J.E. (CIVIL)

JEC/17

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE ASKED TO DO SO.

2018

TEST BOOKLET

CIVIL ENGINEERING

Time allowed : 2 hours

Full marks : 200

Answer ***all*** the questions.

Questions are of equal value.

TEST BOOKLET SERIES

B

026282

Serial No. .....

Roll No.

Signature of the Candidate:

INSTRUCTIONS

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

1. This booklet consists of 12 pages including this front page, containing 100 questions. Verify the Page Nos. and Test Booklet Series on each page and bring at once to the Invigilator's notice any discrepancy.

2. Answers will have to be given in the Special Answer-Sheet supplied for the purpose.

3. Before you proceed to mark in the Answer-Sheet in response to various items in the Test Booklet, you have to fill in some particulars in the Answer-Sheet as per instructions sent to you in the Admit Card. ***Do not fold the Answer-Sheet as this will result in error in your marks.***

4. All questions are of multiple-choice answer-type. You will find ***four*** probable answers **(A), (B), (C)** and **(D)** against each question. Find out which of the four answers appears to you to be correct or the best. Now darken the circle corresponding to the letter of the selected answer in the Answer-Sheet with **Black Ball Point Pen** as per instructions printed on the reverse of the Admit Card and in the Answer-Sheet.

5. One and only one circle is to be fully blackened for answer. Any spot in any other circle (multiple circle) or in wrong circle will be considered as wrong answer. If more than one circle is encoded for a particular answer, it will be treated as a wrong answer.

6. ***There will be negative marking for wrong answers. 2/3 mark will be deducted for each wrong answer.***

7. ***There is a blank page at the end of this booklet for Rough Work.***

8. ***The Special Answer-Sheet should be handed over to the Invigilator before leaving the Examination Hall. You are permitted to take away the used Test Booklet after completion of the examination.***

Please Turn Over

1. Unit of measurement for roofing tiles is specified in terms of

(A) sq. m.
(B) cum.
(C) number
(D) kg

2. Grader is mainly used for

(A) trimming and finishing
(B) shaping and trimming
(C) finishing and shaping
(D) finishing, shaping and trimming

3. Unless otherwise specified, thickness of plaster should be kept

(A) 6 mm to 12 mm
(B) 10 mm to 12 mm
(C) 12 mm to 25 mm
(D) None of the above

4. Which of the following foundation is used for weaker soil?

(A) Column footing
(B) Grillage footing
(C) Raft footing
(D) All of the above

5. The minimum height of a head room is

(A) 2·1 m
(B) 2·5 m
(C) 2·7 m
(D) 3 m

6. Sum of the tread and the riser must lie between

(A) 300 to 350 mm
(B) 400 to 450 mm
(C) 500 to 550 mm
(D) 600 to 700 mm

7. Paints with white lead base are suitable for painting of

(A) wood work
(B) iron work
(C) both wood work and iron work
(D) None of the above

8. To make ten cubic metre of 1 : 2 : 4 by volume concrete, the volume of coarse aggregates required is

(A) 9·5 m^3
(B) 8·5 m^3
(C) 7·5 m^3
(D) 6·5 m^3

9. Minimum width of landing should be

(A) equal to width of stairs
(B) half the width of stairs
(C) twice the width of stairs
(D) one fourth the width of stairs

10. With increase in w/c ratio in a concrete mix

(A) strength decreases and workability increases
(B) strength and workability decreases
(C) workability increases
(D) strength increases and workability decreases

11. The shear stress at the centre of a circular shaft under torsion is

(A) zero

(B) minimum

(C) maximum

(D) infinity

12. Two beams, one of circular cross-section and the other of square cross-section, have equal area of cross-section, when this beam are subjected to bending?

(A) Both beams are equally economical

(B) Square beam is more economical

(C) Circular beam is more economical

(D) None of the above

13. When a cantilever beam is loaded at its free end, the maximum compressive stress shall develop at

(A) bottom fibre

(B) top fibre

(C) neutral axis

(D) centre of gravity

14. The section modulus of a circular section about an axis through its C. G., is

(A) $\frac{\pi}{4} \times d^2$

(B) $\frac{\pi}{16} \times d^2$

(C) $\frac{\pi}{16} \times d^3$

(D) $\frac{\pi}{32} \times d^3$

15. When the shear force diagram is a parabolic curve between two points, it indicates that there is a

(A) point load at the two points

(B) no loading between the two points

(C) uniformly distributed load between the two points

(D) uniformly varying load between the two points

16. When a cantilever beam is loaded with uniformly distributed loads, the bending moment diagram will be a

(A) horizontal straight line

(B) vertical straight line

(C) inclined straight line

(D) parabolic curve

17. The Poisson's ratio for steel varies from

(A) 0·23 to 0·27

(B) 0·25 to 0·33

(C) 0·31 to 0·34

(D) 0·32 to 0·42

18. The length of a conical bar is l, diameter of the base is d and weight per unit volume is w. It is fixed at its upper end and hanging freely. The elongation of the bar under action of its own weight will be

(A) $wl^2/2E$

(B) $wl^2/4E$

(C) $wl^2/6E$

(D) $wl^2/8E$

19. Modular ratio of two materials is the ratio of

(A) linear stress to linear strain

(B) shear stress to shear strain

(C) their modulus of elasticities

(D) their modulus of rigidities

20. Slenderness ratio of a compression member is the ratio of effective length of the compression member to the

(A) area of cross section

(B) moment of inertia

(C) radius of gyration

(D) None of the above

21. Which of the following is the best compression member section?

(A) Single angle section
(B) Double angle section
(C) I-section
(D) Tubular section

22. Butt weld is specified by

(A) leg length
(B) plate thickness
(C) effective throat thickness
(D) penetration thickness

23. The failure of a rivet joint may take place due to

(A) shear failure of rivets
(B) bearing failure of rivets
(C) tearing failure of plates
(D) All of the above

24. Heat of Hydration in a cement at early age is maximum for

(A) C_2S
(B) C_3S
(C) C_4AF
(D) C_3A

25. High yield deformed bar have a

(A) definite yield value
(B) chemical composition different from mild steel
(C) percentage elongation less than that of mild steel
(D) percentage elongation more than that of mild steel

26. Speed regulations on road is decided on the basis of

(A) 60 percentile cumulative frequency
(B) 75 percentile cumulative frequency
(C) 80 percentile cumulative frequency
(D) 85 percentile cumulative frequency

27. When the bituminous surfacing is done on already existing black top road or over existing concrete road, the type of treatment to be given is

(A) seal coat
(B) tack coat
(C) prime coat
(D) spray of emulsion

28. The type of transition curves generally provided on hill roads, is

(A) circular
(B) spiral
(C) cubic parabola
(D) lemniscate

29. The percentage compensation ingradient for ruling gradient of 4% and horizontal curve of radius 760 m is

(A) 0·1%
(B) 1%
(C) 10%
(D) no compensation

30. Road tar RT-4 is recommended for

(A) surface painting
(B) renewal of coats
(C) premixing tar macadam in base course
(D) All of the above

31. Which one of the following binders is recommended for a wet and cold climate?

(A) 80/100 penetration asphalt

(B) Tar

(C) Cutback

(D) Emulsion

32. Coefficient of curvature for a well graded soil, must be between

(A) 0·5 to 1·0

(B) 1·0 to 3·0

(C) 3·0 to 4·0

(D) 4·0 to 5·0

33. Fine sand possesses

(A) good plasticity

(B) limited plasticity

(C) reasonable plasticity

(D) no plasticity and clay like

34. Undisturbed soil samples are required for conducting

(A) hydrometer test

(B) shrinkage limit test

(C) consolidation test

(D) specific gravity test

35. If the shearing stress is zero on two planes, then the angle between the two planes is

(A) 45°

(B) 90°

(C) 135°

(D) 225°

36. The specific gravity and initial void ratio of a sample of soil deposit are 2·71 and 0·85 respectively. The value of critical hydraulic gradient is

(A) 0·82

(B) 0·85

(C) 0·92

(D) 0·95

37. The specific gravity of quartz is

(A) 2·65

(B) 2·72

(C) 2·75

(D) 2·85

38. A sample of clay and a sample of sand have the same specific gravity and void ratio. Their permeability's will differ because

(A) their porosities will be different

(B) their densities will be different

(C) their degree of saturation will be different

(D) the size range of their voids will be different

39. A phreatic line is defined as the line within a dam section below which there are

(A) positive equipotential lines

(B) positive hydrostatic pressure

(C) negative hydrostatic pressure

(D) None of the above

40. When the degree of consolidation is 50%, the time factor is about

(A) 0·2

(B) 0·5

(C) 1·0

(D) 2·0

41. The soil moisture driven off by heat is called

(A) free water

(B) hydroscopic water

(C) gravity water

(D) fringe water

42. Coefficient of compressibility of soil is the ratio of

(A) stress to strain

(B) strain to stress

(C) stress to settlement

(D) rate of loading to settlement

43. The process of turning the telescope of a theodolite over its supporting axes through 180° in a vertical plane is called

(A) transiting

(B) reversing

(C) plunging

(D) Any one of the above

44. The horizontal angle between the true meridian and a survey line is called

(A) magnetic bearing

(B) azimuth

(C) dip

(D) magnetic declination

45. An ideal transition curve is

(A) cubic parabola

(B) clothiod spiral

(C) cubic spiral

(D) true spiral

46. Which of the following curves is avoided on a highway?

(A) Simple curve

(B) Compound curve

(C) Reverse curve

(D) None of the above

47. Location of contour gradient for a highway is best set out from

(A) ridge down the hill

(B) saddle down the hill

(C) bottom to the ridge

(D) bottom to the saddle

48. The suitable contour interval for a map with scale 1 : 10000 is

(A) 2 m

(B) 5 m

(C) 10 m

(D) 20 m

49. The included angles of a theodolite traverse are generally measured as

(A) clockwise from the forward station

(B) anti-clockwise from back station

(C) anti-clockwise from forward station

(D) clockwise from back station

50. If the fore-bearing of a line AB is 35° and that of a line BC 15°, then the included angle between the lines is

(A) 20°

(B) 50°

(C) 160°

(D) 230°

51. The polar moment of inertia of a hollow circular shaft of outer diameter (D) and inner diameter (d) is

(A) $\frac{\pi}{16} \times \left(D^3 - d^3\right)$

(B) $\frac{\pi}{16} \times \left(D^4 - d^4\right)$

(C) $\frac{\pi}{32} \times \left(D^4 - d^4\right)$

(D) $\frac{\pi}{64} \times \left(D^4 - d^4\right)$

52. The load required to produce a unit deflection in a spring is called

(A) flexural rigidity

(B) torsional rigidity

(C) spring stiffness

(D) Young's modulus

53. A reinforced cement concrete beam is considered to be made of

(A) homogeneous material

(B) heterogeneous material

(C) composite material

(D) isotropic material

54. Factor of safety is defined as the ratio of

(A) ultimate stress to working stress

(B) working stress to ultimate stress

(C) breaking stress to ultimate stress

(D) ultimate stress to breaking stress

55. At the neutral axis of a beam

(A) the layers are subjected to maximum bending stress

(B) the layers are subjected to minimum bending stress

(C) the layers are subjected to compression

(D) the layers do not undergo any strain

56. A rod is enclosed centrally in a tube and the assembly is tightened by rigid washer. If the assemble is subjected to a compressive load, then

(A) rod is under compression

(B) tube is under compression

(C) both tube and rod are under compression

(D) tube is under tension and rod is under compression

57. A beam of uniform strength may be obtained by

(A) keeping the width uniform and varying the depth

(B) keeping the depth uniform and varying the width

(C) varying the width and depth

(D) Any one of the above

58. The point of contraflexure is a point where

(A) shear force changes sign

(B) bending moment changes sign

(C) shear force is maximum

(D) bending moment is maximum

59. Euler's formula is valid for

(A) short columns

(B) long columns

(C) both short and long columns

(D) weak columns

60. An isometric view provides

(A) just another elevation details

(B) a two-dimensional details

(C) a three-dimensional details

(D) equal projection line of equal length

61. Unit weight of concrete is taken as

(A) 25 KN/m^3

(B) 20 KN/m^3

(C) 24 KN/m^3

(D) 18 KN/m^3

62. Blast furnace slag cement is used for

(A) dams

(B) bridge abutments

(C) retaining walls

(D) All of the above

63. Biological action is used in

(A) screens

(B) sedimentation tanks

(C) trickling filters

(D) All of the above

64. Minimum compressive strength of burnt clay brick is

(A) 10·5 MPa

(B) 7·5 MPa

(C) 3·5 MPa

(D) 5 MPa

65. Approximate cost for water supply is

(A) 4 to 5% of estimated cost of the building works

(B) 2 to 3% of estimated cost of the building works

(C) 5 to 7% of estimated cost of the building works

(D) 1 to 2% of estimated cost of the building works

66. Original cost of the property minus depreciation is

(A) book value

(B) market value

(C) salvage value

(D) capital value

67. An aggrading river is a

(A) silting river

(B) scouring river

(C) both silting and scouring river

(D) neither silting nor scouring river

68. The drainage water intercepting the canal can be disposed of by passing the canal below the drainage in

(A) aqueduct and syphon aqueduct

(B) aqueduct and super passage

(C) super passage and canal syphon

(D) level crossing

69. A hyetograph is a graphical representation of

(A) rainfall intensity and time

(B) rainfall depth and time

(C) discharge and time

(D) cumulative rainfall and time

70. The effluents from the septic tank are discharged into

(A) drainage

(B) sewer

(C) soak pit

(D) oxidation pond

71. The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in the field is termed as

(A) water conveyance efficiency
(B) water application efficiency
(C) water use efficiency
(D) None of the above

72. The amount of chlorine used for plain chlorination of water is about

(A) 0·2 ppm
(B) 0·3 ppm
(C) 0·4 ppm
(D) 0·5 ppm

73. The characteristics of fresh and septic sewage respectively are

(A) acidic and alkaline
(B) alkaline and acidic
(C) Both acidic
(D) Both alkaline

74. The maximum efficiency of BOD removal is achieved in

(A) oxidation pond
(B) oxidation ditch
(C) aerated lagoons
(D) trickling filters

75. The pipe joint commonly used in pumping station

(A) flexible joint
(B) flanged joint
(C) expansion joint
(D) spigot and socket joint

76. The maximum deflection in a steel beam is limited to

(A) L/360
(B) L/325
(C) L/350
(D) L/150

77. What is the value of Young's modulus for M25 concrete as per IS 456 : 2000?

(A) 2×10^5 MPa
(B) $2{\cdot}5 \times 10^4$ MPa
(C) $2{\cdot}2 \times 10^3$ MPa
(D) $1{\cdot}5 \times 10^5$ MPa

78. Doubly reinforced beams are recommended when

(A) depth of the beam is restricted
(B) breadth of the bean is restricted
(C) both breadth and depth are restricted
(D) shear is high

79. RCC pipe carrying water is mainly designed for

(A) bending moment
(B) shear force
(C) hoop tension
(D) torsional moment

80. In a RCC footing on soil, the minimum thickness at edge should not be less than

(A) 100 mm
(B) 200 mm
(C) 150 mm
(D) 250 mm

81. The weight of the footing is assumed as _____ of the weight transferred to the column.

(A) 5%

(B) 10%

(C) 15%

(D) 20%

82. The diagonal tension in concrete can be resisted by providing

(A) diagonal tension reinforcement

(B) shear reinforcement

(C) inclined tension reinforcement

(D) All of the above

83. If the area of tensile steel reinforcement is doubled, the moment of resistance of the beam increases by about

(A) 12%

(B) 22%

(C) 32%

(D) 42%

84. The maximum spacing of vertical stirrups is 0·75d, and that for inclined at 45° is

(A) 0·375d

(B) d

(C) 0·5d

(D) None of the above

85. The factor of safety for concrete and steel in the working stress method are taken as

(A) 3, 1·78

(B) 2, 1·85

(C) 2·5, 1·2

(D) 1·5, 1·15

86. The form work of RCC slabs up to 4·5 m span can be removed after

(A) 1 day

(B) 3 days

(C) 7 days

(D) 14 days

87. If the ratio of fine sand is increased in a concrete mix, its workability is likely to

(A) decrease

(B) increase

(C) remain constant

(D) None of the above

88. Most widely used type of deep state tube wells in India is

(A) cavity tube well

(B) strainer tube well

(C) slotted pipe-gravel packed tube well

(D) None of the above

89. Zone of aeration in a subsurface water system does not include

(A) capillary zone

(B) saturation zone

(C) soil water zone

(D) intermediate zone

90. Specific capacity of a well

(A) decreases with diameter

(B) decreases with time from the start of pumping

(C) increases with discharge rate

(D) None of the above

91. In India, which of the following is adopted as standard recording rain gauge?

(A) Symon's rain gauge
(B) Tipping bucket rain gauge
(C) Natural syphon type
(D) Weighing bucket type

92. A manhole is classified as shallow if its depth is between

(A) 0·4 to 0·5 m
(B) 0·5 to 0·7 m
(C) 0·7 to 0·9 m
(D) 0·9 to 1·2 m

93. Hydraulic failure of earthen dam is due to

(A) overtopping
(B) wave erosion
(C) toe erosion
(D) All of the above

94. Infiltration galleries are used to trap ground water in

(A) sandy river bed
(B) clayey river bed
(C) rocky river bed
(D) perennial river bed

95. The best unit duration of storm for a unit hydrograph is

(A) 1 hour
(B) one-fourth of basin lag
(C) one-half of basin lag
(D) equal to basin lag

96. When was the Water (Prevention and Control of Pollution) Act enacted by the Indian Parliament?

(A) 1970
(B) 1974
(C) 1975
(D) 1980

97. An inverted syphon is generally designed for

(A) one pipe
(B) two pipes
(C) three pipes
(D) four pipes

98. The self-cleansing velocity of all sewers in India is usually

(A) 0·90 m/sec to 1·2 m/sec
(B) 1·2 m/sec to 1·5 m/sec
(C) 1·5 m/sec to 2 m/sec
(D) 3 m/sec to 5 m/sec

99. The settling velocity of a particle in a sedimentation tank depends on

(A) surface area of tank
(B) depth of tank
(C) both surface area and depth of tank
(D) volume of the tank

100. Normal formation width of a hill road for one way traffic is

(A) 3·6 m
(B) 4·8 m
(C) 5·5 m
(D) 6 m

Space for Rough Work