



SIDDHARTH GROUP OF INSTITUTIONS :: PUTTUR
Siddharth Nagar, Narayanavanam Road – 517583

QUESTION BANK (DESCRIPTIVE)

Subject with Code : DDRCS(13A01502)

Course & Branch: B.Tech - CE

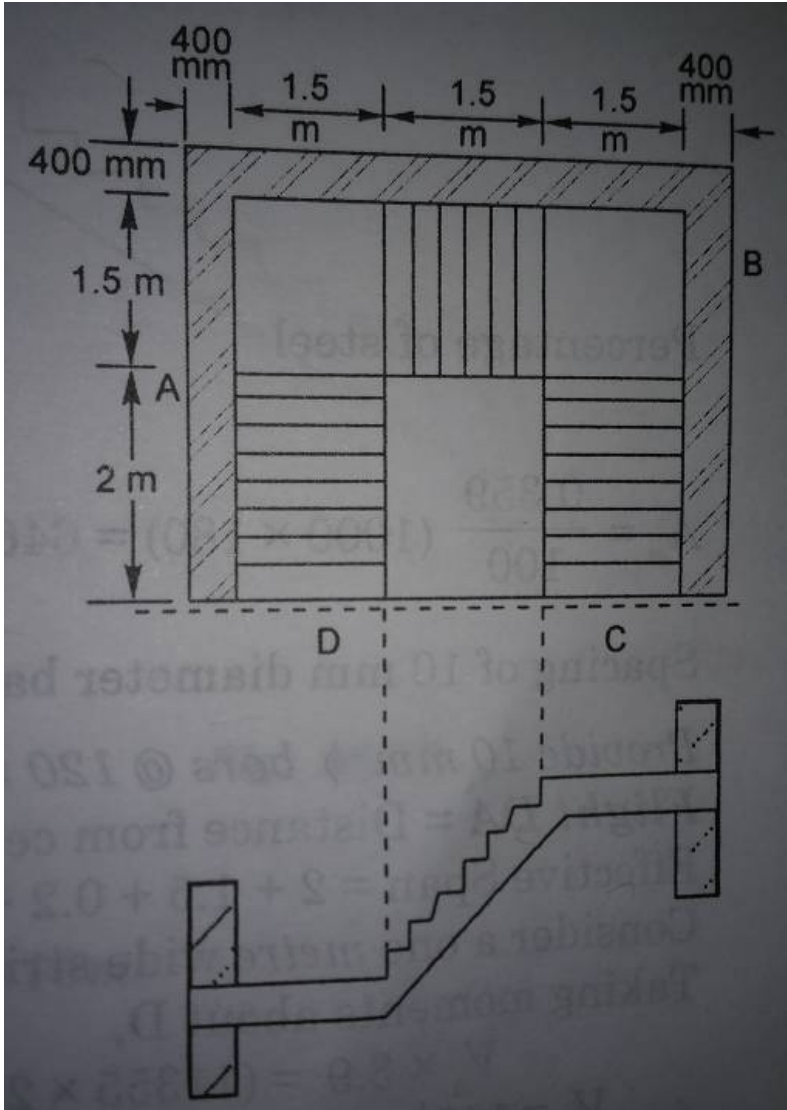
Year & Sem: III-B.Tech & I-Sem

Regulation: R13

UNIT-5

FOOTINGS & STAIRS

1. Design an isolated footing for a column of size 300 mm × 500 mm subjected to an axial service load of 1250 kN. The safe bearing capacity of the soil is 175 kN/m². Use M20 concrete and Fe 415 steel. Draw the cross-section of the column showing the reinforcement details.
2. A square RCC column 400mm x 400mm carries a working load of 650 kN axially. Design a square footing if SBC of soil is 225 kN/m². Use M25 grade concrete and Fe 500 grade steel. Use limit state method.
3. Design an isolated footing for a column of size 300 mm × 450 mm subjected to an axial service load of 1200kN. The safe bearing capacity of the soil is 180 kN/m². Use M25 concrete and Fe 415 steel. Draw the cross-section of the column showing the reinforcement details.
4. Design a combined footing for the two columns at a multi-storey building. The columns of size 400mmx400mm transmit a working load of 300kN each and they are spaced at 5m centres. The safe bearing capacity of soil at site is 200kN/m². Adopt M20 grade concrete and Fe415 grade steel. Sketch the details of reinforcements in the combined footing.
5. Design a rectangular footing of uniform thickness for an axial loaded column of size 300 mm x 600 mm. Load on column is 1150 kN. Safe bearing capacity of the soil is 200 kN/m². Use M20 concrete and Fe 415 Steel.
6. Design a reinforced concrete combined rectangular footing for two columns A and B located 3.6 m apart. The sizes of the columns are 400 mm x 400 mm and 600 mm x 600 mm and the load on them are 1000 kN and 1500 kN respectively. The projection of the footing parallel to the length of the footing beyond the axis of the column A is limited to 590 mm. The safe bearing capacity of the soil is 280 kN/m². Use M20 concrete and Fe415 steel.
7. Design a suitable dog-legged staircase for a residential building, to be located in a staircase room 6 m long, 3.5 m wide and the floor height is 3.2 m. The live load may be taken as 2.0 kN/m². Use M25 concrete and Fe 415 steel.
8. Design a dog legged stair case for an office building in a room measuring 3 m x 6 m clear dimensions. Floor to Floor height is 3.5 m. The building is a public building liable to overcrowding. Stairs are supported on brick wall 230 mm thick at the ends of the landing. Use M20 concrete and Fe415 steel.
9. (a) With neat sketches show various types of shallow footings and briefly explain.
(b) With a neat sketch show various parts of a quarter space landing open dogged legged stair case.
10. As shown in the figure below an arrangement for a stair case to be provided for an office building. Design the staircase. The risers are 150 mm and the threads are 250 mm. The walls are 400 mm thick and the stairs slab has full bearing on the masonry wall. The supporting beam is 400 mm wide. Use M20 concrete and Fe415 steel.





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1. The minimum depth of foundation is []
a) 450mm b) 475mm c) 500mm d) 550mm
2. Given that ϕ is the angle of internal friction 'p' is the safe bearing capacity and γ is the unit weight of soil, the minimum depth of foundation of a masonry footing is given by []
a) $p/\gamma(1-\sin\phi/1+\sin\phi)$ b) $p/\gamma(1+\sin\phi/1-\sin\phi)$
c) $p/\gamma(1-\sin\phi/1+\sin\phi)^2$ d) $p/\gamma(1+\sin\phi/1-\sin\phi)^2$
3. The minimum thickness required at the edge of a footing according to IS: 456-2000 []
a) 230mm b) 150mm c) 100mm d) 450mm
4. The permissible bearing stress for M20 concrete column resting on a rectangular concrete footing in limit state method of design should not be more than []
a) 10MPa b) 9MPa c) 11MPa d) 20MPa
4. What is the assumed design pressure below a rigid footing resting on sandy soil according to IS456-2000 []
a) Parabolic with concave towards the footing base
b) Parabolic with convex towards the footing base
c) Uniform d) all the above
5. The factor of safety against overturning of a footing according to IS:456-2000 should not be less than []
a) 1.5 b) 1.4 c) 2 d) 1.15
6. Which one of the following statement is correct? In a combined footing for two columns carrying unequal loads, the maximum hogging moment occurs at []
a) Inside face of the heavier column b) a section having maximum shear force
c) A section equidistant from both the columns d) a section having zero shear force
7. The critical section for bending moment of a concrete footing under a masonry wall is a section at []
a) The face of the wall
b) A distance of effective depth of footing from the face of the wall
c) A distance of twice the width of the wall from the face of the wall
d) A distance of half the effective depth of footing from the face of the wall
8. In a combined footing the centre of gravity of footing coincides with resultant of loads, the stress at the base of footing from the soil will be []
a) Purely tensile b) purely compressive c) both tensile and compressive d) none
9. The depth of foundation is computed by []
a) rankine's formula b) culomb's formula c) winkler's formula d) Rankine- grashoff formula
10. The load from the column can be transferred to the foundation by []
a) Dowel bars b) column bars c) both a and b d) either a or b

11. Which of the following statements is/are correct? While designing combined footing, the resultant of the column loads passes through the centre of gravity of the footing slab such that the net soil pressure obtained is []
a) Parabolic b) trapezoidal c) uniform d) nonuniform
12. How is the depth of footing for an isolated column governed? []
1. By maximum bending moment 2. by shear force 3. by punching shear
Select the correct answer using the code given below:
a) 2 and 3 only b) 1 and 2 only c) 1 and 3 only d) 1, 2 and 3
13. What is the minimum nominal percentage longitudinal reinforcement to be provided in a concrete pedestal as per relevant IS code? []
a) 0.4 b) 0.2 c) 0.15 d) 0.1
14. In R.F and plain concrete footings, the thickness at the edge shall not less than -----mm for footing on soil []
a) 150 b) 100 c) 180 d) 175
15. In R.F and plain concrete footings, the thickness at the edge shall not less than -----mm for footing on piles []
a) 350 b) 400 c) 300 d) 500
16. The minimum depth of foundation is []
a) 450mm b) 475mm c) 500mm d) 550mm
17. The minimum thickness required at the edge of a footing []
a) 230mm b) 150mm c) 100mm d) 450mm
18. The depth of foundation is computed by []
A) rankine's formula B) culomb's formula
C) winkler's formula D) Rankine- grashoff formula
19. The load from the column can be transferred to the foundation by []
A) Dowel bars B) column bars C) both a and b D) either a or b
20. What is the minimum nominal percentage longitudinal reinforcement to be provided in a concrete pedestal as per relevant IS code? []
A) 0.4 B) 0.2 C) 0.15 D) 0.1
21. The factor of safety against overturning of a footing according to IS: 456-2000 should not be less than []
A) 1.5 B) 1.4 C) 2 D) 1.15
22. The permissible bearing stress for M20 concrete column resting on a rectangular concrete footing in limit state method of design should not be more than []
A) 10MPa B) 9MPa C) 11MPa D) 20Mpa
23. The minimum thickness required at the edge of a footing according to IS : 456 – 2000 is []
(a) 230 mm (b) 150 mm (c) 100 mm (d) 450 mm
24. The permissible bearing stress for M20 concrete column resting on a rectangular concrete footing limit state method of design should not be more than []
(a) 10 Mpa (b) 9 Mpa (c) 11 Mpa (d) 20 Mpa
25. Which one of the following statements is correct ? In a combined footing for two columns carrying unequal loads , the maximum hogging moment occurs at []
(a) Inside face of the heavier column
(b) A section having maximum shear force
(c) A section equidistant from both the columns

- (d) A section having zero shear force
26. In a combined footing the centre of gravity of footing coincides with resultant of loads, the stress at the base of footing from the soil will be []
- (a) Pure tensile
(b) Purely compressive
(c) Both tensile and compressive
(d) None
27. The depth of foundation is computed by []
- (a) Rankine's formula
(b) Coulomb's formula
(c) Winkler's formula
(d) Rankine – grashoff's formula
28. The load from a column can be transferred to the foundation by []
- (a) Dowel bars
(b) Column bars
(c) Both a and b
(d) Either a or b
29. Which one of the following is correct, while designing combined footing, the resultant of the column loads passes through the centre of gravity of the footing slab such that the net soil pressure obtained is []
- (a) Parabolic (b) trapezoidal (c) uniform (d) non – uniform
30. How is the depth of footing for an isolated column governed? []
- (1) By maximum bending moment
(2) By shear force
(3) By punching shear
- Select the correct answer using the code given below :
- (a) 2 and 3 only (b) 1 and 2 only (c) 1 and 3 only (d) 1, 2 and 3
31. What is the minimum nominal percentage longitudinal reinforcement to be provided in a concrete pedestal as per relevant IS code? []
- (a) 0.4 (b) 0.2 (c) 0.15 (d) 0.1
32. The maximum permissible deflection in a cantilever of 10m span after erection of partition walls is
- a) 40mm (b) 20mm (c) 28.6mm (d) 10mm []
33. The creep strains are caused due to []
- a) DL only (b) LL only (c) both DL & LL (d) independent of load
34. The minimum effective depth of a R.F concrete beam of 15m simple span for deflection control is
- a) 0.75m (b) 1.125m (c) 1.25m (d) 1.5m []
35. Deflection can be controlled by using appropriate []
- a) Aspect ratio (b) modular ratio (c) span/depth ratio (d) water/cement ratio
36. For the same c/s area which of the following beams deflect more []
- a) Circular beam (b) I section (c) rectangular beam (d) T beam
37. The final deflections due to all including effects of temperature, creep and shrinkage measured from as cast level of the supports of floors, roofs, and all other horizontal members of R.F concrete should not normally exceed []
- a) span/350 (b) span/250 (c) span/350 or 20mm whichever is less (d) 5/384 of span

38. In coastal region minimum grade of concrete for R.C.C is []
a) M₁₅ b) M₂₀ c) M₂₅ d) M₃₀
39. In LSD of concrete structures the strain distribution is assumed to be []
a) Linear b) Non linear c) parabolic d) parabolic and rectangular
40. Which of the following is not a limit state of serviceability []
a) Deflection b) Cracking c) Torsion d) Durability

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