Unit - V

5. Design the Waist slab type staircase comprising a straight flight of steps, supported between two stringers beams along two sides. Assume data: Riser: 150mm; Tread: 300mm; width of staircase is 2.2m; width of beams: 280mm. Assume live load of 5.5 kNm² and exposer condition is moderate. 14

OR

A Stair case has to be designed for a room of plan area 3m × 5m and height is 3.6m. The live load may be assumed on stair case is 21kN/m². Use M20 grade concrete and Fe 415 steel. Calculate total load on effective span of approach landing, Flight and landing at mid height. Use Tread and Rise of 250mm. and 150mm. respectively and nose of 3mm thickness. Also assume effective depth of waist slab is 180mm with effective cover of 25mm. 14

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Roll No ....

CE-504

B.E. V Semester

Examination, June 2016

Structural Design and Drawing-I (RCC)

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt all questions. Internal choice in each unit is there.

ii) Assume suitable data if missing.

iii) Use of IS code and Design Aid is permitted.

iv) Draw neat sketch and detailing in case of design and wherever it is necessary.

Unit - I

1. a) What do you understand by Strength Criterion and Serviceability Criterion? Clearly Explain. 2

   b) In case of limited dimensions of beam, what is the solution of design of under Reinforced design of beam from over reinforced section? 2

   c) Define Effective depth; Neutral Axis; Lever Arm and Section Modulus. 3

   d) Differentiate Working stress method of design and Limit State method of design. 7

OR

Find the moment of resistance of a R.C. beam 180 × 400mm. the beam is reinforced with 4-12mm. diameters bars in tension zone. The effective cover to the reinforcement is 30mm. Use grade of concrete is M20 and Grade of Steel Fe415. Also State type of beam. 7

Unit - II

2. a) In case of limited dimensions of beam, what is the solution of design of under reinforced design of beam from over reinforced section? 2

b) In case of singly reinforced beam at which position reinforcement will provide and why it is provide. 2

c) By using any method of design, determine moment of resistance of the rectangular singly reinforced beam of size 450 × 800mm. size, reinforced with 6 bars of 20mm. diameter bars. Grade of concrete is M20 and steel of Fe-415. 3

d) For a rectangular beam of size 250mm. wide × 520 mm. effective depth, find out the depth of neutral axes, balanced lever arm, balanced moment of resistance and balanced steel area. Also apply Shear and development length checks. The materials are M20 grade and HYSD steel of Fe415. 7

OR

Design a Singly reinforced rectangular beam to carry a live load of 55 kN/m. Beam has a span of 5m. Use M20 grade of concrete and Fe415 steel HYSD. Apply all Strength and serviceability checks. 14

Unit - III

3. a) What are basic differences between One way slab and Two way slab? 2

b) Why Torsional Steel is provided in case of Two way Slab? At which location Torsional Steel is required? 2

c) Define Under reinforced and Over reinforced sections. 3

d) A One-way slab has a thickness (effective) of 150mm. Slab carry total factored load of 45kN/m. Check whether slab is design as a under reinforced or over reinforced section. Also calculate Area of steel required to beam factored bending moment of resistance. Use Grade of concrete M20 and Steel of HYSD Fe415. 7

OR

Design a Two way Slab for a room size of 4.5m × 3.5m with ends conditions are simply supported and corners held down (not free to lift up). Live load may be assumed 6.0kN/m² and Floor finishing load 1.1kN/m². Use M20 grade concrete and Fe415 steel. Also apply necessary checks. 14

Unit - IV

4. Design a short column subjected to carry an axial load of 1400kN. Factored moment of resistance in one direction as 65kN-m and moment in other direction as 45kN-m. 14

OR

Design a Square footing for a Square column. Column is 300mmx 300mm in size and transmits a load of 800kN. The safe bearing capacity of soil may be taken as 140kN/m². Use M20 concrete and Fe415 HYSD. 14