WBPSC JE

Previous Year Paper

Civil 2016

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

TEST BOOKLET SERIES

A

2016

TEST BOOKLET

CIVIL ENGINEERING

Time allowed : 2 hours

Full marks : 200

Answer *all* the questions.

Questions are of equal marks.

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. Answer 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 oval 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. If more than one oval is encoded for a particular answer, it will be treated as a wrong answer.
6. ***There will be negative marking for wrong answers; 2/3rd marks will be deducted for each wrong answer.***
7. There are blank pages 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.***
9. Candidates are ***not allowed*** to use ***Calculator*** in the Examination Hall.

[Please Turn Over]

When not stated otherwise, notation have their usual meaning.

1. The Thiessen polygon corresponds to

(A) a polygon obtained by joining adjacent rain gauge stations.

(B) an area subscribed for the construction of depth-area curve.

(C) locate the boundary of equal rainfall depth.

(D) a representative boundary used for weighing the observed station precipitation.

2. The standard Symon's type rain gauge has a collecting area of diameter

(A) 100 mm

(B) 127 mm

(C) 254 mm

(D) 92 mm

3. If the depth of partial flow in a sewer of diameter 200 cm is $\frac{1}{4}$th of running full then its wetted perimeter is

(A) π

(B) $\frac{2\pi}{3}$

(C) $\frac{3\pi}{2}$

(D) $\frac{\pi}{3}$

4. The value of camber recommended for cement concrete roads in the areas of heavy rainfall is

(A) 1 in 33

(B) 1 in 40

(C) 1 in 50

(D) 1 in 25

5. An isometric drawing is

(A) true measurements can be made only along or parallel to the isometric axes.

(B) the frontal face appears in its true shape.

(C) all faces are unequally distorted.

(D) mutually perpendicular axes.

6. Ultimate strength to cement is provided by

(A) Tricalcium silicate

(B) Dicalcium silicate

(C) Tetracalcium Alumino ferrite

(D) Tricalcium Aluminate

7. If base period of the crop is 140 days and a Channel supplies 0.6 m^3/sec of water for irrigating a crop land of 240 hectre, the delta of water will be

(A) 3.365 m

(B) 1.183 m

(C) 3.024 m

(D) 2.365 m

8. Telescopic alidate is used in

(A) Compass surveying

(B) Theodolite traversing

(C) Plane Table surveying

(D) Tacheometric contouring

9. Maximum size of aggregate to be used in concrete mixes for water retaining structures is

(A) 25 mm

(B) 12 mm

(C) 40 mm

(D) 20 mm

10. The moisture content of timber used in building window and door frames should be in the range of

(A) 8 – 12%

(B) 20 – 22%

(C) 2 – 5%

(D) 12 – 18%

11. The number of traditional bricks required for 10^3 of brickwork with standard thickness of cement mortar

(A) 4200

(B) 5025

(C) 4950

(D) 4850

12. An arrangement for temporarily supporting a structure from beneath for safety is known as
(A) Jacking
(B) Shuttering
(C) Derick
(D) Underpining

13. Sand drains are used
(A) to reduce the settlement
(B) to increase the permeability
(C) to transfer the loads
(D) to increase the rate of consolidation

14. The liquid limit (LL), plastic limit (PL) and shrinkage limit (SL) of a cohesive soil satisfy the relation
(A) LL > PL > SL
(B) LL < PL > SL
(C) LL < PL < SL
(D) LL > PL < SL

15. The maximum deflection in timber beams or joints shall not be more than
(A) $\frac{\text{Span}}{300}$
(B) $\frac{\text{Span}}{360}$
(C) $\frac{\text{Span}}{325}$
(D) $\frac{\text{Span}}{375}$

16. In case of a quarter circle the c.g. is located at
(A) 0.424 r
(B) 0.25 r
(C) $\frac{r}{2}$
(D) 0.67 r

17. Moment of Inertia (MI) of a triangle of base 'b' and height 'h' about its base is expressed as
(A) $\frac{b^2h}{12}$
(B) $\frac{bh^3}{12}$
(C) $\frac{bh^3}{36}$
(D) $\frac{b^3h}{36}$

18. The bottom of the sewage inlet chamber of septic tanks is laid as outward slope
(A) 1 in 10
(B) 1 in 15
(C) 1 in 20
(D) 1 in 25

19. Compression members tend to buckle in the direction of the
(A) least radius of gyration
(B) minimum cross-section
(C) axis of load
(D) perpendicular to the axis of the load

20. When two plates butt together and rivetted with two cover plates with two rows of rivet, the joint is known as
(A) single rivetted single cover butt joint
(B) single rivetted double cover butt joint
(C) double rivetted single cover butt joint
(D) double rivetted double cover butt joint

21. When a rectangular beam is loaded transversely the maximum compressive stress develops on
(A) bottom fibre
(B) every cross-section
(C) top fibre
(D) neutral axis

22. Quick lime is
(A) Calcium carbonate
(B) Calcium oxide
(C) Calcium hydroxide
(D) Calcium sulphate

23. Which of the following type of cements is suitable for use in massive concrete structures like large dam?
(A) OPC
(B) PPC
(C) Low heat cement
(D) Rapid hardening cement

24. The differential settlement in case of foundation of sandy soils should not exceed

(A) 25 mm
(B) 40 mm
(C) 15 mm
(D) 65 mm

25. If the specific gravity of a settleable particles is increased from 2 to 3, the settling velocity will

(A) get doubled
(B) increased by 1.50 times
(C) increased by 2.60 times
(D) increased by 2.25 times

26. Corrosion in sewer system occurs due to production of

(A) CH_4
(B) H_2S
(C) CO_2
(D) All of the above

27. The tolerance limit of hardness in water as per IS drinking water standard is specified as

(A) 200 mg/L
(B) 750 mg/L
(C) 600 mg/L
(D) 500 mg/L

28. The ratio of the moment of inertia of a circular plate and that of a square plate for equal depth is

(A) < 1.00
(B) $\frac{3\pi}{16}$
(C) > 1.0
(D) 1.0

29. When a terrain is observed with a cross slope varies from 10 to 25%, it is referred as

(A) Mountain terrain
(B) Steep terrain
(C) Hilly terrain
(D) Rolling terrain

30. For a well conditioned triangle, no angle should be less than

(A) 45°
(B) 30°
(C) 60°
(D) 20°

31. If the radius of a simple curve is R, the length of the chord for calculating offsets by the method of chords produced should not exceed

(A) $\frac{R}{20}$
(B) $\frac{R}{15}$
(C) $\frac{R}{25}$
(D) $\frac{R}{10}$

32. Black cotton soil is unsuitable for foundations because its

(A) particles are cohesive
(B) permeability is uncertain
(C) property to undergo volumetric change
(D) bearing capacity is low

33. If the design speed is 80 kmph, perception reaction time is 3 secs and the co-efficient of friction is 0.5, the safe stopping sight distance will be

(A) 290 m
(B) 117 m
(C) 145 m
(D) 213 m

34. The width of carriage way for a single lane is recommended as

(A) 3.75 m
(B) 4.00 m
(C) 5.50 m
(D) 7.5 m

35. For a R.C.C., structure, the shape of shear stress diagram is

(A) fully rectangular
(B) fully parabolic
(C) parabolic above neutral axis and rectangular above the neutral axis
(D) rectangular above neutral axis and parabolic below neutral axis

36. The minimum cover in a slab should neither be less than the diameter of bar nor less than

(A) 15 mm
(B) 20 mm
(C) 13 mm
(D) 25 mm

37. Alum as a coagulant is found to be more effective when pH range of water is

(A) 6-8
(B) 7-9
(C) 5-7
(D) 3-5

38. If f_y is the characteristic yield strength of steel, then the design yield stress of steel according to IS code is related as

(A) 0.57 f_y
(B) 0.87 f_y
(C) 0.67 f_y
(D) 0.70 f_y

39. The minimum factor of safety against overturning for a retaining wall would be

(A) 1.5
(B) 2.0
(C) 2.5
(D) 3.0

40. The limits of percentage 'P' of the longitudinal reinforcement in a column is given by

(A) 0.15 – 2%
(B) 0.8 – 8%
(C) 0.8 – 6%
(D) 0.6 – 6%

41. The degree of static indeterminacy of a pin jointed frame is expressed as

(A) m + r + 2j
(B) m – r + 2j
(C) m + r – 2j
(D) m + r – 3j

42. Which of the following types of rivetted joint is free from bending stresses?

(A) Lap joint
(B) Double butt joint with single cover plate
(C) Butt joint with double cover plate
(D) Single butt joint

43. The maximum slenderness ratio of a compression number carrying both dead and live load is

(A) 180
(B) 350
(C) 200
(D) 225

44. The angle of roof truss with AC sheets should not be less than

(A) 27°
(B) 35°
(C) 30°
(D) 25°

45. In case of timber structures, the form factor for solid circular cross-section is taken as

(A) 1.414
(B) 1.180
(C) 1.810
(D) 1.670

46. Due to change in price level, a revised estimate is prepared if the sanctioned estimate exceeds

(A) 2%
(B) 2.5%
(C) 3%
(D) 5%

47. The timber floor not spanning on the masonry wall but anchored to the wall gives
(A) lateral restraint but not rotational restriant
(B) both lateral and rotational restraint
(C) nither lateral nor rotational restraint
(D) rotational restraint but no lateral restraint

48. The fineness modulus of fine aggregate is in the range of
(A) 2–3.5
(B) 4–5.0
(C) 3.5–5.5
(D) 5–7.0

49. Maximum quantity of water needed per 50 kg of cement for M15 grade of concrete is
(A) 25 lit
(B) 30 lit
(C) 32 lit
(D) 35 lit

50. Air entrainment in the concrete increases
(A) Workability
(B) Strength
(C) The unit weight
(D) None of the above

51. For walls, columns and vertical faces of all structural members, the formwork is generally removed after
(A) 7 days
(B) 14 days
(C) 2 days
(D) 3 days

52. The percentage of reinforcement in case of slabs when tor steel are used is not less than
(A) 0.10
(B) 0.12
(C) 0.15
(D) 0.20

53. Maximum distance between the expansion joints in structures as per IS code is
(A) 30m
(B) 35m
(C) 45m
(D) 25m

54. Due to attack of dry rot, the timber
(A) cracks
(B) shrinks
(C) grumbles
(D) reduces to powder

55. If 'L' is the perimeter of a closed traverse, ΔD is the closing error, in departure, the correction for the departure of a traverse side of length l, according to Bowditch rule is
(A) $\Delta D \frac{l}{L}$
(B) $\Delta D \frac{l^2}{L}$
(C) $\Delta D \frac{L}{l^2}$
(D) $L \times \frac{l}{\Delta D}$

56. The forebearing of the lines AB and BC are measured as 146°30' and 68°30'. The included angle ABC is recorded as
(A) 102°
(B) 155°
(C) 78°
(D) 25°

57. The horizontal angle between the true meridian and magnetic meridian at a place is called
(A) Azimuth
(B) Declination
(C) Local attraction
(D) Dip

58. In chain surveying tie lines are primarily provided
(A) to check the accuracy of the survey
(B) to take the offsets from chain lines
(C) to increase the number of the chain lines
(D) to avoid long offsets from chain lines

59. Which type of bonding of brickwall is unsuitable for walls of thickness less than $1\frac{1}{2}$ bricks?
(A) English
(B) Single flemish
(C) Raking
(D) Double flemish

60. Gypsum is added during grinding operation of cement production to facilitate
(A) increasing compressive strength
(B) delay in setting action
(C) increase the soundness
(D) increase the fineness

61. The slope of the e-logp curve for a soil mass gives
(A) co-efficient of permeability (K_p)
(B) compression index (C_c)
(C) co-efficient of volume compressibility (C_v)
(D) co-efficient of consolidation (M_v)

62. 5 days 20°C BOD equal to
(A) 3 days 27°C BOD
(B) 4 days 30°C BOD
(C) 6 days 32°C BOD
(D) 7 days 35°C BOD

63. Crushing strength of a first class brick should not be less than
(A) 5 N/mm^2
(B) 10 N/mm^2
(C) 15 N/mm^2
(D) 7.5 N/mm^2

64. The percentage of alumina in a good brick earth lies in the range of
(A) 5 – 10%
(B) 10 – 20%
(C) 20 – 30%
(D) 2 – 5%

65. The raft slab is projected beyond the outerwalls of the structure by
(A) 25 – 30cm
(B) 15 – 20cm
(C) 30 – 45cm
(D) 10 – 15cm

66. The slump recommended for beams and slab is
(A) 25 – 50 mm
(B) 75 – 100 mm
(C) 40 – 120 mm
(D) 50 – 75 mm

67. The exterior angle between outer faces of a wall is known as
(A) Headen
(B) Quion
(C) Turn
(D) Junction

68. Various activities of a project are shown on Bar charts by
(A) vertical lines
(B) horizontal lines
(C) dots
(D) crosses

69. Irrigation canals are generally aligned along
(A) valley line
(B) contour lines
(C) straight line
(D) ridge line

70. When a canal is carried over a natural drainage the structure provided is known as

(A) Aqueduct
(B) Syphon
(C) Level crossing
(D) Super passage

71. The main function of a diversion headworks of a canal from a river is

(A) to remove silt
(B) to control floods
(C) to store water
(D) to raise water level

72. In a loaded beam, the point of contraflexure occurs at a section where

(A) SF is maximum
(B) BM is zero
(C) BM is maximum
(D) BM is minimum

73. A beam of length 'L' is pinned at both ends and is subjected to a concentrated bending couple of moment 'M' at its centre, the maximum BM in the beam is

(A) $\frac{M}{2}$
(B) $\frac{ML}{2}$
(C) $\frac{M}{3}$
(D) M

74. According to lacey, scour depth in a river depends upon the straightness of the reach. If D is the depth of scour in regime flow in a right angled bend it is

(A) 1.25D
(B) 1.75D
(C) 2.00D
(D) 1.50D

75. The velocity of partial flow in a sewer line will be equal to the velocity in full condition if depth of flow in the sewer line equals to

(A) 80%
(B) 50%
(C) 67%
(D) 75%

76. The rate of accumulation of sludge in septic tank is recommended as

(A) 25 lit/person/month
(B) 30 lit/person/year
(C) 30 lit/person/month
(D) 25 lit/person/day

77. The dimensions of a rectangular settling tank are L = 24m, W = 6m, H = 3m. If 2 hr. detention time for tank is recommended the rate of flow of sewage per hour is

(A) $204m^3$
(B) $212m^3$
(C) $208m^3$
(D) $216m^3$

78. In a barrage, the crest level is kept

(A) high with large gates
(B) low with large gates
(C) low with no gates
(D) high with no gates

79. The minimum width of a septic tank is

(A) 750 mm
(B) 900 mm
(C) 600 mm
(D) 1000 mm

80. The plinth area of a building includes

(A) lift and wall including landing
(B) area of the stain cover
(C) area of the cantilever porch
(D) internal shaft for sanitary installation up to 2 sq. m in area

81. If two forces acting at a joint are not along the straight line, then for the equlibrium of the joint

(A) one of the forces must be zero

(B) each force shall be zero

(C) forces must be equal and same sign

(D) forces must be equal and opposite sign

82. The most important purpose of providing frog in a brick is to

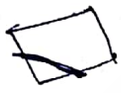
(A) reduce the mass of brick

(B) form adequate joint between mortar and brick

(C) Improve insulation

(D) Increase strength of the brick

83. A king closure is a



(A) full brick

(B) $\frac{3}{4}$th brick

(C) longitudinally $\frac{1}{2}$ brick

(D) crosswise $\frac{1}{2}$ brick

84. The area of a sloping surface of a protecting embankment of mean height 'd', side slope s : 1 and length L is

(A) d^2s

(B) $Ld\sqrt{1+s^2}$

(C) $\frac{1}{2}\sqrt{dL(1+s^2)}$

(D) $2L.d\sqrt{1+s^2}$

85. For 12 mm thick cement plastering 1 : 6 on 100 sqm, new brickwork, the quantity of cement required is

(A) $0.20m^3$

(B) $0.25m^3$

(C) $0.29m^3$

(D) $0.27m^3$

86. The critical load of a pin jointed column is expressed by

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

(B) $P_{Cr} = \frac{\pi^2 EI}{4L^2}$

(C) $P_{Cr} = \frac{\pi^2 EI}{16L^2}$

(D) $P_{Cr} = \frac{4\pi^2 EI}{L^2}$

87. The necking of the steel section in stress-strain curve is observed

(A) at yield stress

(B) in strain hardening range

(C) at plastic stage

(D) after reaching ultimate tensile stress

88. The shape factor on strong axis of a wide flanged I-section of ductile steel is

(A) 1.14

(B) 1.50

(C) 1.70

(D) 2.34

89. Uncertainities and excess payment can be avoided in case of

(A) percentage contract

(B) cost plus fixed sum contract

(C) lump sum contract

(D) item rate contract

90. Two people weighing W each are sitting on a plank of length L floating on water at $\frac{L}{4}$ from either end. Neglecting the weight of the plank, the bending moment at the centre of the plank is

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

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

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

(D) Zero

91. The consistency of a saturated cohesive soil is affected by

(A) Water content
(B) Particle size distribution
(C) Co-efficient of permeability
(D) Density Index

92. The time for a clay layer to achieve 85% consolidation is 10 years. If the layer was half as thick, 10 times more permeable and 4 times more compressible than the time that would be required to achieve the same degree of consolidation is

(A) 1 year
(B) 5 years
(C) 12 years
(D) 16 years

93. The ultimate bearing capacity of a soil is 300 KN/m^2. The depth of foundation is 1.0m and unit weight of soil is 20 KN/m^3. Choosing a factor of safety of 2.5, the net safe bearing capacity is

(A) 100 KN/m^2
(B) 112 KN/m^2
(C) 80 KN/m^2
(D) 100.5 KN/m^2

94. Mechanical stabilization requires

(A) mixing of two or more types of natural soils
(B) addition of chemicals to soils
(C) addition of lime to soils
(D) addition of cementing materials to soils

95. The rise and fall method provides an arithmetic check on

(A) back sights and fore sights
(B) intermediate sights
(C) back sights and intermediate sights
(D) back sights, intermediate sights and fore sights

96. The combined correction due to curvature and refraction for a distance of 1 km on the surface of earth is

(A) 0.763m
(B) 0.0673m
(C) 0.673m
(D) 0.0763m

97. As per code of practice for prestressed concrete the minimum grades of concrete to be used for post-tensioned and pre-tensioned structural elements respectively

(A) M20 for both
(B) M40 and M30
(C) M15 and M20
(D) M30 and M40

98. The name of the test associated with road aggregates for determining hardness property is known as

(A) Los Angele's abrasion test
(B) Soundness test
(C) Toughness test
(D) Crushing test

99. The objective of providing a transition curve on the approach to horizontal curves in order to

(A) reduce the jerk to allowable levels
(B) increase jerk to allowable levels
(C) minimize the length of the horizontal curve
(D) None of the above

100. According to Indian standard, the actual size of modular brick is

(A) 19 cm × 10 cm × 7.5 cm
(B) 20 cm × 9 cm × 9 cm
(C) 19 cm × 9 cm × 9 cm
(D) 23 cm × 11.5 cm × 7.5 cm