

**Ph. D. Entrance Test – 2015****Subject: Civil Engineering****Paper – I**

**Important:** Please consult your Admit Card/Roll No. slip before filling your Roll Number on the Test Booklet and Answer Sheet.

Roll No.                      *In Figure*                      *In Words*

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O.M.R. Answer Sheet Serial No.

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Signature of Candidate: \_\_\_\_\_ Signature of Invigilator: \_\_\_\_\_

**Time: 60 Minutes    Number of Questions: 50    Maximum Marks: 50**

**DO NOT OPEN THE SEAL ON THE BOOKLET UNTIL ASKED TO DO SO.**

**INSTRUCTIONS:**

1. Write your Roll No. on the Questions Booklet and also on the OMR Answer Sheet in the space provided and nowhere else.
2. Enter the Question Booklet Serial No. on the OMR Answer Sheet. Darken the corresponding bubbles with **Black Ball Point/Black Gel Pen**.
3. Do not make any identification mark on the Answer Sheet or Question Booklet.
4. Please check that this Question Booklet contains **50** Questions. In case of any discrepancy, inform the Assistant Superintendent within 10 minutes of the start of Test.
5. Each question has four alternative answer (A,B,C,D) of which only one is correct. For each question, darken only one bubble (A or B or C or D), whichever you think is the correct answer, on the Answer Sheet with **Black Ball Point/Black Gel Pen**. **There shall be no negative marking for wrong answers.**
6. If you do not want to answer a question, leave all the bubbles corresponding to that question blank in the Answer Booklet. No marks will be deducted in such cases.
7. Darken the bubbles in the OMR Answer Sheet according to the Serial No. of the question given in the Question Booklet.
8. If you want to change an already marked answer, erase the shade in the darkened bubble completely.
9. For rough work only the blank sheet at the end of the Question Booklet be used.
10. The Answer Sheet is designed for computer evaluation. Therefore, if you do not follow the instructions given on the Answer Sheet, it may make evaluation by the computer difficult. **Any resultant loss to the candidate on the above account, i.e. not following the instructions completely, shall be of the candidate only.**
11. After the test, hand over the Question Booklet and the Answer Sheet to the Assistant Superintendent on duty.
12. In no case the Answer Sheet, the Question Booklet, or its part or any material copied/noted from this Booklet is to be taken out of the examination hall. Any candidate found doing so would be expelled from the examination.
13. A candidate who creates disturbance of any kind or changes his/her seat or is found in possession of any paper possibly of any assistant or found giving or receiving assistant or found using any other unfair means during the examination will be expelled from the examination by the Centre Superintendent/Observer whose decision shall be final.
14. **Communication equipment such as mobile phones, pager, wireless set, scanner, camera or any electronic/digital gadget etc., is not permitted inside the examination hall. Use of calculators is not allowed.**
15. The candidates will not be allowed to leave the Examination Hall/Room before the expiry of the allotted time.

- The maximum bending moment due to a moving load on a fixed ended beam occurs
  - At a support
  - Always at the midspan
  - Under the load only
  - None of these
- A long column has maximum crippling load when its
  - Both ends are hinged
  - Both ends are fixed
  - One end is fixed and other end is hinged
  - One end is fixed and other end is free
- Three hinged arch is
  - Statically indeterminate by one degree
  - Statically indeterminate by two degrees
  - Statically determinate
  - Unstable structure
- If a shaft of diameter  $d$  is subjected to a torque,  $T$ , the maximum shear stress is
  - $32 T/\pi d^3$
  - $16 T/\pi d^3$
  - $16 T/\pi d^2$
  - $64 T/\pi d^4$
- Strain energy stored in a member is a given by
  - $\frac{1}{2} \times \text{stress} \times \text{volume}$
  - $\frac{1}{2} \times \text{strain} \times \text{volume}$
  - $\frac{1}{2} \times \text{strain} \times \text{stress} \times \text{volume}$
  - $\frac{1}{2} \times \text{stress} \times \text{strain}$
- A masonry pier ABCD as shown in Fig supports a vertical load  $W$  at a point P. The nature of bending stresses at A due to eccentricity of load about x-x axis and y-y axis are



- Compressive and compressive
  - Tensile and tensile
  - Compressive and tensile
  - Tensile and compressive
- Strain energy stored in a member is a given by
    - $\frac{1}{2} \times \text{stress} \times \text{volume}$
    - $\frac{1}{2} \times \text{strain} \times \text{volume}$
    - $\frac{1}{2} \times \text{strain} \times \text{stress} \times \text{volume}$
    - $\frac{1}{2} \times \text{stress} \times \text{strain}$
  - The moment required to rotate the near end of a prismatic beam through unit angle, without translation, the far end being fixed, is given by
    - $EL/L$
    - $2EI/L$
    - $3EI/L$
    - $4EI/L$



9. Bending moment at any section in a conjugate beam gives in the actual beam
- A) Slope  
B) Curvature  
C) Deflection  
D) Bending moment
10. Bending compressive and tensile stresses respectively are calculated based on
- A) Net area and gross area  
B) Gross area and net area  
C) Net area in both cases  
D) Gross area in both cases
11. Difference between gross diameter and nominal diameter for the rivets up to 25 mm diameter is
- A) 1 mm  
B) 1.5 mm  
C) 2 mm  
D) 2.5 mm
12. Efficiency of a riveted joint, having the minimum pitch as per IS : 800, is
- A) 40 %  
B) 50 %  
C) 60 %  
D) 70 %
13. Bolts are most suitable to carry
- A) Shear  
B) Bending  
C) Axial tension  
D) Shear and bending
14. For a standard 45° fillet, the ratio of the size of the fillet to throat thickness is
- A) 1 : 1  
B) 1 :  $\sqrt{2}$   
C)  $\sqrt{2}$  : 1  
D) 2 : 1
15. Lacing bars in steel column should be designed to resist
- A) Bending moment due to 2.5 % of the column load  
B) Shear force due to 2.5 % of column load  
C) 2.5 % of the column load  
D) Both (a) and (b)
16. Minimum pitch provided in rivetted steel tanks is
- A) 1.5 d  
B) 2.0 d  
C) 2.5 d  
D) 3.0 d
- Where d is diameter of rivets
17. Steel tanks are mainly designed for
- A) Weight of tank  
B) Wind pressure  
C) Water pressure  
D) Earthquake pressure
18. The property of fresh concrete, in which the water in the mix tends to rise to the surface while placing and compacting, is called
- A) Segregation  
B) Bleeding  
C) Bulking  
D) Creep
19. Workability of concrete is inversely proportional to
- A) Time of transit  
B) Water-cement ratio  
C) The air in the mix  
D) Size of aggregate

20. The compressive strength of 100 mm cube as compared to 150 mm cube is always  
 A) Less                                      B) More                                      C) Equal                                      D) All of these
21. The most commonly used admixture which prolongs the setting and hardening time is  
 A) Gypsum                                      B) Calcium chloride  
 C) Sodium silicate                                      D) All of the above
22. The fineness modulus of fine aggregate is in the range of  
 A) 2.0 to 3.5                                      B) 3.5 to 5.0                                      C) 5.0 to 7.0                                      D) 6.0 to 8.5
23. Diagonal tension in a beam  
 A) Is maximum at neutral axis  
 B) Decreases below the neutral axis and increases above the neutral axis  
 C) Increases below the neutral axis and decreases above the neutral axis  
 D) Remains the same
24. According to IS : 456, minimum slenderness ratio for a short column is  
 A) Less than 12                                      B) Less than 18  
 C) Between 18 and 24                                      D) More than 24
25. The minimum cover in a slab should neither be less than the diameter of bar nor less than  
 A) 10 mm                                      B) 15 mm                                      C) 25 mm                                      D) 13 mm
26. The ratio of the diameter of reinforcing bars and the slab thickness is  
 A)  $\frac{1}{4}$                                       B)  $\frac{1}{5}$                                       C)  $\frac{1}{6}$                                       D)  $\frac{1}{8}$
27. The depth of footing for an isolated column is governed by  
 (i) Maximum bending moment  
 (ii) Shear force  
 (iii) Punching shear  
 The correct answer is  
 A) Only (i)                                      B) Only (i) and (ii)                                      C) (i) and (iii)                                      D) (i), (ii) and (iii)
28. The critical section for finding maximum bending moment for footing under masonry wall is located  
 A) At the middle of the wall  
 B) At the edge of the wall  
 C) halfway between the middle and edge of the wall  
 D) At a distance equal to effectiveness depth of footing from the edge of the wall
29. Water content of soil can  
 A) Never be greater than 100%                                      B) Take value only from 0% to 100%  
 C) Be less than 0%                                      D) May be greater than 100%



30. If the permeability of a soil is 0.08 cm/sec, the type of soil is  
 A) Gravel                      B) Sand                      C) Silt                      D) Clay
31. Phreatic line in earthen dam is  
 A) Straight line                      B) Parabolic                      C) Circular                      D) Elliptical
32. The unit of co-efficient of consolidation is  
 A)  $\text{cm}^2/\text{gm}$                       B)  $\text{cm}^3/\text{gm}$                       C)  $\text{cm}^2/\text{sec}$                       D)  $\text{gm-cm}/\text{sec}$
33. If a cohesive soil specimen is subjected to a vertical compressive load, the inclination of the crack to the horizontal is  
 A)  $90^\circ$                       B)  $45^\circ$                       C)  $22.5^\circ$                       D)  $0^\circ$
34. Allowable bearing pressure for a foundation depends upon  
 A) Allowable settlement only                      B) Ultimate bearing capacity of soil  
 C) Both (a) and (b)                      D) None of the above
35. The bearing capacity of a circular footing in comparison to a strip footing of width equal to diameter of former will be  
 A) Equal                      B) More                      C) Less                      D) Cannot be said
36. Maximum size of clay particles is  
 A) 0.002 mm                      B) 0.02mm                      C) 0.075 mm                      D) 1 mm
37. Hydraulic head that would produce a quick condition in a sand stratum of thickness 1.5 m, specific gravity 2.67 and void ratio 0.67 is equal to  
 A) 1.0 m                      B) 1.5 m                      C) 2.0 m                      D) 3.0 m
38. Which of the following method is more suitable for the determination of coefficient of permeability of clayey soil?  
 A) Constant head method                      B) Falling head method  
 C) Horizontal permeability test                      D) All of the above
39. The value of compression index for a remolded sample whose liquid limit is 50% is approximately equal to  
 A) 0.028                      B) 0.28                      C) 0.36                      D) 0.036
40. Rise of water table in cohesion less soils up to ground surface reduces the net ultimate bearing capacity approximately by  
 A) 25%                      B) 50%                      C) 75%                      D) 90%

41. The settlement of a group of friction piles as compared to that of a single pile is  
 A) Same                      B) Less                      C) More                      D) None of these
42. The unit of kinematic viscosity is  
 A)  $\text{gm/cm-sec}^2$                       B)  $\text{dyne-sec/cm}^2$                       C)  $\text{gm/cm}^3\text{-sec}$                       D)  $\text{cm}^2/\text{sec}$
43. Quick sand is  
 A) Coarse sand                      B) Fine sand                      C) Medium sand                      D) A phenomenon
44. A floating body is said to be in a state of stable equilibrium  
 A) When its metacentric height is zero  
 B) When the metacentre is above the centre of gravity  
 C) When the metacentre is below the centre of gravity  
 D) Only when its centre of gravity is below its centre of buoyancy
45. Centre of buoyancy always  
 A) Coincides with the centre of gravity  
 B) Coincides with the centroid of the volume of fluid centre of gravity  
 C) Remains above the centre of gravity  
 D) Remains below the centre of gravity
46. The terrain may be classified as rolling terrain if the cross slope of land is  
 A) Up to 10%                      B) Between 10% and 25%  
 C) Between 25% and 60%                      D) More than 60%
47. As per IRC recommendations the maximum limit of super elevation for mixed traffic in plain areas is  
 A) 1 in 15                      B) 1 in 12.5                      C) 1 in 10                      D) Equal to camber
48. The equilibrium super elevation for mixed traffic required to counteract the centrifugal force fully is given by  
 A)  $V^2/27.5R$                       B)  $V^2/75R$                       C)  $(0.75V)^2/127R$                       D)  $V^2/127R$ ,  
 Where V is the maximum speed of vehicle in kmph and R is the radius of curve in meter
49. The maximum design gradient for vertical profile of a road is  
 A) Ruling gradient                      B) Limiting gradient  
 C) Exceptional gradient                      D) Minimum gradient
50. The maximum width of a vehicle recommended by IRC is  
 A) 1.85m                      B) 2.44m                      C) 3.81m                      D) 4.72m

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