Fifth Semester B.Arch. Degree Examination, Jan./Feb.2021
Structures – V

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
2. *Use of IS456-2000 & SP16 is permitted.*
3. *Any missing data may be assumed suitably.*

1   a. Explain the importance of W/C ratio. **(06 Marks)**
    b. Define workability. What are the factors affecting workability? **(07 Marks)**
    c. List the advantages and disadvantages of R.C.C over other materials. **(07 Marks)**

2   a. Explain the basic principle of working stress method of design of RC structures. **(06 Marks)**
    b. A rectangular RC beam 400×600 mm is reinforced with 4 bars of 22 mm dia, with a cover of 200 mm. If M20 concrete and Fe415 steel are used calculate the moment resistance of the beam. Adopt working stress method. **(14 Marks)**

3   a. Explain the philosophy of limit state method of design. **(06 Marks)**
    b. Determine the factored moment of resistance of a beam section $230mm \times 460mm$ effective depth reinforced with 2 – 16 mm diameter bars as compression reinforced at an effective cover of 40 mm and 4 – 20 mm diameter bars as tension reinforcement. The materials are M-20 grade concrete and Fe-415 steel. **(14 Marks)**

4   a. Differentiate between one way slab and two way slab. **(06 Marks)**
    b. Design a R.C. slab for a hall $3.50m \times 12.50m$. Wall thickness 300 mm L.L = 3 kN/m². F.F.=1.0 kN/m². Use M20 concrete and Fe415 steel. Sketch the details of reinforcement. **(14 Marks)**

5   Design the necessary reinforcement for a RC beam 300×450 mm to carry a udl of 25 kN/m over a span of 4 m. The beam is supported on a 400 mm thick wall at the ends. Use M20 concrete and Fe415 steel. Adopt limit state method. Assume $f' = 40$ mm. **(20 Marks)**

6   Design the necessary reinforcement for a RC column 300×400 mm subjected to an axial design load of 1600 kN. Use M20 concrete and Fe415 steel. Adopt limit state method sketch the cross section. **(20 Marks)**

7   Design a square isolated footing for a column of size 300 mm $\times$ 300 mm subjected to a load of (service load) of 330 kN. The SBC of soil is 360 kN/m². Use M-20 grade concrete and Fe-415. Draw neat reinforcement details. **(20 Marks)**

8   The dimensions of a stair case hall is 2.40 m $\times$ 4.75 m. The floor to floor height is 3520 mm. Design an intermediate flight of a dog-legged stair using M_{20} concrete and Fe415 steel. Take L.L = 3 kN/m². Assume that the landings span in the same direction as the stair and are supported on 300 mm thick brick masonry walls. Sketch the details of reinforcement. **(20 Marks)**

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