MSCWB

Previous Year Paper

AE (Civil)
2016

Do not open this Booklet until you are asked to do so

2016
Test Booklet
MCEA

Time allowed : 2 hours
Full marks : 200
Questions are of equal Mark

BOOKLET GROUP

C

Roll No. _____

Full Signature of the Candidate : _____

INSTRUCTIONS

Candidates should read the following instructions carefully before answering the questions :

1. This booklet consists of 16 pages including this front page. Verify the page Nos. and Group on each page and bring at once to the Invigilator's notice, discrepancy, if any.
2. **Answer will have to be given in the Answer-Sheet supplied for the purpose.**
3. You should write your Roll No. & Full Signature on this page (where directed) and Full name, Roll No., Centre of Examination, Booklet Group & Full Signature with date (where indicated) on the Answer-Sheet in BLACK Ball Point Pen.
4. All questions are of multiple-choice answer type. You will find your probable answers (A), (B), (C) & (D) against each question. Find out which of the four answers appears to you to be correct. NOW DARKEN COMPLETELY WITH BLACK BALL POINT PEN WITHIN THE CIRCLE BELOW THE LETTER OF THE SELECTED ANSWER IN THE ANSWER-SHEET AS SHOWN HEREUNDER :

Example— Question : Kolkata is the capital city of—

(A) Bihar (B) Assam (C) Orissa (D) West Bengal

Answer : (A) ○ (B) ○ (C) ○ (D) ●

5. **i) If more than one circle is darkened for a particular answer it will be treated as an incorrect/wrong answer.**
   ii) Any sign other than complete darken inside the circle will be treated as incorrect/wrong answer.
6. **There are 100 questions carrying 2 (TWO) marks each.**
7. **THERE WILL BE NEGATIVE MARKING. 1 (ONE) MARK WILL BE DEDUCTED FOR EACH WRONG / INCORRECT ANSWER.**
8. There is/are extra blank page/s at the end of this booklet for rough work. The sheet should not be torn out from the Test Booklet.
9. **Candidates are not allowed to use Calculator, Pager and Mobile Phone or any other type of electronic gadget of communication in the Examination Hall.**
10. **The Entire Set (Answer-Sheet & Test Booklet including used/unused extra pages) should be handed over to the Invigilator before leaving the Examination Hall.**
11. ***You are warned against adoption of any unfair means at the examination. Any report in this behalf from Centre Supervisors or Examiners may lead to instant cancellation of your examination and debarment from appearing in future examinations/selections.***

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Do Not Write Anything On This Page

1. **Increase in compactive effort causes**
   (A) Increase in optimum moisture content and decrease in dry unit weight
   (B) Increase in both optimum moisture content and dry unit weight
   (C) Decrease in optimum moisture content and increase in dry unit weight
   (D) Decrease in both optimum moisture content and dry unit weight

2. **Area ratio of a sampler should be**
   (A) Less than 5%
   (B) Greater than 5%
   (C) Less than 10%
   (D) Greater than10%

3. **Normal consistency of ordinary Portland cement is about**
   (A) 10%
   (B) 20%
   (C) 30%
   (D) 40%

4. **Slump recommended for mass concrete is about**
   (A) 25 to 50 mm
   (B) 50 to 100 mm
   (C) 100 to 125 mm
   (D) 125 to 150 mm

5. **If K_x and K_z are the permeabilities in x and z directions respectively, effective permeability is given by**
   (A) $Ke = \sqrt{K_x K_z}$
   (B) $Ke = K_x + K_z$
   (C) $Ke = \frac{K_x}{K_z}$
   (D) $Ke = K_x - K_z$

6. **If the Mohr's circle for a given stress condition touches the failure envelope.**
   (A) The soil is stable
   (B) Incipient failure occurs
   (C) Soil has failed
   (D) None of these

7. **Earth pressure on a wall due to 'at rest' condition is**
   (A) Greater than active as well as passive pressure
   (B) Greater than active and less than passive pressure
   (C) Less than active as well as passive pressure
   (D) Less than active and greater than passsive pressure.

8. **Maximum angle β of an infinite slope in a purely cohesionless soil is**
   (A) $\beta = \phi$, angle of internal friction
   (B) $\beta = \phi/2$
   (C) $\beta = \phi/3$
   (D) Not related to ϕ

9. **Crushing strength of a first class brick should not be less than**
   (A) 3.5 N/mm^2
   (B) 7.0 N/mm^2
   (C) 10.5 N/mm^2
   (D) 14.0 N/mm^2

10. **Nominal size of modular brick is**
   (A) 190 mm × 90 mm × 80 mm
   (B) 190 mm × 190 mm × 90 mm
   (C) 200 mm × 100 mm × 100 mm
   (D) 200 mm × 200 mm × 100 mm

11. **Number of bricks required for one cubic metre of brick masonry is**
   (A) 400
   (B) 450
   (C) 500
   (D) 550

12. **Angle of intersection of two plane mirrors of an optical square is**
   (A) 30°
   (B) 45°
   (C) 60°
   (D) 90°

13. **If the true bearing of a line AB is 269°30' then the azimuth of line AB is**
   (A) 0°30'
   (B) 89°30'
   (C) 90°30'
   (D) 269°30'

14. **Most commonly used retarder in cement is**
   (A) Gypsum
   (B) Calcium chloride
   (C) Calcium carbonate
   (D) None of the above

15. **Percentage of carbon content in mild steel is**
   (A) Less than 0.25
   (B) Between 0.25 and 0.7
   (C) Between 0.7 and 1.5
   (D) Greater than 1.5

16. **Slenderness ratio for masonry walls should not be more than**
   (A) 10
   (B) 20
   (C) 30
   (D) 40

17. **To make one cubic metre of 1:2:4 by volume concrete, volume of coarse aggregate required is**
   (A) 0.95m^3
   (B) 0.85 m^3
   (C) 0.75 m^3
   (D) 0.65 m^3

18. **Surkhi is added to lime mortar to**
   (A) Prevent shrinkage
   (B) Decrease setting time
   (C) Increase volume
   (D) Impart hydraulicity

19. **Minimum reinforcement required in design of slabs is**
(A) 0.10 per cent
(B) 0.15 per cent
(C) 0.20 per cent
(D) 0.30 per cent

20. **In a rectangular beam section subjected to torsion, maximum shear stress occurs**
(A) At the edge of wider face
(B) At the middle of wider face
(C) At the edge of shorter face
(D) At the middle of shorter face

21. **Lateral ties provided in a column prevent**
(A) Tension
(B) Compression
(C) Bending
(D) None of these

22. **In limit state design of concrete structures, maximum limit imposed by IS codes on redistribution of moments in statically indeterminate beams is**
(A) 10%
(B) 15%
(C) 20%
(D) 30%

23. **Two footings, one circular and other square are founded in pure clay. The diameter of circular footing is the same as the side of square footing. The ratio of their net ultimate bearing capacities is**
(A) Near unity
(B) 1.3
(C) $^{1}/_{1.3}$
(D) None of the above

24. **A raft of size 10 m× 10 m is founded at a depth of 5 m in a deposit of clay with undrained shear strength of 30 KN/m^2. With a factor of safety of 2.5, the net safe bearing capacity will be**
(A) 86.3 KN/m^2
(B) 79.2 KN/m^2
(C) 93 KN/m^2
(D) 97 KN/m^2

25. **Group efficiency of a pile group**
(A) Will always be less than 100%
(B) Will always be greater than100%
(C) May be less than 100% or more than 100% depending upon the type of soil
(D) Is more than 100% for pile groups in cohesionless soils and less than 100% for pile groups in cohesive soils

26. Length of rectangular sedimentation tank should not be more than

(A) B
(B) 2B
(C) 4B
(D) 8B
where B is the width of tank

27. Dissolved oxygen level in natural unpolluted waters at normal temperature is found to be of the order of

(A) 1 mg/L
(B) 10 mg/L
(C) 100 mg/L
(D) 1000 mg/L

28. Product of H^+ ions and OH^- ions in a stronger alkali is

(A) 0
(B) 1
(C) 10^{-1}
(D) 10^{-14}

29. Turbidity is measured on

(A) Standard silica scale
(B) Standard cobalt scale
(C) Standard platinum scale
(D) Platinum cobalt scale

30. The most common cause of acidity in water is

(A) Carbon dioxide
(B) Oxygen
(C) Hydrogen
(D) Nitrogen

31. Lacey's regime scour depth is given by

(A) $1.35\left(\frac{q}{f}\right)^{1/3}$
(B) $1.35\left(\frac{q^2}{f}\right)^{1/6}$
(C) $1.35\left(\frac{q^2}{f}\right)^{1/3}$
(D) $1.35\left(\frac{q}{f}\right)^{1/6}$
Where q is the discharge per unit width, f is silt factor

32. In a siphon aqeduct the most severe condition of uplift on the floor occurs when

(A) Canal runs full, drain is dry but the water table is at stream bed
(B) Canal is dry and drain is at high flood level
(C) Canal runs dry and drain also runs dry
(D) Both the canal and drain run full.

33. Duty is largest

(A) At the head of water course
(B) On the field
(C) At the head of main canal
(D) Same at all places

34. Water utilizable by plants is available in soils mainly in the form of

(A) Gravity water
(B) Capillary water
(C) Hydroscopic water
(D) Chemical water

35. **According to Khosla's theory, the exit gradient in the absence of downstream cutoff is**

(A) 0
(B) Unity
(C) Infinity
(D) Very large

36. **A divide wall is provided**

(A) At right angle to axis of weir
(B) Parallel to the axis of weir and upstream of it
(C) Parallel to the axis of weir and downstream of it
(D) At an inclination to the axis of weir.

37. **If the R.L's of canal bed level and high flood level of drainage are 212.0 m and 210.0 m respectively, then cross drainage work will be**

(A) Aqueduct
(B) Super paasage
(C) Syphon
(D) Syphon aqueduct

38. **Water stored in a reservoir below minimum pool level is called**

(A) Useful storage
(B) Dead storage
(C) Valley storage
(D) Surcharge storage

39. **Horizontal distances obtained by tacheometric observations**

(A) Require slope correction
(B) Require tension correction
(C) Require slope and tension correction
(D) Do not require slope and tension correction

40. **The shape of a vertical curve generally provided is**

(A) Circular
(B) Parabolic
(C) Spiral
(D) Elliptical

41. **Major resisting force in a gravity dam is**

(A) Water pressure
(B) Wave pressure
(C) Self weight of dam
(D) Uplift pressure

42. **For the upstream face of an earthen dam most adverse condition for stability of slope is**

(A) Sudden draw down
(B) Steady seepage
(C) During construction
(D) Sloughing of slope

43. Euler's formula states that the buckling load P for a column of length L, both ends hinged and whose least moment of inertia and modulus of elasticity of the material of column are L and E respectively is given by

(A) $P = \frac{\pi^2 EI}{L}$

(B) $P = \frac{\pi^2 EI}{L^2}$

(C) $P = \frac{\pi L^2}{EI}$

(D) $P = \frac{\pi EI}{L^2}$

44. Maximum deflection of a simply supported beam of length L with central concentrated load W is

(A) $\frac{WL^2}{48EI}$

(B) $\frac{WL^2}{24EI}$

(C) $\frac{WL^3}{48EI}$

(D) $\frac{WL^2}{8EI}$

45. Maximum bending moment due to a moving load on a simply supported beam occurs

(A) at the mid-span
(B) at the supports
(C) under the load
(D) any where in the span

46. Portal bracing in truss bridge is used to

(A) Transfer load from top of end posts to bearings
(B) Keep the rectangular shape of bridge cross section
(C) Stiffen the structure laterally
(D) Prevent sideways buckling of top chord

47. Efficiency of a riveted joint having minimum pitch as per IS:800 is

(A) 40%
(B) 50%
(C) 60%
(D) 70%

48. Bolts are most suitable to carry

(A) Shear
(B) Bending
(C) Axial tension
(D) Shear and bending

49. Slenderness ratio of lacing bars should not exceed

(A) 100
(B) 120
(C) 145
(D) 180

50. A bult weld is specified by

(A) Effective throat thickness
(B) Plate thickness
(C) Size of weld
(D) Penetration thickness

51. Strain energy of a member may be equated to

(A) average resistance × displacement

(B) $\frac{1}{2}$ stress × strain × area of cross section

(C) $\frac{1}{2}$ stress × strain × volume of member

(D) $\frac{1}{2}\frac{(\text{stress})^2 \times \text{volume of member}}{\text{Young's modulus}}$

52. Two standard angles 50×50×6 (ISA 5050) are placed back to back touching each other to form a column 3^M long. Assuming ends are hinged and E = 210 GN/m² and proportional limit stress 210 MN/m², the critical load will be

(A) 30 KN

(B) 40 KN

(C) 60 KN

(D) 80 KN

53. Most accurate method of finding the average depth of rainfall over an area is

(A) Isohyetal method

(B) Arithmetic mean method

(C) Thiessen polygon method

(D) Any of the above.

54. Gantry girders are designed to resist

(A) Lateral loads

(B) Longitudinal and vertical loads

(C) Lateral, longitudinal and vertical loads

(D) Lateral and longitudinal loads

55. As per IS code, maximum bending moment for design of purlins can be taken as

(A) $\frac{WL}{6}$

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

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

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

where W is total distributed load including wind load on the purlins and L is the centre to centre distance of supports

56. Lug angles

(A) Are used to reduce the length of connection

(B) Are unequal angles

(C) Increases shear lag

(D) All of the above

57. Battens provided for a compression member shall be designed to carry a transverse shear equal to

(A) 2.5% of axial force in member

(B) 5% of axial force in member

(C) 10% of axial force in member

(D) 20% of axial force in member.

58. Negative skin friction on piles may occur when

(A) Pile settlement is greater than soil settlement
(B) Soil settlement is greater than pile settlement
(C) Soil settlement is equal to pile settlement
(D) Soil settlement is half of pile settlement

59. Skin friction and end bearing resistance of piles can be obtained in a separated way by

(A) Routine pile load test
(B) Initial pile load test
(C) Cyclic pile load test
(D) None of these

60. In case of 2-way slab, the limiting deflection is

(A) Primarily a function of long span
(B) Primarily a function of short span
(C) Independent of long or short span
(D) Dependent on both long and short span

61. Allowable deflection in reinforced concrete beams shall not exceed

(A) $^{Span}/_{250}$
(B) $^{Span}/_{300}$
(C) $^{Span}/_{350}$
(D) $^{Span}/_{400}$

62. In limit state design of concrete structures strain distribution is assumed to be

(A) Linear
(B) Non-linear
(C) Parabolic
(D) Parabolic and rectangular

63. Reduction co-efficient of a reinforced concrete column with an effective length of 4.8 m and size 250×300 mm is

(A) 0.80
(B) 0.85
(C) 0.90
(D) 0.95

64. Drops are provided in flat slab to resist

(A) Bending moment
(B) Thrust
(C) Shear
(D) Torsion

65. If the loaded length of span in metres of a railway steel bridge carrying a single track is 6 m, the impact factor is taken as

(A) 0
(B) 0.5
(C) Between 0.5 and 1.0
(D) 1.0

66. **A hill road is one which passes through a terrain with a cross slope of**
(A) 0 to 10%
(B) 10 to 25%
(C) 25 to 60%
(D) none of the above

67. **The camber for hill roads in case of bituminous surfacing is**
(A) 2%
(B) 2.5%
(C) 3%
(D) 4%

68. **W. index will be always**
(A) equal to ϕ. index
(B) more than ϕ. index
(C) less than ϕ. index
(D) a constant fraction of ϕ. index

69. **An aquifer which is underlain by an impermeable layer at the bottom and not confined at the top is known as**
(A) confined aquifer
(B) unconfined aquifer
(C) semiconfined aquifer
(D) perched aquifer

70. **Water existing in capillary zone is a part of**
(A) phreatic water
(B) ground water
(C) gravity water
(D) vadose water

71. **Disinfectionof water results in**
(A) Removal of turbidity
(B) Removal of hardness
(C) Killing of disease bacteria
(D) Complete sterilisation

72. **Period of cleaning of slow sand filters is about**
(A) 24-48 hrs.
(B) 10-12 days
(C) 2-3 months
(D) 1-2 year

73. **Pathogens can be killed by**
(A) Nitrification
(B) Chlorination
(C) Oxidation
(D) None of the above

74. **If BoD of a town is 20000 kg/day and BoD per capita per day is 0.05 Kg, then population equivalent of town is**
(A) 1000
(B) 4000
(C) 100000
(D) 400000

75. **For normal sludge, the value of sludge index for Indian conditions is**
(A) 0 to 50
(B) 50 to 150
(C) 150 to 350
(D) 350 to 500

76. **In a single point method of finding mean velocity across a vertical, the velocity is measured above stream bed at depth(d)**

(A) 0.4d
(B) 0.6d
(C) 0.7d
(D) 0.8d

77. **If N is the speed of current meter in revolutions per second, the velocity measured by it is proportional to**

(A) $N^{1/2}$
(B) N
(C) $N^{3/2}$
(D) N^2

78. **Maximum width of a vehicle as recommended by IRC is**

(A) 1.85 m
(B) 2.44 m
(C) 3.81 m
(D) 4.72 m

79. **Stopping sight distance is always**

(A) less than overtaking sight distance
(B) equal to overtaking sight distance
(C) more than overtaking sight distance
(D) none of the above.

80. **Toughness index is the ratio of**

(A) consistency index
(B) flow index to plasticity index
(C) liquidity index to flow index
(D) plasticity index to flow index

81. **A sample of clay has a natural water content of 64%. Its liquid limit was found to be 75% and plastic limit 35%. Its liquidity index will be**

(A) 45.6%
(B) 72.5%
(C) 56.8%
(D) 64%

82. **Time factor for a particular average degree of consolidation**

(A) always depends upon the distribution of initial excess hydrostatic pressure with depth
(B) depends upon the co-efficient of consolidation
(C) depends upon the drainage path
(D) is independent of distribution of initial excess hydrostatic pressure

83. **A clay deposit suffers a total settlement of 5 cm with oneway drainage. With twoway drainage the total settlement will be**

(A) 10 cm
(B) 2.5 cm
(C) 20 cm
(D) 5 cm

84. **The nearest object from a raingauge should be at a minimum distance equal to**
(A) Its height
(B) Twice its height
(C) Thrice its height
(D) Four times its height

85. **Any cyclic trend present in rainfall data can be ascertained from**
(A) depth-area duration curve
(B) moving average curve
(C) intensity-duration curve
(D) double mass curve

86. **Rates of rainfall for half an hour period of 3 hr storm are 1.6, 3.6, 5.0, 2.8, 2.2, 1.0 cm/hr. Corresponding surface run-off is estimated to 3.6 cm. ϕ index will be**
(A) 1.6 cm/hr
(B) 2.4 cm/hr
(C) 2.0 cm/hr
(D) 3.2 cm/hr

87. **Maximum average rainfall intensity at a given location**
(A) Increases with increase in duration
(B) Decreases with increase in duration
(C) Independent of duration of rainfall
(D) Sometimes increases and sometimes decreases with increase in duration

88. **In the quadrilateral bearing system, a whole circle bearing of 293°30' can be expressed as**
(A) W23°30'N
(B) N66°30'W
(C) S113°30'N
(D) N23°30'W

89. **Adjustment of horizontal cross hair is required particularly when the instrument is used for**
(A) Levelling
(B) Prolonging a straight line
(C) Measurement of horizontal angles
(D) All of the above

90. **Following sights are taken on a 'turning point'**
(A) Foresight only
(B) Backsight only
(C) Foresight and Backsight
(D) Foresight and Intermediate sight

91. **Rise and Fall method of levelling provides a complete check on**
(A) Backsight
(B) Intermediate sight
(C) Foresight
(D) All of the above

92. **Size of a plane table is**
(A) 750 mm × 900 mm
(B) 600 mm × 750 mm
(C) 450 mm × 600 mm
(D) 300 mm × 450 mm

93. Composting and lagooning are the methods of

(A) Sludge digestion
(B) Sludge disposal
(C) Sedimentation
(D) Filtration

94. Width of ballast section for Broad Gauge is

(A) 1.83 m
(B) 2.25 m
(C) 3.35 m
(D) 4.30 m

95. Composite sleeper index is the index of

(A) Hardness and strength
(B) Strength and toughness
(C) Toughness and weir resistance
(D) Wear resistance and Hardness

96. Normal maximum cant permissible in Metre Gauge is

(A) 75 mm
(B) 90 mm
(C) 140 mm
(D) 165 mm

97. A series of closely spaced contour lines represents a

(A) Steep slope
(B) Gentle slope
(C) Uniform slope
(D) Plane surface

98. The instrument used for accurate centering in plane table survey is

(A) Spirit level
(B) Alidade
(C) Plumbing fork
(D) Trough compass

99. Two point problem and three point problem are methods of

(A) resection
(B) orientation
(C) traversing
(D) resection and orientation

100. Bowditch rule is applied to

(A) An open traverse for graphical adjustment
(B) A closed traverse for adjustment of closing error
(C) Determining the effect of local attraction
(D) None of the above