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**Fifth Semester B.Arch Degree Examination, June/July 2018**  
**Structures - V**

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions.**  
**2. Use of IS 456 – 2000 and SP: 16 are permitted.**

- 1 Explain the following :
  - a. Concrete mix design
  - b. Water – cement ratio
  - c. Workability of concrete
  - d. Reinforced concrete

(20 Marks)
- 2 a. Differentiate between singly reinforced and Doubly reinforced R.C beams. (05 Marks)  
b. A rectangular R.C beam  $400 \times 600$ mm is reinforced with 4 nos – 22mm dia bars with a clear cover of 20mm. If M20 concrete and Fe415 steel are used, calculate the moment of resistance of the beam. Use any method. (15 Marks)
- 3 a. A rectangular R.C beam  $300 \times 600$ mm is reinforced with 4 nos of 20mm dia bars with an effective cover of 40mm. If M20 concrete and Fe 415 steel are used, calculate the moment of resistance of the beam. Adopt limit state method. (10 Marks)  
b. A T – beam of depth 500mm and width of rib 300mm has a flange  $900 \times 110$ mm. calculate the moment of resistance of the beam if 5 numbers of 25mm dia bars are used. M20 concrete, Fe415 steel, effective cover = 60mm Adopt Limit state method. (10 Marks)
- 4 Design the necessary reinforcement for a R.C beam  $300 \times 450$ mm to carry a udl of 25kN/m over a clear span of 4.0m. The beam is simply supported over a 400mm thick wall at ends. Use M20 concrete and Fe415 steel. (Sketch the details c/s only). Adopt limit state method. Assume effective cover 40mm. (20 Marks)
- 5 a. Differentiate between one way slab and Cantilever slab. (03 Marks)  
b. Design a R.C slab  $4.0\text{m} \times 16.0\text{m}$  supported on a masonry wall 230mm thick. IL =  $2.5 \text{ kN/m}^2$ . Floor finish =  $1 \text{ kN/m}^2$  M20 concrete, Fe 415 steel. Adopt limit method. Sketch the details. (17 Marks)
- 6 a. Design the necessary reinforcement for a R.C column  $300 \times 500$ mm subjected to an axial load of 1400kN. Use M20 concrete and Fe 415 steel. Adopt limit state method. Sketch the details. (14 Marks)  
b. Explain the design of columns subjected to combined Axial load and uniaxial bending by limit state method using SP: 16. (06 Marks)
- 7 Design a R.C footing for column  $400 \times 400$ mm to carry an axial load of 1600kN. Use M20 concrete and Fe 415 steel. SBC of soil is  $220 \text{ kN/m}^2$ . Sketch the details Adopt Limit state method. (20 Marks)
- 8 Explain the following with respect to design of stairs as per IS 456 – 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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