



22/AE/CM/M-2024-05

Booklet Serial No.

6200276

Booklet Series

DQuestion Booklet
CIVIL ENGINEERING - I
Paper - V

Candidate's Roll Number

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Time Allowed : 01 Hour

Maximum Marks : 100

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Question Booklet contains 50 questions in all.
2. All questions carry equal marks.
3. Attempt all questions.
4. An Answer Sheet has been supplied inside the question booklet to mark the answers. **You must write your Roll Number and encode it and write other particulars in the space provided in the Answer Sheet, failing which your Answer Sheet will not be evaluated.**
5. **Immediately after commencement of the examination, you should check up your Question Booklet and attached answer sheet and ensure that the Question Booklet Series is printed on the top left-hand corner of the Booklet and the series encoded in answer sheet are same. Also please check that the Booklet contains 12 printed pages including two pages (Page Nos. 11 and 12) for Rough Work and no page or question is missing or unprinted or torn or repeated or question booklet and answer sheet have different series. If you find any defect in this Booklet and attached answer sheet, get it replaced immediately by a complete Booklet with OMR sheet of the same series.**
6. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
7. Questions and their responses are printed in English version in this Booklet. Each question comprises of **four** responses — (A), (B), (C) and (D). You are to select **ONLY ONE** correct response and mark it in your Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose **ONLY ONE** response for each question. Your total marks will depend on the number of correct responses marked by you in the Answer Sheet.
8. In the Answer Sheet, there are **four** circles — (A), (B), (C) and (D) against each question. To answer the questions, you are to mark with **Black/Blue ink ballpoint pen ONLY ONE** circle of your choice for each question. Select only one response for each question and mark it in your Answer Sheet. If you mark more than one circle for one question, the answer will be treated as wrong. **Use Black/Blue ink ballpoint pen only to mark the answer in the Answer Sheet. Any erasure or change is not allowed.**
9. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the Answer Sheet out of the Examination Hall during the examination. **After the examination has concluded, you must hand over your Answer Sheet to the Invigilator.** Thereafter, you are permitted to take away the Question Booklet with you.
10. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.
11. Candidates must assure before leaving the Examination Hall that their Answer Sheets will be kept in Self Adhesive LDPE Bag and completely packed/sealed in their presence.



1. In a two hinged parabolic an increase in temperature will
- (A) decrease the bending moment
 - (B) decrease the horizontal thrust
 - (C) make no change in the horizontal



thrust

- (D) increase the horizontal thrust

2. For large span and heavy gravity loads, which of the following will be economical ?

- (A) Plate girder
- (B) Beam
- (C) Truss



- (D) Arch

3. A slab is designed as one way if the ratio of long span to short span is

- (A) Between 1 and 1.5
- (B) Greater than 3
- (C) Between 2 and 3
- (D) Greater than 2

4. The best tension member section will be a

- (A) Channel section
- (B) Bolted angle section
- (C) Welded single angle section
- (D) Double angle section on opposite side of gusset plate



5. A cantilever sheet pile derives its stability from

- (A) Self weight
- (B) Lateral resistance of soil
- (C) The anchor rod
- (D) None of the above

6. If one end of a prismatic beam AB with fixed ends is given a transverse displacement (Δ) without rotation, then the moment induced at A or B due to the displacement is

- (A) $12EI \Delta/L^3$
- (B) $12EI \Delta/L^2$
- (C) $EI \Delta/L^3$
- (D) $6EI \Delta/L^2$





7. Coarse grained soils are the best compacted by a

- (A) Sheep's foot roller
- (B) Rubber tyred roller
- (C) Drum roller
- (D) Vibratory roller



8. For a propped cantilever subjected to a point load at mid span, the value of collapse load is

- (A) 6 Mp/L
- (B) 12 Mp/L
- (C) 4 Mp/L
- (D) 8 Mp/L



9. Beam-columns are the structural members subjected to

- (A) Axial compression and bending moment
- (B) Axial tension and bending moment
- (C) Bending moment and shear force
- (D) All the above

10. The purpose of reinforcement in pre-stressed concrete is

- (A) To develop sufficient bond stress
- (B) To impart initial compressive stress in concrete
- (C) To resistance tensile stresses
- (D) None of the above



11. If the building height greater than 50 m, but less than or equal to 250 m, then the building is known as

- (A) Tall building
- (B) Medium rise building
- (C) Low rise building
- (D) Super tall building

12. The slenderness ratio of lacing flats is limited to

- (A) 350
- (B) 110
- (C) 145
- (D) 225





13. Lime stabilization is very effective in treating

- (A) Silty soil
- (B) Plastic clayey soil
- (C) Non-cohesive
- (D) Sandy soil



14. A continuous beam of constant M_p has three equal spans (L) and carries uniformly distributed load on each span. The value of collapse load for the beam will be

- (A) $4 M_p/L$
- (B) $9.656 M_p/L$
- (C) $11.656 M_p/L$
- (D) $12 M_p/L$

15. The rate of consolidation



- (A) Increases with decrease in temperature
- (B) Is independent of temperature
- (C) Increases with increase in temperature
- (D) None of the above

16. The % of voids in cement is approximately

- (A) 80%
- (B) 40%
- (C) 50%
- (D) 60%



17. The fixed support in a real beam becomes in the conjugate beam as

- (A) Roller support
- (B) Free support
- (C) Hinged support
- (D) Fixed support

18. The degree of freedom of a block type machine foundation is

- (A) 6
- (B) 2
- (C) 3
- (D) 4





19. For a base failure, the depth factor

D_f is

- (A) $D_f > 1$
- (B) Zero
- (C) 1
- (D) None of the above



20. The equation of a parabolic arch of span 'L' and central height h is given by

- (A) $y = h \times (L - x)/L^2$
- (B) $y = 8h \times (L - x)/L^2$
- (C) $y = 3h \times (L - x)/L^2$
- (D) $y = 4h \times (L - x)/L^2$



21. Eigen values of a square matrix are always

- (A) Negative
- (B) Real and imaginary
- (C) Positive
- (D) Both negative and positive

22. If the degree of saturation of a partially saturated soil is 60%, then the air content of the soil is

- (A) 60%
- (B) 80%
- (C) 20%
- (D) 40%

23. Inorganic soils with low compressibility are represented by



- (A) CH
- (B) MH
- (C) SL
- (D) ML

24. A beam curved in plan is designed for

- (A) Bending moment, shear and torsion
- (B) Shear only
- (C) Bending only
- (D) Shear and torsion





25. A load W is moving on a simply supported beam of span L from left to right. The maximum bending moment at $0.4L$ from left support is

- (A) $0.8 WL$
- (B) $0.24 WL$
- (C) $0.2 WL$
- (D) $0.16 WL$




26. A continuous beam is deemed to be a deep beam when the ratio of effective span to overall depth is less than

- (A) 2.0
- (B) 3.5
- (C) 3.0
- (D) 2.5


27. The shear lag effect in beam flanges are disregarded when the outstand of the beam flange is less than or equal to

- (A) L_o
- (B) $L_o/10$
- (C) $L_o/20$
- (D) $L_o/15$

28. The maximum energy stored at elastic limit of a material is called

- (A) Resilience 
- (B) Proof resilience
- (C) Modulus of resilience
- (D) Bulk resilience

29. Total number of stress components at a point within a soil mass loaded at its boundary is

- (A) 18 
- (B) 6
- (C) 9
- (D) 12

30. To determine the modulus of rupture, the size of test specimen used is

- (A) $150 \times 150 \times 700$ mm
- (B) $150 \times 150 \times 500$ mm
- (C) $150 \times 150 \times 200$ mm
- (D) $150 \times 150 \times 100$ mm



31. According to IS specifications, the minimum depth of foundation in sand and clay should be respectively

- (A) 800 mm and 900 mm
- (B) 1000 mm and 1200 mm
- (C) 1000 mm and 800 mm
- (D) 700 mm and 900 mm



32. According to Whitney's theory, depth of stress block for a balanced section of a concrete beam is limited to

- (A) 0.8 d
- (B) 0.537 d
- (C) 0.637 d
- (D) 0.75 d



33. An example of a light moment connections is

- (A) Split beam connection
- (B) Framed connection
- (C) Clip angle section
- (D) Unstiffened seat connection

34. The design wind speed is assumed to be constant from the mean ground level upto a height of



- (A) 4 m
- (B) 20 m
- (C) 10 m
- (D) 8 m

35. In an internally indeterminate truss if the area of cross section of a redundant member is double



- (A) The force in that member will be four times
- (B) The force in that member will be twice
- (C) The force in that member will not be affected
- (D) The force in that member will be halved



36. In case of well foundation, grip length is defined as the

- (A) Depth of the bottom of the well below the maximum scour level
- (B) Length below the top of the well cap to the cutting edge
- (C) Length between the bottoms of the well cap to the cutting edge
- (D) Depth of the bottom of the well below the minimum scour level

37. Shear strength of a soil is a unique function of



- (A) Effective stress only
- (B) Both effective and total stress
- (C) Total stress only
- (D) None of the above

38. The rotational stiffness coefficient K_{11} for the frame having two members of equal EI/L is given by

- (A) $8 EI/L$
- (B) $7 EI/L$
- (C) $9 EI/L$
- (D) $6 EI/L$



39. For economical spacing of roof truss, if t, p, r are the cost of truss, purlin and roof coverings respectively, then

- (A) $t = p + 2r$
- (B) $t = 2p + r$
- (C) $t = 3p + 2r$
- (D) $t = p + 3r$



40. The minimum cover to the ties or spirals should **not** be less than

- (A) 10 mm
- (B) 25 mm
- (C) 20 mm
- (D) 15 mm



41. A fully compensated raft foundation for a building is

- (A) Such that the weight of the excavated soil is equal to the load due to the building
- (B) Designed as a completely flexible raft



- (C) Designed as a very rigid raft
- (D) Supported by piles of short length

42. If the strain energy absorbed in a cantilever beam in bending under its weight is X times greater than the strain energy absorbed in an identical simply supported beam in bending under its own weight, then the magnitude of X is

- (A) 6
- (B) 16
- (C) 12
- (D) 8



43. For a linear elastic structural element

- (A) Stiffness is equal to flexibility
- (B) Stiffness is directly proportional to the flexibility
- (C) Stiffness may not be correlated with flexibility
- (D) Stiffness is inversely proportional to the flexibility

44. The upstream slope of an earth dam under steady seepage condition is

- (A) Seepage line
- (B) Equipotential line
- (C) Flow line
- (D) Phreatic line



45. Which of the following losses of pre-stress occurs only in pre-tensioning and not in post-tensioning ?

- (A) Loss due to friction
- (B) Elastic shortening of concrete
- (C) Shrinkage of concrete
- (D) Creep of concrete

46. The ratio of the undisturbed shear strength to the remoulded shear strength in cohesive soils under undrained conditions is

- (A) Greater than 1
- (B) 1
- (C) Between 0 and 1
- (D) Zero





47. Residual soils are formed by
- (A) Water
 - (B) Weathering of the parent rocks



- (C) Wind
- (D) Glaciers

48. The effective length of a battened column is

(A) Increased by 5%

(B) 30%



(C) 25%

(D) 20%

49. A fixed beam of span L is loaded with uniformly distributed load throughout the span. The contraflexure point will be at

(A) $0.15 L$

(B) $0.30 L$

(C) $0.25 L$

(D) $0.21 L$



50. When the plastic limit of a soil is greater than the liquid limit, then the plasticity index is reported as

(A) Negative

(B) Zero

(C) 1

(D) Positive

