

USN

--	--	--	--	--	--	--	--	--	--



10CV52

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Design of RCC Structural Elements

Time: 3 hrs.

Max. Marks:100

**Note: 1. Answer FIVE full questions, selecting at least TWO questions from each part.
2. Use of IS 456-2000 and SP-16 is permitted.**

PART - A

- 1 a. Explain working stress method, limit state method of RCC design. (04 Marks)
- b. Distinguish between balanced, under reinforced and over reinforced section of RCC design. (06 Marks)
- c. Derive the expression for depth of NA $\bar{y} = 0.42x_u$, in the case of rectangular RCC beam design. (06 Marks)
- d. Obtain an expression for limiting percentage of steel for a rectangular RCC section with M20 concrete and Fe500 steel. (04 Marks)
- 2 a. A singly reinforced beam 250mm × 450mm deep up to centre of reinforcement E cover 50mm Effective span 6m using M20 concrete and Fe 500 steel. Determine the central point load that can be supported in addition to self wt.
When i) 3 – 16mm dia bars ii) 3 – 20mm dia bars are used as reinforcement. (12 Marks)
- b. A doubly reinforced concrete beam 250mm wide 500mm deep is required to support 40kN/m including self wt effective span is 5m. Effective cover 50mm, using M₂₀ concrete Fe 415 steel, find steel for flexure and shear. (08 Marks)
- 3 A rectangular section 200×450mm overall is reinforced with 3 – 16mm dia of an effective depth 420mm. Two hanger bars 12mm dia effective span 5m. The beam support a load of 10kN/m. Calculate short term deflection and long term deflection using M₂₀ concrete and Fe415 steel. (20 Marks)
- 4 A hall 16m × 6m supported by beams spaced 4m c/c thickness of slab 120mm UDL 4kN/m² Design a T beam using M20 concrete Fe415 steel for flexure and shear. Take bearing as 500mm. Also show the check for deflection and bond. (20 Marks)

PART - B

- 5 Design a two-way RCC slab for a room 6m × 4m supported on wall 230mm corners are held down. Live load 4kN/m² Floor finish 1.0kN/m². Adopt M20 concrete Fe415 steel. (20 Marks)
- 6 a. Design RCC column having unsupported length 2.75m to support a load of 2000kN using M20 concrete Fe415 steel
i) As a square section ii) As a rectangular section with $\frac{b}{D} = \frac{3}{4}$. (12 Marks)
- b. A column 300mm × 400mm is to support a ultimate load of 1200kN, Mu200kNm. Find steel using M20 concrete Fe415 steel, assuming effective cover 50mm. Sketch the reinforcement details. (08 Marks)
- 7 A square column 400mm sides carries a load of 900kN. Design a footing SBC of soil 100kN/m². Adopt M20 concrete Fe415 steel. Show the check for one way, two way shear and bond strength. (20 Marks)
- 8 The main stair of an office building has to be located in a stair measuring 3.5m×5.5m. Distance between the floor is 3.75m live load 3kN/m². Design the Dog legged stair using M20 concrete, Fe415 steel. Also sketch the details of reinforcement. (20 Marks)

* * * * *

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.