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09ENG55

**Fifth Semester B.Arch. Degree Examination, Dec.2019/Jan.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. 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. State assumptions made in working stress method of design of reinforced concrete. (04 Marks)
  - b. Explain the necessity of doubly reinforced beams. (04 Marks)
  - c. The cross section of a singly reinforced concrete beam is 300 mm wide and 400 mm deep to the centre of the reinforcement which consists of 3 bars of 12 mm dia. If the stresses in concrete and steel are not to exceed 7 N/mm<sup>2</sup> and 230 N/mm<sup>2</sup>. Determine the moment of resistance of the section. Take  $m = 13.33$ . (12 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 × 460mm effective depth reinforced with 2-16mm diameter bars as compression reinforced at an effective cover of 40mm and 4-20mm diameter bars as tension reinforcement. The materials are M-20 grade concrete and Fe – 415 steel. (14 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<sup>2</sup>. Adopt M-20 grade concrete and Fe415 HYSD bars. (20 Marks)
  
- 5
 

Design a one way slab of clear span 3.0m × 8.0m supported on beams 350mm thick to carry live load of 2kN/m<sup>2</sup> and floor finish of 1kN/m<sup>2</sup>. Use M-20 and Fe-415. Draw neat sketches. (20 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<sup>2</sup>. Use M20 and Fe415. (20 Marks)
  
- 7
 

Design an R.C. footing for a column 400mm × 400mm to carry an axial load of 1600 kN. Use M<sub>20</sub> concrete and Fe415 steel. Bearing capacity of soil is 220 kN/m<sup>2</sup>. 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<sub>20</sub> concrete and Fe415 steel. Take L.L = 3kN/m<sup>2</sup>. 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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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and/or equations written eg. 42+8 = 50, will be treated as malpractice.