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09ENG5.5

Fifth Semester B.Arch. Degree Examination, June/July 2017
Structures – V

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. IS456-2000 is permitted.
3. Unless specified adopt limit state method of design.

1 a. What are the advantages of R.C.C. as a structural material? **(08 Marks)**

b. State and explain the following:
i) Concrete mix design
ii) Water cement ratio
iii) Workability of concrete. **(12 Marks)**

2 a. Explain, balanced under reinforced and over-reinforced sections with reference to working stress method of design. **(12 Marks)**

b. A rectangular beam of cross-section 350 × 600mm is reinforced with 3 numbers of 22mm diameter mild steel bars with an effective cover of 30mm. If M15 concrete is used calculate the moment of resistance of the beam. Adopt working stress method of design. **(08 Marks)**

3 Design the neeessary reinforeement for a R.C. beam 230 × 450mm. The beam is to carry a udl of 20kN/m over a span of 4.0mt. Use M20 conerete and Fe415 steel. Take f' = 40mm. **(20 Marks)**

4 a. Differentiate between one way slab and two way slab. **(06 Marks)**

b. Design a R.C. slab for a hall 3.50m × 12.50m. Wall thickness 300mm L.L. = 3kN/m^2. F.F. = 1.0 kN/m^2 use M20 concrete and Fe415 steel. Sketch the details of reinforcement. **(14 Marks)**

5 a. A T-beam of depth 500mm and width of rib 300mm has a flange 900mm × 110mm. Calculate the moment of resistance of the beam if 5 numbers 25mm diameter Fe315 steel bars are used. M_{20} concrete. Take effective cover as 60mm. **(14 Marks)**

b. Calculate the "Effective width of flange" bf for the T-beam shown.

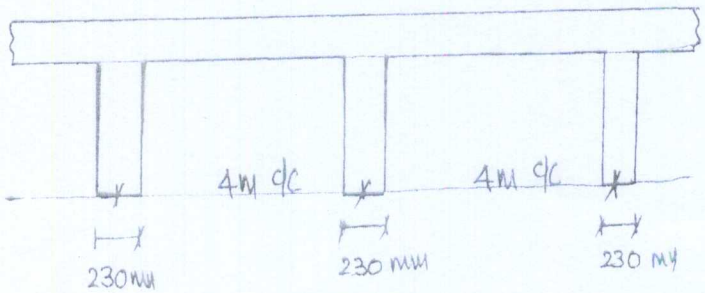

Fig.Q.5(b)

D = 600mm; f' = 60mm; Df = 130mm; Spacing or T-beams 4m c/c; Effective span of T-beam = 8mt. **(06 Marks)**

6 a. Explain the behaviour with sketches:
   i) Axially loaded columns
   ii) Combined axially loaded and uniaxial bending
   iii) Combined axial load and biaxial bending. **(09 Marks)**

   b. Design the necessary reinforcement for a R.C. column 400 × 600mm and of length 3000mm to support an axial load at 1800 kN. Use M20 concrete and Fe415 steel. **(11 Marks)**

7 Design an R.C. footing for a column 400mm × 400mm to carry an axial load of 1600 kN. Use M_{20} concrete and Fe415 steel. Bearing capacity of soil is 220 kN/m^2. Sketch the reinforcement details. **(20 Marks)**

8 The dimensions of a stair case hall is 2.40m × 4.75m. The floor to floor height is 3520mm. Design an intermediate flight of a dog-legged stair using M_{20} concrete and Fe415 steel. Take L.L 3kN/m^2. Assume that the landings span in the same direction as the stair and are supported on 300mm thick brick masonry walls. Sketch the details of reinforcement. **(20 Marks)**

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