Fifth Semester B.Arch. Degree Examination, Aug./Sept.2020
Structures – V

Time: 3 hrs.

Max. Marks:100

Note: 1. *Answer any FIVE full questions.*
2. *Use of IS456 & SP-16 is permitted.*
3. *Any missing data may be assumed suitably.*

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 $350 \times 600mm$ 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 necessary reinforcement for a R.C. beam $230 \times 450mm$. The beam is to carry a udl of 20kN/m over a span of 4.0mt. Use M20 concrete and Fe415 steel. Take f' = 40mm. **(20 Marks)**

4 Design a one-way slab with a clear span of 3.5 m simply supported on 200 mm thick concrete masonry walls to support a live load of 4 kN/m^2. Adopt M-20 grade concrete and Fe415 HYSD bars. **(20 Marks)**

5 a. Explain minimum eccentricity and slenderness ratio. **(05 Marks)**
   b. Design the reinforcements in a rectangular column of size $300 \times 500mm$ to support a design ultimate load of 500 kN together with a factored moment of 200 kNm. Adopt the value of $fck = 20 \ N/mm^2$ and $Fy = 415 \ N/mm^2$. **(15 Marks)**

6 A square column 500×500 mm carries an axial load of 1500 kN. Design the column and a square footing for the column. The safe bearing capacity of the soil is 225 kN/m^2. Use M20 and Fe415. **(20 Marks)**

7 Design a square isolated footing for a column of size 300mm $\times$ 300mm subjected to a load of (service load) of 330 kN. The SBC of soil is 360 kN/m^2. Use M-20 grade concrete and Fe–415. Draw neat reinforcement details. **(20 Marks)**

8 Design a 2-way slab for a room 4.3m $\times$ 6.5m in dimensions. It is supported on 300 thick walls on all four sides. The L.L is 3kN/m^2 and floor finish is 1.0 kN/m^2. Use M-20 grade and Fe – 415 steel. Edges are simply supported and corners are not held down. **(20 Marks)**

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