09ENG55

Fifth Semester B.Arch. Degree Examination, Feb./Mar. 2022
Structures – V

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions.*
2. Use of IS456-2000 and SP 16 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 necessary reinforcement 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 concrete and Fe415 steel. Take f' = 40mm. **(20 Marks)**

4 a. Differentiate between ONE WAY and TWO WAY slabs. **(04 Marks)**

b. Design a RC slab for a hall $4m \times 16m$ supported on masonry wall 230 mm thick. I.L = 2.5 kN/m². Floor finish is 1 kN/m². M20 concrete and Fe415 steel adopt limit state method. **(16 Marks)**

5 Design the necessary reinforcement for a RC beam 300×450mm 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 mm $\times$ 400mm 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 R.C. footing for column 400×400mm to carry an axial load of 1600 kN. Use M20 concrete and Fe 415 steel. SBC of soil is 220 kN/m². Sketch the details Adopt limit state method. **(20 Marks)**

8 Explain the following with respect to design of stairs as per IS456-2000.
   a. Rise and Tread. **(02 Marks)**
   b. Waist slab. **(02 Marks)**
   c. Effective span. **(08 Marks)**
   d. Distribution of loading on stairs. **(08 Marks)**

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