civil Engineering works", all work shall be measured net in decimal system nearest to :
- (A) 0.01 (B) 0.001
(C) 0.1 (D) None of the above
29. Excavation exceeding 1.5 m in width as well as 10 m² on plan but not exceeding 300 mm in depth shall be described as :
- (A) Excavation (B) Surface dressing
(C) Cutting (D) Surface excavation
30. Which estimate is least accurate?
- (A) Detailed Estimate (B) Plinth area estimate
(C) Revised estimate (D) Supplementary estimate
31. Refractory bricks can be :
- (A) Acid bricks (B) Basic bricks
(C) Neutral bricks (D) All of the above
32. The rate of hydration and hydrolysis of cement depends upon its :
- (A) Setting time (B) Fineness
(C) Soundness (D) None of the above

33. The following statements about slump loss in concrete is true :
- (A) It occurs when the free water from a concrete mixture is removed by hydration reaction
 - (B) It results from gradual stiffening of hydrated cement paste
 - (C) It causes loss of consistency in fresh concrete with elapsed time
 - (D) All of the above
34. The percentage of nickel in invar steel is :
- (A) 30
 - (B) 36
 - (C) 40
 - (D) 46
35. A stair with treads cantilevered from a central column is :
- (A) Circular stair
 - (B) U shaped stair
 - (C) Spiral Stair
 - (D) Helical Stair
36. The intermediate vertical member of a window frame is called a :
- (A) Mullion
 - (B) Rail
 - (C) Style
 - (D) Horn
37. A project network has four paths of duration 32, 34, 20 and 25 days. What is the minimum duration of project completion?
- (A) 32
 - (B) 34
 - (C) 20
 - (D) 25
38. The following term is associated with fire-rated doors and windows :
- (A) Resistance rating
 - (B) Fire protection rating
 - (C) Fire prone
 - (D) None of the above
39. The term AR used in conjunction with GFRC panels refer to :
- (A) Acid resistant
 - (B) Alkali-resistant
 - (C) Alumina resistant
 - (D) Alumina reinforced
40. The following is not a process related to claim management :
- (A) Claim identification
 - (B) Claim notification
 - (C) Claim substantiation
 - (D) Claim conciliation

41. One of the following is not an inventory control technique :
- (A) ABC (B) FSN
(C) VED (D) PQR
42. Large voids are present in the following foundation :
- (A) Strip Footing (B) Raft Foundation
(C) Wall Footing (D) Pile Foundation
43. Structural frame of a building is subject to stresses due to settlement of foundations when :
- (A) Settlement is caused by live loads
(B) Settlement is caused by dead loads
(C) Settlement is caused by lateral loads
(D) Settlement is non uniform over the foundation area
44. The function of a stirrup in a reinforced concrete beam is to :
- (A) Reduce the deflection of the beam
(B) Increase the durability of the beam
(C) Increase the strength of the beam in shear
(D) Increase the strength of the beam in bending
45. A sound knot is one which is :
- (A) free from decay (B) causes sound when struck
(C) hollow in the interior (D) none of the above
46. An engineer of high ethical values does not exhibit this professional character trait :
- (A) Professional pride (B) Social awareness
(C) Environmental consciousness (D) Desire for career growth
47. The material which forms an arch is primarily under :
- (A) Compression (B) Tension
(C) Compression and tension (D) None of the above

48. While calculating the cost of accidents, payment of work not performed is a :
- (A) Direct cost for worker (B) Direct cost for employer
(C) Indirect cost to worker (D) Indirect cost for employer
49. In quality management, non-conformance cost consists of :
- (A) Internal and external failure costs
(B) Prevention and appraisal costs
(C) Prevention and internal failure costs
(D) Appraisal and internal failure costs
50. Fatigue behaviour of materials is highly sensitive to :
- (A) Surface effects (B) Mean Stress
(C) Design details (D) All of the above
51. Dechlorination of water is achieved by adding :
- (A) Sodium thiosulphate (B) Sodium sulphate
(C) Sodium hexa meta phosphate (D) Sodium bisulphate
52. The efficiency of a sedimentation tank does not depend up on :
- (A) detention time (B) depth of the tank
(C) horizontal velocity of water (D) length of the tank
53. Consider the following statements with respect to slow sand filters :
- (i) Quality wise they are more efficient than rapid sand filters
(ii) They need periodic back washing
(iii) Their flow rate is much smaller than that of pressure filters
- (A) All statements are correct (B) (i) and (ii) are correct
(C) (ii) and (iii) are correct (D) (i) and (iii) are correct

54. The population figures in a growing town are as follows :

Year	Population
1970	40000
1980	46000
1990	53000
2000	58000

The predicted population in 2010 by Arithmetic increase method is

- (A) 62000 (B) 63000
(C) 64000 (D) 65000

55. Which of the following method is used to remove chlorides from water?

- (A) Reverse osmosis (B) Lime soda process
(C) Cation exchange process (D) Chemical coagulation

56. If 10 ml of raw sewage is diluted to 250 ml and the dissolved oxygen content of the diluted sample changes from 9 mg/L to 5 mg/L after incubation at 20°C for 5 days, BOD₅ of raw sewage in mg/L is :

- (A) 0.16 (B) 4
(C) 10 (D) 100

57. Under natural conditions of flow, an unpolluted river would contain :

- (A) more dissolved oxygen in summer than in winter
(B) less dissolved oxygen in summer than in winter
(C) same amount of dissolved oxygen in summer and winter
(D) the least amount of dissolved oxygen during floods

58. In the design of storm sewers, time of concentration is relevant to determine the :

- (A) rainfall intensity (B) velocity in the sewer
(C) time of travel (D) area served by the sewer

59. The two main gases liberated from an anaerobic sludge digestion tank would include :

- (A) Ammonia and carbon dioxide (B) Carbon dioxide and methane
(C) Methane and hydrogen sulphide (D) Ammonia and methane

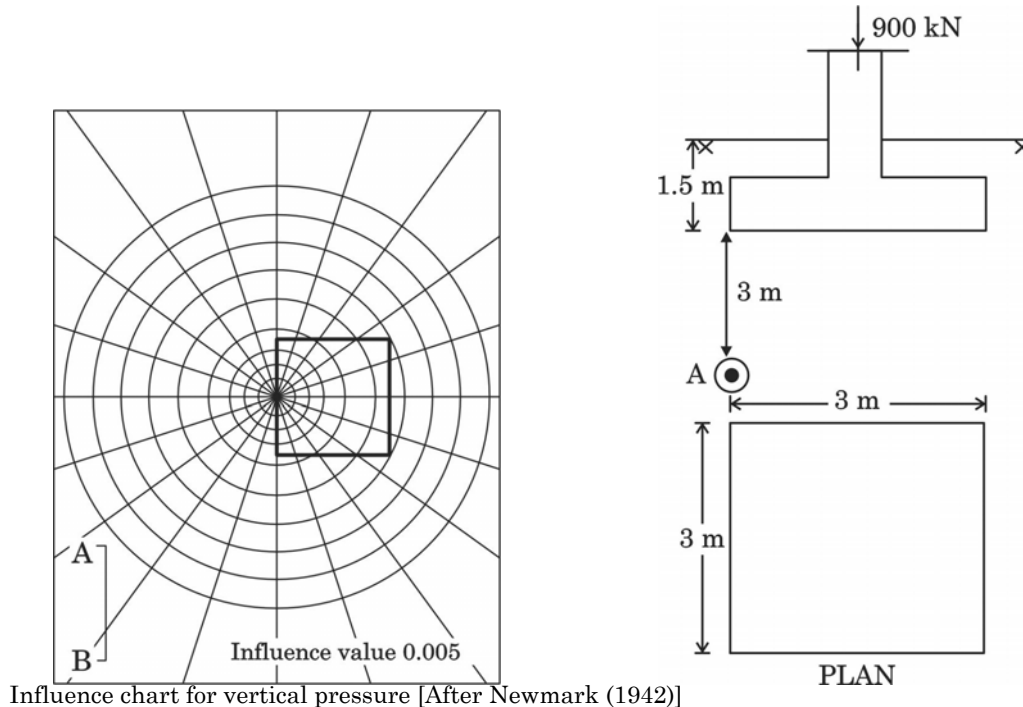
60. Carbon monoxide is hazardous to health because :
- (A) it is carcinogenic in nature
 - (B) it causes loss of sense of smell
 - (C) it reduces oxygen carrying capacity of blood
 - (D) it may cause conjunctivitis
61. The strength of the column with helical reinforcement shall be _____ times the strength of similar column with lateral ties.
- (A) 1.5
 - (B) 1.05
 - (C) 1.25
 - (D) 2.0
62. As per IS 456-2000 for the design of reinforced concrete beam, the maximum allowable shear stress ($\tau_{c \text{ max}}$) depends on the :
- (A) Grade of concrete and percentage of reinforcement
 - (B) Grade of concrete and grade of steel
 - (C) Grade of concrete and thickness of the member
 - (D) Grade of concrete only
63. In a plate girder, the web plate is connected to the flange plates by fillet welding. The size of the fillet weld is designed to safely resist :
- (A) The horizontal shear force between the flanges and the web plate
 - (B) The forces causing buckling in the web
 - (C) The vertical shear force at the section
 - (D) The bending stresses in the flanges
64. For the design of a simply supported T-beam the ratio of effective span to overall depth of the beam is limited to :
- (A) 15
 - (B) 7
 - (C) 20
 - (D) 26
65. As per ISI, rolled steel beam sections are classified into :
- (A) two series
 - (B) three series
 - (C) four series
 - (D) five series
66. When a load is transferred through one surface to another surface in contact, the stress is known as
- (A) Shearing stress
 - (B) Tensile stress
 - (C) Compressive stress
 - (D) Working stress

67. If L is the unsupported length, the effective length of a column effectively held in position and restrained against rotation in both ends, is :
- (A) $0.50 L$ (B) $0.65 L$
(C) $0.75 L$ (D) $0.80 L$
68. In a singly reinforced beam, if the permissible stress in concrete reaches earlier than that in steel, the beam section is called :
- (A) Critical section (B) Economic section
(C) Over reinforced section (D) Under reinforced section
69. Spacing of stirrups in a simply supported rectangular beam, is :
- (A) Kept constant throughout the length
(B) Increased at the centre of the beam
(C) Increased at ends of the beam
(D) Decreased towards the centre of the beam
70. Pick up the incorrect statement from the following : Tensile reinforcement bars of a rectangular beam :
- (A) Are bent down at suitable places to serve as shear reinforcement
(B) Are curtailed if not required to resist bending moment
(C) Are bent up at suitable places to serve as shear reinforcement
(D) Are maintained at bottom to provide at least local bond stress
71. In a simply supported slab, alternate bars are curtailed at :
- (A) $1/4^{\text{th}}$ of the span (B) $1/5^{\text{th}}$ of the span
(C) $1/6^{\text{th}}$ of the span (D) $1/7^{\text{th}}$ of the span
72. The loss of prestress due to elastic shortening of concrete is least in :
- (A) One wire pre-tensioned beam
(B) One wire post-tensioned beam
(C) Multiple wire pre-tensioned beam with sequential cutting of wires
(D) Multiple wire post-tensioned beam subjected to sequential prestressing

73. A concrete beam having a rectangular cross-section of $200 \text{ mm} \times 400 \text{ mm}$ is prestressed with a force of 400 kN at an eccentricity of 100 mm . The maximum compressive stress in the concrete is :
- (A) 12.5 N/mm^2 (B) 5.0 N/mm^2
(C) 2.5 N/mm^2 (D) 7.5 N/mm^2
74. Rivet value is defined as :
- (A) greater of the bearing strength of the rivet and the shearing strength of the rivet
(B) lesser of the bearing strength of the rivet and the tearing strength of the thinner plate
(C) lesser of the bearing strength of the rivet and the shearing strength of the rivet
(D) lesser of the shearing strength of the rivet and the tearing strength of the thinner plate
75. If the width of the foundation for two equal columns is restricted, the shape of the footing generally adopted, is :
- (A) Square (B) Rectangular
(C) Trapezoidal (D) Triangular
76. Total pressure on the vertical face of a retaining wall of height H acts parallel to free surface and from the base at a distance of :
- (A) $H/3$ (B) $H/4$
(C) $2H/3$ (D) $H/2$
77. A R.C.C. column is treated as long, if its slenderness ratio is greater than :
- (A) 10 (B) 12
(C) 15 (D) 60
78. Side face reinforcement shall be provided in a horizontally curved beam when the depth of web in the beam exceeds ————— mm.
- (A) 750 (B) 500
(C) 450 (D) 350

79. In doubly reinforced beam, tension reinforcement is designed for a stress of $0.87 f_y$ and in compression reinforcement the stress is taken as :
- Equal to that of the tension reinforcement
 - Lower than the tension reinforcement
 - Greater than the tension reinforcement
 - Double that of the tension reinforcement
80. An ISMB 500 is used as a beam in a multi-storey construction. From the viewpoint of structural design, it can be considered as 'laterally restrained' when :
- The tension flange is laterally restrained
 - Web is stiffened
 - The compression flange is laterally restrained
 - Conditions (A) and (B) are met
81. The relative compaction of a sandy road base in the field is 90%. The maximum and minimum dry unit weights of the sand are $\gamma_{dmax} = 20 \text{ kN/m}^3$ and $\gamma_{dmin} = 10 \text{ kN/m}^3$. Determine the dry unit weight in the field.
- 9 kN/m^3
 - 18 kN/m^3
 - 20 kN/m^3
 - 15 kN/m^3
82. Calculate the active total thrust on a vertical wall 5 m high, retaining a sand of unit weight 20 kN/m^3 for which $\phi' = 30^\circ$, the surface of the sand is horizontal and the water table is below the bottom of the wall :
- 25 kN/m
 - 50 kN/m
 - 75 kN/m
 - 100 kN/m
83. A canal and a river run parallel on an average of 100 m apart. The elevation of the water surface in the canal is at +300 m and in the river at +200 m. A stratum of sand intersects both the river and canal below their water levels. The sand is 2 m thick and sandwiched between strata of impervious clay. Compute the seepage loss q from the canal per m run, if permeability of sand is $6 \times 10^{-4} \text{ m/s}$:
- $1.2 \times 10^{-3} \text{ m}^3/\text{s}$
 - $2.4 \times 10^{-3} \text{ m}^3/\text{s}$
 - $6 \times 10^{-3} \text{ m}^3/\text{s}$
 - $3.6 \times 10^{-3} \text{ m}^3/\text{s}$

84. Find the stress at the point A shown below, at a depth of 3m below the edge of the footing. The load coming on the footing is 900 kN. The plan of the square footing has been plotted on top of the Newmark graph to a scale of AB = 3 m and placed in such a way that point A falls directly over the center of the chart. (Influence value = 0.005)



- (A) 5 kN/m² (B) 10 kN/m²
 (C) 12.5 kN/m² (D) 22.5 kN/m²
85. A soil with liquidity index < 0 indicates which of the following?
- (A) Semi-solid state, high strength, brittle (sudden) fracture is expected
 (B) Plastic state, intermediate strength, soil deforms like a plastic material
 (C) Liquid state, low strength, soil deforms like viscous fluid
 (D) Flowing like water, no shear strength
86. As per the Indian standard soil classification system, a sample of silty clay with liquid limit of 45% and plasticity index of 29% is classified as :
- (A) CH (B) CI
 (C) CL (D) CL-ML
87. For a saturated sand deposit, the void ratio and specific gravity of solids are 0.6 and 2.67 respectively. The critical (upward) hydraulic gradient for the deposit would be :
- (A) 0.98 (B) 1.04
 (C) 0.5 (D) 2.0

88. A soil is composed of solid spherical grains of identical specific gravity and diameter between 0.075 mm and 0.0075 mm. If the terminal velocity of the largest particle falling through water without flocculation is 0.5 mm/s, that for the smallest particle would be :
- (A) 0.005 mm/s (B) 0.05 mm/s
(C) 0.5 mm/s (D) 5 mm/s
89. A 30 cm square bearing plate settles by 9 mm in the plate load test on cohesionless soil when the intensity of loading is 200 kN/m². The settlement of a square shallow foundation of 1.5 m side under the same intensity of loading will be nearly :
- (A) 40 mm (B) 25 mm
(C) 50 mm (D) 100 mm
90. For a clay slope of height 20 m, stability number 0.05, bulk density 20 kN/m³ and cohesion 30 kN/m², the critical height of the slope would be :
- (A) 10 m (B) 20 m
(C) 30 m (D) 40 m
91. What is the braking distance required in meters to stop a vehicle moving at a design speed of 54 kmph, if the coefficient of friction is 0.30 and acceleration due to gravity is 10 m/s²?
- (A) 52.5 (B) 40.8
(C) 35.5 (D) 37.5
92. Which of the following factors does **not** affect the Flash Point of bitumen?
- (A) Type of crude oil used (B) Ambient temperature
(C) Heating rate during the test (D) Volatile content of bitumen
93. A CBR test is conducted on a compacted subgrade soil sample, and the following data is obtained :
- Load at 2.5 mm penetration : 900 kg
 - Load at 5.0 mm penetration : 800 kg
- The standard loads are 1370 kg and 2055 kg for 2.5 mm and 5.0 mm respectively. What is the CBR value of the subgrade?
- (A) 39% (B) 57%
(C) 66% (D) 70%

94. Which of the following parameters is **most important** in determining the width of a taxiway?
- (A) Runway orientation (B) Aircraft weight
(C) Taxiway length (D) Aircraft wingspan
95. For the design of a runway, the primary purpose of a blast fence is to :
- (A) Protect the aircraft during take-off
(B) Prevent the mixing of exhaust gases with taxiing aircraft
(C) Protect nearby structures from jet blast
(D) Increase the effective length of the runway
96. If the mean of the maximum daily temperature is 55.55 °C and mean of the average daily temperature is 25.25 °C for the hottest month of the year, what is the Airport Reference Temperature?
- (A) 35.35 °C (B) 49.20 °C
(C) 32.15 °C (D) 47.68 °C
97. What is the equilibrium cant in cm required for a 4° curve Meter Gauge track, if the maximum speed permitted is 100 kmph?
- (A) 25 (B) 18
(C) 15 (D) 12
98. Which of the following **methods** is commonly used to **prevent flooding** of a tunnel during construction?
- (A) Grouting (B) Ventilation
(C) Shoring (D) Dredging
99. A city is being planned with a Floor Area Ratio (FAR) of 1.5 for a plot of size 2000 m². What is the maximum permissible built-up area?
- (A) 2000 m² (B) 2500 m²
(C) 3000 m² (D) 3500 m²
100. In the fundamental diagram of traffic flow, what is the relationship between flow (q) and density (k) at maximum flow?
- (A) Density is half the jam density
(B) Density is equal to the jam density
(C) Density is zero
(D) Flow is inversely proportional to density

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK