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10CV52

**Fifth Semester B.E. Degree Examination, June/July 2019**  
**Design of RCC Structural Elements**

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions, selecting at least TWO full questions from each part.  
2. Use of IS456-2000 and SP-16 is permitted.

**PART – A**

- 1 a. State and explain “Design Load”. (05 Marks)  
b. What are the codal requirements for modulus of elasticity for reinforcing steel and concrete? (05 Marks)  
c. What are the values of partial safety factors for loads (DL and IL) with respect to limit state of service ability? (05 Marks)  
d. State the codal provisions for “Other Limit States”. (05 Marks)
- 2 a. A rectangular R.C. beam  $300 \times 600$ mm is reinforced with 4 number of 20mm dia bars with a cover of 30mm. If M20 concrete and Fe415 steel are used. Calculate the moment of resistance of the beam. (09 Marks)  
b. A T-beam of depth 500mm and width of rib 300mm has flange  $900 \times 110$ mm. Calculate the moment of resistance if 5 numbers 25mm dia Fe415 steel bars are used with an effective cover of 60mm, M20 concrete is used. (11 Marks)
- 3 a. State the “Slenderness limits for beams to Ensure lateral stability” as per codal requirements. (05 Marks)  
b. What is the minimum grade of plain concrete, reinforced concrete and minimum cover to reinforcement when the exposure is “severe”. (05 Marks)  
c. Explain the permissible values of deflection as per codal provisions when deflection is calculated. (05 Marks)  
d. State the codal requirements for limit state of “cracking” in flexural members. (05 Marks)
- 4 Design the necessary reinforcement for a R.C. beam  $300 \times 450$ mm to carry a udl of 25kN/m over a span of 4mt. The beam is supported on a 400mm thick wall at the ends. Use M20 concrete and Fe415 steel. Assume effective cover to reinforcement as 40mm. (20 Marks)

**PART – B**

- 5 a. Explain the structural behaviour of one way and two way slabs? (04 Marks)  
b. Design an R.C. slab for the following data:  
Ly = 7500mm Lx = 3000mm  
Simply supported on four sides  
L.L =  $4 \text{ kN/m}^2$  F.F. =  $1 \text{ kN/m}^2$   
M.20 concrete, Fe415 steel  
Sketch the details of reinforcement (Plan). (16 Marks)

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- 6 a. Explain the terms “short” and “slender” compression members. (04 Marks)  
b. Design the necessary reinforcement for a R.C. column  $400\text{mm} \times 600\text{mm}$  and of length  $3000\text{mm}$  to carry an axial load of  $1800\text{kN}$ . M20 concrete and Fe415 steel. Sketch the details. (16 Marks)
- 7 Design a R.C. footing for an R.C. column  $300 \times 500\text{mm}$  to carry an axial load of  $1200\text{kN}$ . Allowable bearing pressure on soil is  $240 \text{ kN/m}^2$ . Use M20 concrete Fe415 steel. Sketch the details of reinforcement. (20 Marks)
- 8 Design an intermediate flight of a dog legged stair for a hall  $2.40\text{m} \times 4.75\text{m}$ . Floor to floor height is  $3520\text{mm}$ . Take L.L as  $4 \text{ kN/m}^2$  and finishes =  $0.6 \text{ kN/m}^2$ . Assume landings span in the direction of stair. The slab is supported on  $230\text{mm}$  thick masonry walls at ends. Sketch the details. (20 Marks)

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