F 3634 (Pages : 3) Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, NOVEMBER 2014

Fifth Semester

Branch : Civil Engineering

CE 010 503—DESIGN OF CONCRETE STRUCTURES–I (CE)

(New Scheme—2010 Admission onwards)

[Regular/Improvement/Supplementary]

Time : Three Hours Maximum : 100 Marks

Missing data if any may be suitably assumed and stated.
IS : 456 and SP : 16 are allowed to be used.

Part A

Answer **all** *questions.*

Each question carries 3 *marks.*

1. What is meant by modular ratio ?
2. Write the equation for nominal shear reinforcement.
3. Define partial safety factor.
4. Distinguish between unsupported length and effective length of column.
5. What are the situations in which combine footings are preferred ?

(5 × 3 = 15 marks)

Part B

Answer **all** *questions.*

Each question carries 5 *marks.*

6. Write down the Steps for solving the design type of problem of singly reinforced rectangular beams.
7. How to determine the lever arm ?
8. How to determine the design shear strength of concrete in slabs of different depths having the same percentage of reinforcement ?
9. State the values of design strength of concrete and steel to be considered in the design strength of axially loaded short column.
10. What are the critical sections of determining the bending moment in isolated footing ?

(5 × 5 = 25 marks)

Turn over

Part C

Answer **all** *questions.*

Each question carries 12 *marks.*

11. Determine the moment of resistance of the rectangular beam having b = 600 mm, D = 650 mm, A_{st} = 804 mm^2 (4-16ϕ), σ_{cbc} = 7 N/mm^2 and σ_{st} = 230 N/mm^2. Also determine the balanced moment of resistance of the beam and the balanced area of tension steel. (Working stress method).

Or

12. Establish the equations for determining the depth of neutral axis, moment of resistance and area of tension steel of an under reinforced rectangular beam. (Working stress method).

13. Design a singly reinforced concrete beam to suit the following data. Clear span = 4 m ; width of support = 300 mm; working live load = 5 kN/m ; M25 grade concrete and Fe415 HYSD bars.

Or

14. Determine the ultimate moment capacity of the doubly reinforced beam of b = 350 mm, d' = 60 mm, d = 600 mm, A_{st} = 2945 mm^2 (6-25ϕ), A_{sc} = 1256 mm^2, using M20 and Fe415.

15. Design simply supported slab to suit the following data: clear span 3 m, supported brick walls 230 mm thick. Live load l .5 kN/m^2. Using M20 and Fe415.

Or

16. Design a two way slab for a room size 4 m by 5 m with discontinuous and simply supported edges on all sides with corners prevented from lifting to support a live load of 4 kN/m^2, M20 grade concrete and Fe415 HYSD bars.

17. Design the reinforcement in a column size 400 mm by 600 mm subjected to an axial working load of 2000 kN. The column has an unsupported length of 3 m and is against side sway in both directions. Adopt M20 grade concrete and Fe 415 HYSD bars.

Or

18. Design the reinforcements in a circular column of diameter 300 mm with helical reinforcement to support a factored load of 1500kN. The column has an unsupported length 3 m and is braced against sideway. Adopt M20 grade concrete Fe415 HYSD bars.

19. Design a combine column footing with strap beam for two reinforced concrete column of size 300 mm by 300 mm spaced 4 m centre to centre and each supporting a service load of 500 kN. The safe bearing capacity of the soil at site is 150 kN/mm^2. Adopt M20 grade concrete Fe415 HYSD bars.

Or

20. Design the waist-slab type of the staircase of Fig. 1 (Page on 3). Landing slab A is supported on beams along JK and PQ, while the waist-slab and landing slab B are spanning longitudinally as shown in Fig. 1. The finish loads and live loads are l kN/m^2 and 5 kN/m^2 respectively. Use riser R = 160 mm, trade T = 270 mm, concrete grade = M 20 and steel grade = Fe 415.

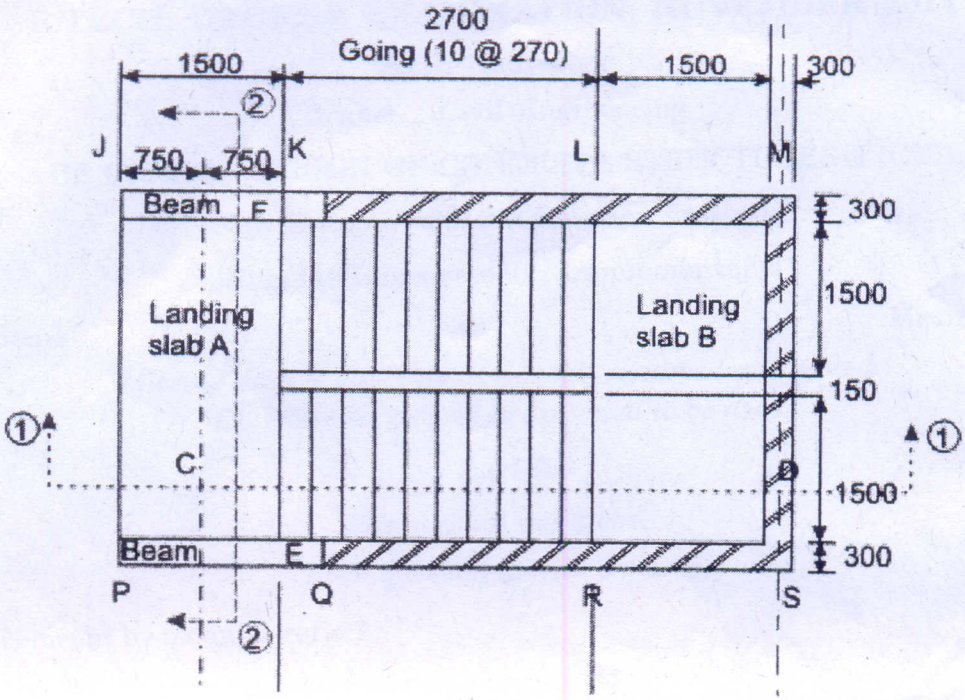

Fig1.