Booklet Serial No.

000845

Test Booklet Series

TEST BOOKLET - 2022
CIVIL ENGINEERING
Lecturer I
(09)

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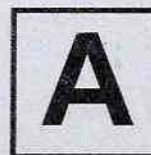
Time Allowed: Two Hours	Maximum Marks: 100

INSTRUCTIONS

1. IMMEDIATELY AFTER THE COMMENCEMENT OF THE EXAMINATION, YOU SHOULD CHECK THAT THIS TEST BOOKLET DOES *NOT* HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.

2. **Please note that it is the candidate's responsibility to encode and fill in the Roll Number and Test Booklet Series Code A, B, C or D carefully and without any omission or discrepancy at the appropriate places in the OMR Response Sheet. Any omission/discrepany will render the Response Sheet liable for rejection.**

3. You have to enter your Roll Number on the Test Booklet in the Box provided alongside. **DO NOT** write **anything else** on the Test Booklet.

4. This Test booklet contains **100** items (questions). Each item comprises of four responses (answers). You will select the response which you want to mark on the Response sheet. In case you feel that there is more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each item.

5. You have to mark all your responses **ONLY** on the separate Response Sheet provided. See directions in the Response Sheet.

6. All items carry equal marks.

7. Before you proceed to mark in the Response sheet the response to various items in the Test Booklet you have to fill in some particulars in the Response Sheet as per instructions sent to you with your Admission Certificate.

8. After you have completed filling in all your responses on the Response Sheet and the examination has concluded, you should hand over to the Invigilator *only the Response Sheet*. You are permitted to take away with you the Test Booklet and Candidate's Copy of the Response Sheet.

9. Sheets for rough work are appended in the Test Booklet at the end.

10. **Penalty for wrong answers:**
    THERE WILL BE PENALTY FOR WRONG ANSWERS MARKED BY THE CANDIDATE.
    (i) There are four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **0.25** of the marks assigned to that question will be deducted as penalty.
    (ii) It a candidate gives more than one answer, it will be treated as a **wrong answer** even if one of the given answers happens to be correct and there will be same penalty as above for that question.
    (iii) If a question is left blank, i.e., no answer is given by the candidate, there will be no **penalty** for that question.

(2)

1. **Assertion (A):** The relationships between loads, shear forces, and bending moments in beams are quite useful when investigating the shear forces and bending moments throughout the entire length of a beam.

   Reason (R): The relationships are helpful when constructing shear-force and bending-moment diagrams.

   A)   Both A and R are individually true and R is the correct explanation of A

   B)   Both A and R are individually true but R is NOT the correct explanation of A

   C)   A is true but R is false

   D)   A is false but R is true

2. The method of sections for planar trusses can be formalized by the following procedure.

   i)   Consider each of the bar forces in turn and determine the bar force by moment about the point of intersection of the other two forces, or projection on the transverse direction, if they are parallel.

   ii) Divide the truss structure into two parts by a section, intersecting two or three bars.

   iii) Determine the reactions on the truss structure.

   Select the proper sequence from the following options.

   A)   i, ii and iii

   B)   iii, i and ii

   C)   ii, iii and i

   D)   iii, ii and i

3. Match List-I (system of forces) with List-II (definition) and select the correct answer using the codes given below the lists:

	List-I		List-II
a.	Coplanar forces	1.	The forces, whose lines of action lie on the same line.
b.	Collinear forces	2.	The forces, meet at one point.
c.	Concurrent forces	3.	The forces, whose lines of action lie on the same plane.

Codes:	a	b	c
A)	1	2	3
B)	3	1	2
C)	2	3	1
D)	1	3	2

4. The following statements are associated with the stress-strain diagram for steel.

   1. For small values of the strain the relationship is linear (straight line) and the stress is proportional to the strain, this behavior is valid until the stress reaches the proportional limit.

   2. If the stress exceeds the proportional limit the strain begins to increase more rapidly and the slope of the curve decreases.

   Select the correct answer using the codes given below

   Codes:

   A) 1 and 2 are correct

   B) 1 and 2 are wrong

   C) 1 correct and 2 wrong

   D) 1 wrong and 2 correct

5. Match List-I (Type of Arch) with List-II (Indeterminacy) and select the correct answer using the codes given below the lists:

	List-I		List-II
a)	Fixed Arch	1.	Indeterminate to the first degree.
b)	Three-hinged Arch	2.	Indeterminate to the third degree.
c)	Two-hinged Arch	3.	Determinate Arch.

 | Codes: | a | b | c |
   |---|---|---|---|
   | A) | 1 | 2 | 3 |
   | B) | 3 | 1 | 2 |
   | C) | 2 | 3 | 1 |
   | D) | 1 | 3 | 2 |

6. **Assertion (A):** Circular tubes are more efficient than solid bars in resisting torsional loads. In a typical hollow tube, most of the material is near the outer boundary of the cross section where both the shear stresses and the moment arms are highest. If weight reduction and savings of material are important, it is advisable to use a circular tube.

   Reason (R): The shear stresses in a solid circular bar are maximum at the outer boundary of the cross-section and zero at the center. Therefore, most of the material in a solid shaft is stressed significantly below the maximum shear stress. Furthermore, the stresses near the center of the cross-section have a smaller moment arm for use in determining the torque.

   A) Both A and R are individually true, and R is the correct explanation of A

   B) Both A and R are individually true but R is NOT the correct explanation of A

   C) A is true but R is false

   D) A is false but R is true

7. Find the approximate location of the shear center for a beam with the cross-section of the channel as shown in the figure. h = 250 mm, b = 130 mm, t = 3 mm. Choose the correct answer from the following options.
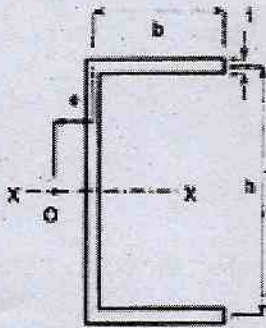
A) 44.67 mm
C) 49.75 mm

B) 47.95 mm
D) 46.35 mm

8. Find the shortest length L for a steel column with pinned ends having a cross-sectional area of 60 mm x 100 mm, for which the elastic Euler formula applies. Let E = 200 Gpa and assume the proportional limit to be 250 Mpa. Choose the correct answer from the following options.

A) 1540 mm
B) 1650 mm
C) I 450 mm
D) I 760 mm

9. Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I

a) Applied Load

b) Shear Force

c) Moment

d) Slope

List-II

1. $EI\dfrac{dy}{dx}$

2. $EI\dfrac{d^4y}{dx^4}$

3. $EI\dfrac{d^2y}{dx^2}$

4. $EI\dfrac{d^3y}{dx^3}$

Codes:	a	b	c	d
A)	1	2	3	4
B)	4	3	2	1
C)	2	4	3	1
D)	3	1	4	2

10. For the design of bridges, industrial crane rails, conveyors, and other structures where loads move across their span _____ plays an important role.

A) Influents lines

B) Shear force

C) Moment

D) Torsion

11. Match List-I (soil particles) with List-II (grain size) and select the correct answer using the codes given below the lists:

List-I		List-II	
a.	Gravel	1.	less than 0.002 mm
b.	Sand	2.	4.75 mm to 0.075 mm
c.	Silt	3.	4.75 mm to 80 mm
d.	Clay	4.	0.075 mm to 0.002

Codes:	a	b	c	d
A)	1	2	3	4
B)	3	2	4	1
C)	2	4	1	3
D)	1	3	2	4

12. **Assertion (A):** The standard penetration test is the most commonly used in-situ test, especially for cohesionless soils which cannot be easily sampled.

Reason (R): The test is extremely useful for determining the relative density and the angle of shear resistance of cohesionless soils.

A) Both A and R are individually true but R is NOT the correct explanation of A

B) Both A and R are individually true and R is the correct explanation of A

C) A is true but R is false

D) A is false but R is true

13. A sample of wet silty clay soil has a mass of I 26 kg. The following data were obtained from laboratory tests on the sample: Wet density = 2.1, G = 2.7, water content, w = I5%. Determine the dry density of the soil sample and choose the correct answer from the following options.

A)   1826.2 kg/m³

B)   1862.2 kg/m³

C)   1743.5 kg/m³

D)   1658.7 kg/m³

14. The bearing capacity of soil supporting a footing of size 3m x 3m will not be affected by the presence of a water table located at a depth below the base of the footing of

A)   m

B)   1.5 m

C)   m

D)   6.0 m

15. The natural moisture content of excavated soil is 32%. Its liquid limit is 60% and its plastic limit is 27%. Determine the plasticity index of the soil and choose the correct answer from the following options.

A) 35%

B) 38%

C) 33%

D) 27%

16. The group efficiency of driven piles in the sand at a close spacing may be

A)   Equal to 100%

B)   Greater than 100%

C)   Well below 100%

D)   Zero

17. **Assertion (A)**: The coefficient of permeability of a disturbed sample may be different from that of the undisturbed sample even though the void ratio is the same.

Reason (R): This may be due to a change in the structure or the stratification of the undisturbed soil or a combination of these factors.

A) Both A and R are individually true but R is NOT the correct explanation of A

B) Both A and R are individually true and R is the correct explanation of A

C) A is true but R is false

D) A is false but R is true

18. The most accurate method for the determination of water content in the laboratory is

A) Sand bath method

B) Oven-drying method.

C) Pycnometer method.

D) Calcium carbide method

19. The total compression of saturated clay strata under excess effective pressure may be considered as the sum of:

1. Immediate compression

2. Primary consolidation

3. Secondary compression

Which of the above statements are true?

A) 1 & 2

B) 2 & 3

C) 1 & 3

D) 1, 2 & 3

20. For a soil deposit having n = 33% and G = 2.6, the critical gradient is

A) 1.0

B) 1.05

C) 1.07

D) 1.10

21. At a depth of 6 m below the ground surface at a site, a vane shear test gave a torque value of 6040 N-cm. The vane was 10 cm high and 7 cm across the blades. Estimate the shear strength of the soil and choose the correct answer from the following options.

A) 64 kN/m^2

B) 69 kN/m^2

C) 72 kN/m^2

D) 62 kN/m^2

22. Consolidation time of a soil sample
    A) Increases with an increase in permeability.
    B) Increases with a decrease in compressibility.
    C) Increases with a decrease in a unit weight of soil.
    D) Increases with a decrease in permeability.

23. If you have to choose between an alignment of highway through cutting, embankment, Pavement at ground level itself, and a tunnel, the best choice is
    A) Road nearer to ground level
    B) Embankment
    C) Cutting
    D) Tunnel

24. Match List I with List II and select the correct answer using the codes given below the lists:

    List-I   List II
    a. Penetration test   1. Design of bituminous concrete mix
    b. Marshal Test   2. Overlay design
    c. Ring and ball test   3. Gradation of asphalt cement
    d. Benkelman beam test   4. Determination of softening point

    Codes: a   b   c   d
        A) 3   2   4   1
        B) 3   1   4   2
        C) 2   3   1   4
        D) 4   2   3   1

25. A rising gradient of 1 in 50 meets a falling gradient of 1 in 500. The length of the vertical curve if the rate of change of gradient is 1% per 100 m.
    A) 45.45 m
    B) 180 m
    C) 200 m
    D) 220 m

26. Consider the following statements with reference to pavements:

1) Flexible pavements are more suitable than rigid pavements in regions where subgrade strength is uneven.

2) The load-carrying capacity of rigid pavements depends more on the properties of concrete than the strength of the subgrade.

3) Compared to flexible pavements rigid pavements are more affected by temperature variations.

Of these statements

A) 1 and 2 are correct

B) 1 and 3 are correct

C) 2 and 3 are correct

D) 3 alone is correct

27. The base course of a WBM road consists of.

A) 120 to 180 mm stone placed on their ends upwards.

B) 120 to 180 mm stone placed on their ends upwards + 50 mm stone Macadam + water.

C) 120 to 180 mm stone placed on their ends upwards + 50 mm stone Macadam + water + 2 layers of metal each 150 thick.

D) 120 to 180 mm stone placed on their ends upwards + 50 mm stone Macadam + water + 2 layers of metal each 150 thick + Rolled + Screenings applied.

28. Match List I with List II and select the correct answer using the codes given below the lists:

	List-I		List II
a.	Shovel	1.	To lift rails
b.	Crowbars	2.	To remove dog spikes out of sleepers
c.	Rail tongs	3.	To correct track alignment
d.	Claw bar	4.	To handle ballast

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

29. Consider the following situations:
   1. Traffic volume entering from all roads is less than 3000 vehicles per hour.
   2. Pedestrian volume is high.
   3. Total right turning traffic is high.
   4. A road in a hilly region.

   A rotary will be more suitable than control by signals, in situations listed against

   A) 1 and 3
   B) 1 and 4
   C) 2 and 4
   D) 2 and 3

30. The most suitable foundation for a culvert is
   A) Caisson foundation
   B) Well foundation
   C) Pile foundation
   D) Spread foundation

31. Grade separation had the advantage of
   A) easy right turn
   B) no speed restriction
   C) number of points of conflict is nil
   D) crossing angle is 90°

32. The height of the bridge is kept _____ above high flood level.
   A) 0.2 to 1.5m
   B) 1.2 to 1.5m
   C) 1.8 to 2.1m
   D) 2.2 to 2.5m

33. The outer signal is provided at a minimum distance of
   A) 1 km from home signal
   B) 580 meters from the home signal
   C) 860 meters from the home signal
   D) 180 meters from the home signal

34. The Pressure head of oil of specific gravity 0.8, corresponding to the pressure head of 6 m of water will be

    A) 73.6 m

    B) 0.13 m

    C) 7.5 m

    D) 4.8 m

35. Considering a Francis Turbine which of the following component act as a recuperator of pressure energy?

    A) Speed ring

    B) Draft tube

    C) Stay vane

    D) Wicket gate

36. A body weighs 4.5 N in water and 6 N in oil with a specific gravity of 0.8. The weight of the body is_____

    A) 7.5N

    B) 6.5N

    C) 8N

    D) 12N

37. A pipe carrying 0.05 m³/s of water suddenly contracts from 30 cm to 15 cm in diameter. Then the coefficient of contraction is _____ when the loss of head is 0.5 m.

    A) 0.89

    B) 0.23

    C) 0.47

    D) 0.65

38. The discharge through a large vertical rectangular orifice of breadth B when the head of liquid causes flow over the upper and the lower edges is H1 and H2 respectively

A) $Q = \frac{2}{3} C_d \sqrt{2g} B \left[H_1^{\frac{3}{2}} - H_2^{\frac{3}{2}} \right]$

B) $Q = \frac{2}{3} C_d \sqrt{2g} B \left[H_2^{\frac{3}{2}} - H_1^{\frac{3}{2}} \right]$

C) $Q = \frac{2}{3} C_d \sqrt{2g} B \left[H_1^{\frac{2}{3}} - H_2^{\frac{2}{3}} \right]$

D) $Q = \frac{2}{3} C_d \sqrt{2g} B \left[H_2^{\frac{2}{3}} - H_1^{\frac{2}{3}} \right]$

39. The discharge of water through a rectangular channel of width 6 m is 18 m³/s, when the depth of flow of water is 3 m, then the specific energy of flowing water is
A) 3.115m
B) 1 m
C) 1.115m
D) 6m

40. In a rectangular channel, there occurs a jump corresponding to $Fr_1 = 2.5$. Then the critical depth expressed in terms of initial depth y_1 is:
A) $1.84y_1$
B) $3.95y_1$
C) $15.63y_1$
D) $6.25\, y_1$

41. If the velocity components in a two-dimensional flow field are expressed as

$u = \frac{y^3}{3} + 2x - x^2 y$

$v = xy^2 - 2y - \frac{x^3}{3}$

These functions represent a possible case of:
A) Compressible flow
B) Irrotational flow
C) Laminar flow
D) Impossible flow

42. When a body moves concurrently in two fluids, which of the following takes place?

A) Gravitational drag

B) Compressibility drag

C) Induced drag

D) Pressure drag

43. The dimension of dynamic viscosity in an FLT system is:

A) FL^2T

B) $FL^{-1}T^2$

C) FL^4T^2

D) $ML^{-2}T^2$

44. The value of Chezy's constant for a smooth cemented channel having a unit hydraulic mean radius, calculated using Bazin's formula is:

A) 33

B) 54

C) 12

D) 82

45. Which of the following is true for the M3 flow profile in an open channel?

A) $d > d_0 > dc$

B) $d_0 > d_c > d$

C) $d_c > d_0 > d$

D) $d_0 = d_c > d$

46. Rainfall of intensity of 20mm/hr occurred over a watershed of area 100ha for a duration of 6h measured direct runoff volume in the stream draining the watershed was found to be 30,000 m³. The precipitation not available to run-off in this case is

A) 9cm

B) 3cm

C) 17.5mm

D) 5mm

47. The air mass lifting, where an air mass rises to pass over a mountain range is known as____

A) Convective lifting

B) Orographic lifting

C) Frontal lifting

D) Condensation lifting

48. The standard recording rain gauge adopted in India is of

A) Weighing bucket type

B) Natural siphon type

C) Tipping bucket type

D) Telemetry type

49. Which of the following statements is correct for a Depth-Area-Duration precipitation curve?

i) Curves, convex upwards, duration increasing outward

ii) Curves, concave upwards, duration increasing downward

iii) Curves, concave downwards, duration increasing outward

iv) Curves, concave upwards, duration increasing inward

A) i only

B) iii, iv

C) iii only

D) i and iii

50. **Assertion (A):** Surface irrigation is the oldest and most common method of irrigation
Reason (R): The uncertain infiltration rate, and cropping pattern decides the irrigation efficiency

A) Both A and R are individually true and R is the correct explanation of A

B) Both A and R are individually true but R is NOT the correct explanation of A

C) A is true but R is false

D) A is false but R is true

51. Match List-I (Canal Structures) with List-Il (Usage) and select the correct answer using the codes given below the lists:

List-I		List-II	
(a)	Sarda fall	1.	Upstream water level
(b)	Glacis fall	2.	Surplus water release
(c)	Cross regulator	3.	Raised crest fall
(d)	Canal Escapes	4.	Maximum energy dissipation

Codes:

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

52. A well with a radius of 0.3m, including gravel envelope and developed zone, completely penetrates an unconfined aquifer with K=25 m/day and an initial water table at 30m above the bottom of the aquifer. The well is pumped so that the water level in the well remains at 22m above the bottom of the aquifer. Assuming that pumping has essentially no effect on water table height at 300m from the well, determine the steady-state well discharge. (Neglect well losses).

A) 3500 m³/day

B) 5500 m³/day

C) -2750 m³/day

D) -4730 m³/day

53. For a basin, in a given period Δt there is no change in the groundwater and soil water status. If P -precipitation, R = total runoff, E = Evapotranspiration and Δs increase in the surface water storage in the basin, the hydrological water budget equation states

A) $P=R-E\pm\Delta S$

B) $R=P+E-\Delta S$

C) $P=R+E+\Delta S$

D) $E=P-R+\Delta S$

54. Which among the following are the assumptions considered in the theory of seepage?

   i)   The soil is heterogeneous and isotropic

   ii)   The voids are completely filled with water

   iii)   The seepage flow obeys Darcy's law at a steady state condition

   iv)   The soil and water are under compressible flow

   A)   i and iii

   B)   i and iv

   C)   iii only

   D)   iii and iv

55. The hydraulic methods of flood routing use

   A)   Continuity equation

   B)   Continuity and momentum equation

   C)   Energy Equation

   D)   Continuity and Energy equation

56. An embankment constructed parallel to the river for flood protection on one side is known as

   A)   Spurs

   B)   Levees

   C)   Guide banks

   D)   Aprons

57. The permeability of a soil sample at the standard temperature of 20°C is 0.01 cm/s. The Permeability of the same material at a flow temperature of 10°C is

   A)   Depends on the material porosity

   B)   =0.01

   C)   >0.01

   D)   <0.01

58. If P is the amount of acid required to reach 8.3 and M is the total quantity of acid required to reach 4.5, Which of the following statements are true?

   (i) $P = M$, all alkalinity is OH^-

   (ii) $P = M/2$, all alkalinity is CO_3^{2-}

   (iii) $P > M/2$, predominant species are CO_3^{2-} and HCO_3^-

   (iv) $P < M/2$, predominant species are OH^- and CO_3^{2-}

   A)   i and ii are correct

   B)   i and ii are wrong

   C)   iii and iv are correct

   D)   i is wrong and ii is correct

59. The fire demand of a city having a population of 1,40,000 estimated by the Kuichling formula is

   A)   0.40 cumecs

   B)   1.12 cumecs

   C)   0.62 cumecs

   D)   0.80 cumecs

60. The permissible limit of free residual chlorine (in mg/L) in drinking water as per IS 10500: 2012 standards should be a minimum of

   A)   0.5mg/L

   B)   0.3 mg/L

   C)   0.20 mg/L

   D)   0.1 mg/L

61. **Assertion (A):** The k value of the BOD determines the speed of the reaction

   Reason (R): Simpler organic compounds have lower k values and complex compounds have higher k values

   A)   Both A and R are individually true and R is the correct explanation of A

   B)   Both A and R are individually true but R is NOT the correct explanation of A

   C)   A is true but R is false

   D)   A is false but R is true

62. Match List-I (unit operation) with List-II (a mechanism) and select the correct answer using the codes given below the lists:

	List-I		List-II
(a)	Gas Transfer	1.	Reynold's number
(b)	Colloidal force	2.	Darcy's law
(c)	Settling velocity	3.	Henry's coefficient
(d)	Filter media	4.	Zeta potential

Codes:

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

63. Find the minimum velocity required to transport coarse sand through a sewer of 60cm dia with sand particles of 1mm dia and a specific gravity of 2.66. Assume $\beta = 0.06$ and f= 0.02. Assume the sewer to run half full.

A) 6.25 m/sec

B) 0.850m/sec

C) 0.625 m/sec

D) 8.50 m/sec

64. Which among the following are not true regarding the sewage flow depth?

i. Sewers are designed to run full at ultimate peak flows

ii. Small size sewers are generally designed to flow at ½ depth

iii. Large size sewers are designed to flow at ¼ depth

iv. Maximum velocity is obtained when sewer flow depth is 0.81D

A) i, ii and iii

B) ii and iv

C) ii, iii and iv

D) i and iii

65. Which value of BOD/COD ratio for untreated wastewater is biologically treated?
    A)   >0.5
    B)   <0.75
    C)   >0.3
    D)   <0.1

66. **Assertion (A):** The end products of the anaerobic digestion are fermented into acids and alcohols of low molecular weight

    Reason (R): The organisms involved in the anaerobic reaction solubilizes the organic solids through hydrolysis and fermentation
    A)   Both A and R are individually true and R is the correct explanation of A
    B)   Both A and R are individually true but R is NOT the correct explanation of A
    C)   A is true but R is false
    D)   A is false but R is true

67. The annual average permissible ambient concentration of Sulphur dioxide as per NAAQ standards is

    A) $365 \mu g / m^3$

    B) $800 \mu g / m^3$

    C) $157 \mu g / m^3$

    D) $80 \mu g / m^3$

68. The threshold of pain is about 120 dB. How many times greater in intensity (in w/m²) is this?
    A)   2 w/m²   B)   20 w/m²
    C)   1 w/m²   D)   10 w/m²

69. Which of the following is not an accelerator in the setting of concrete?
    A) $CaCl_2$
    B) $Ca(NO_3)_2$
    C) CH_3OH
    D)   NaCl

70. Equilibrium torsion occurs in
    i)   Edge beam of a frame
    ii)   Canopy beam
    iii) Curved beam
    A)   i, ii and iii   B)   ii and iii
    C)   i and ii   D)   i and iii

71. Which of the following is not a Principal category of tensioning steel in a prestressed concrete member?
    i)   Mechanical
    ii)   Electrical
    iii)   Hydraulic
    iv)   Chemical
    A)   i and ii
    B)   iv only
    C)   i, ii and iv
    D)   None of the above

72. Bolt designated a M16 of property class 8.8 will have an ultimate tensile strength of _____MPa.
    A)   640 MPa
    B)   800 MPa
    C)   160 MPa
    D)   128 MPa

73. Where bars of two different diameters are to be spliced, the lap length is governed by _____.
    A)   Smaller diameter
    B)   Larger diameter
    C)   Length of bar
    D)   Location of splice

74. The final deflection of horizontal members below the level of casting should not exceed span/_____.
    A)   150
    B)   350
    C)   450
    D)   250

75. Clinker Aggregates are also called as

    A)   Cinders

    B)   Breeze

    C)   Vermiculite

    D)   Perlite

76. When the thickness of the thicker plate is 20 mm, the minimum size of the weld is _____.

   A)   3 mm

   B)   5 mm

   C)   6 mm

   D)   10 mm

77. Permissible bearing stress of bolt is considered as _____ of the ratio of the nominal bearing capacity of the bolt to the nominal bearing area of a bolt

   A)   40%

   B)   80%

   C)   60%

   D)   75%

78. Under which of the following conditions does lateral torsional buckling need not be considered?

   i)   The bending is about the minor axis of the section

   ii)   The ratio between the moment of inertia about the major and minor axis is not high

   iii)   The non-dimensional slenderness ratio is less than 0.4 in the case of major axis bending

   A)   i, ii and iii

   B)   ii and iii

   C)   i and ii

   D)   i and iii

79. The buckling class of a built-up steel section is _____.

   A)   d

   B)   c

   C)   a

   D)   b

80. The tacheometric method of surveying is generally preferred for

A) Providing Primary Control.

B) Large Scale Survey.

C) Fixing Points with Highest Precision

D) Difficult Terrain.

81. Match the survey with its scale

Types of the survey - Recommended Scale

a) Building Survey - i. 1:25000

b) Topographical Survey - ii. 1:10000

c) Route Survey - iii. 1:1000

The correct match is

    (a) (b) (c)

A) i   ii   iii

B) iii i   ii

C) iii ii i

D) ii   i   iii

**82.** Reciprocal levelling is employed to determine the accurate difference in the level of two points which

A) Are quite apart and where it is not possible to set up the instrument midway between the points

B) Are quite close and where it is not possible to set up the instrument midway between the points.

C) Have a very large difference in level and two instrument settings are required to determine the difference in level.

D) Are at the almost same elevation

83. Identify the correct match.

a) The region using standard topographic symbols.

b) Raster representation of the region using a coarse-resolution grid cell.

c) Vector representation of the same region
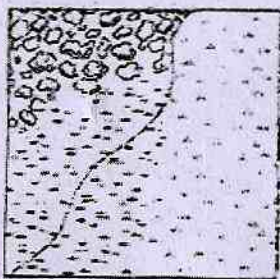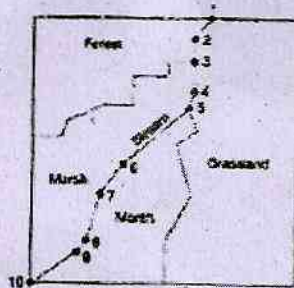
F	F	F	S	G	G
F	F	M	S	G	G
F	M	S	S	G	G
M	S	S	G	G	G
M	S	M	G	G	G
S	S	M	G	G	G

1   2   3

The correct match is

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

84. Consider the following statements:

Assertion (A): The wear at the bottom of staff is of no consequence

Reason (R): It is unnecessary to keep the zero of graduation at the foot of the staff because the differences in staff readings represent differences in the level

The correct answer is

A) A and R are both correct and R is the correct explanation of A

B) A and R are both correct and R is NOT the correct explanation of A

C) A is correct, but R is NOT correct

D) A is NOT correct, but R is correct

85. Which one of the following statements is not correct in respect of a prismatic compass?

   1. It consists of a glass-topped case of diameter 114 mm.

   2. An engine-divided aluminum ring carrying the needle rotates on a jeweled center.

   3. The scale is divided around the ring from 0 to 360 degrees and half a degree in an anti clockwise direction.

   4. The zero reading is engraved at the south end of the graduated ring.

   The correct statements are

   A) 1 & 2 only

   B) 3 & 4 only

   C) 3 only

   D) 2 only

86. The error in the horizontal circle reading of $41°59'13.96''$ and vertical circle reading of $+36°52'11.63''$ for any pointing due to the trunnion axis not being perpendicular to the vertical axis by $(90° - i)$ where i is $20''$, is

   A) $-15''$

   B) $+18''$

   C) $+15''$

   D) $-18''$

87. The error in the horizontal circle readings due to the line of collimation not being the trunion axis is eliminated by

   A) Taking readings on the different parts of the horizontal circle.

   B) Taking readings on both faces.

   C) Removing the parallax.

   D) Transiting the telescope.

88. For orientation of a plane table with three points a, b and c, Bessel's drill is

A) Align b through a and draw a ray towards c, align a through b and draw a ray towards c, and finally align c through the point of intersection of the previously drawn rays

B) Align c through a and draw a ray towards b, align a through c and draw a ray towards b, and finally align b through the point of intersection of the previously drawn rays.

C) Align c through b and draw a ray towards a, align b through c and draw a ray towards a, and finally align a, through the point of intersection of the previously, drawn rays

D) In the first two steps, any two of the points may be used and a ray is drawn towards the third point, which is sighted through the point of intersection of previously drawn rays in the final step.

89. Consider the following statements:

Assertion (A): The counting of the paces by the leader when pulling the chain forward should be carefully noted

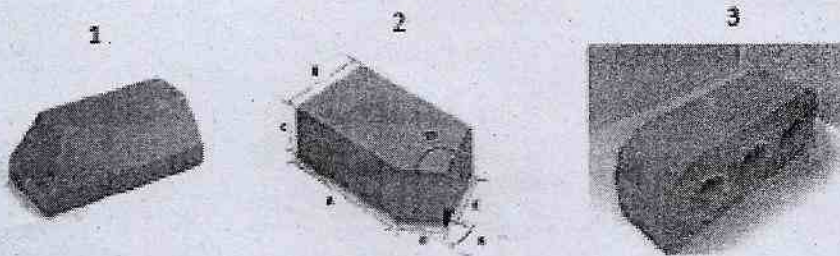**Reason (R):** It saves the follower to search for the arrow in high grass.

The correct answer is

A) A and R are both correct and R is the correct explanation of A

B) A and R are both correct and R is NOT the correct explanation of A

C) A is correct, but R is NOT correct

D) A is NOT correct, but R is correct

90. Pick up the incorrect statement from the following for the Tape Surveying

A) While measuring a distance with a tape of length 100.005 m, the distance to be increasing by 0.005 m for each tape length

B) An increase in temperature causes a tape to increase in length and the measured distance is too large.

C) The straight distance between endpoints of a suspended tape is reduced by an amount called the sag correction.

D) A 100 m tape of cross section 10 mm × 0.25 mm stretches about 10 mm under 5 kg pull.

91. The temperature at which the bricks are burnt in a kiln varies from 800°C to _____, depending upon the type of brick clay.

A) 900°C

B) 1000°C

C) 1100°C

D) 1200°C

92. Which of the below is not to be followed for stone masonry construction?

A) Header stones are dumb-bell shaped

B) Properly cured for 2-3 weeks.

C) Construction to be raised uniformly.

D) Wetted stones to be used

93. Identify the correct match.

a) Squint Brick

b) Bullnose Brick

c) Splay Brick

The correct match is

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

94. Consider the following statements:

Assertion (A): The lower the difference between the minimum strength and the mean strength of a concrete mix, the lower the cement content to be used.

Reason (R): The method for controlling, the difference between the minimum strength and the mean strength is quality control.

The correct answer is

A) A and R are both correct and R is the correct explanation of A

B) A and R are both correct and R is NOT the correct explanation of A

C) A is correct, but R is NOT correct

D) A is NOT correct, but R is correct

95. Which one of the following statements is not correct in respect of cement storage:

1. The bags of cement should be placed 30cm away from the walls all around.

2. Cement should be stacked not more than ten bags in height to prevent the formation of clods under compaction due to heavy load.

3. The cement storage floor should be made only from cement concrete 1:2:4 at least 15cm thick.

4. Cement bags should not be stacked together to avoid the free circulation of air.

The correct statements are

A) 1 & 2 only

B) 3 & 4 only

C) 3 only

D) 2 only

96. If t is the duration of an activity, t1 is the latest finish possible moment of its preceding activity and t2 is the earliest start possible moment, the independent float of the activity is

A) $(t1-t2)-t$

B) $t - (t1 - t2)$

C) $(t1+t2)-t$

D) $t+(t1 -t2)$

97. In this method, the depreciation of properties is assumed to be equal to the annual sinking fund plus the interest on the fund for that year.

A) Sinking fund

B) Annual fund

C) Constant percentage

D) Straight line

98. Crash project duration is obtained by summing the

A) Normal durations for all the activities

B) Crash durations for all activities

C) Crash durations for all the activities along the critical path were obtained by taking into account the normal duration for all the activities

D) Crash durations for all the activities along the critical path are obtained by taking into account the crash duration for all the activities.

99. Consider the following statements:

Assertion (A): Highway and road work announced in Kerala, Tamil Nadu, West Bengal, and Assam in budget 2021.

Reason (R): Such an announcement will increase the revenue expenditure of the government.

The correct answer is

A) A and R are both correct and R is the correct explanation of A

B) A and R are both correct and R is NOT the correct explanation of A

C) A is correct, but R is NOT correct

D) A is NOT correct, but R is correct

100. A project has a Profitability Index of 1.30. What does it mean?

A) The NPV is less than zero

B) The payback period is more than one year

C) That the project returns Rs. 1.30 for every Re 1 invested in the project

D) That IRR. is 1.30 times that of the Hurdle Rate

ROUGH WORK

ROUGH WORK

ROUGH WORK