

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



Fifth Semester B.E. Degree Examination, June-July 2009
Design of Structures RCC

Time: 3 hrs.

Max. Marks:100

- Note:** 1. Answer any FIVE full questions selecting at least TWO from each part.
 2. Use of IS456-2000, SP-16, IS 875 permitted. Use SP-16 for Question 6 only.
 3. Assume any missing data suitably.

PART – A

- 1 a. Explain the terms balanced, under reinforced and over reinforced sections. (06 Marks)
 b. A.R.C. beam of section 300 mm x 550 mm (over all) is reinforced with 4 bars of 16 mm with an effective cover of 50 mm. The beam is simply supported over an effective span of 5m. Find the maximum load carrying capacity of the beam inclusive of its self-weight. M20 concrete and Fe500 steel are used. (14 Marks)
- 2 Find the moment of resistance of a T-beam with the following details.
 Effective width of flange = 955 mm
 Depth of flange = 120 mm
 Width of web = 300 mm
 Effective depth = 580 mm
 Reinforcement = 8 bars of 20 mm
 Concrete M20 and steel Fe 415 (20 Marks)
- 3 A reinforced concrete beam of size 250 x 500 mm (over all) is provided with 4 bars of 20 mm at an effective cover of 40 mm. The section has to resist a BM of 60 kN-m. Determine the crack width at the mid point of the tension edge. M20 concrete and Fe 415 steel are used. The bars are arranged in one layer with side covers of 25 mm, clear. (20 Marks)
- 4 a. Discuss the design situations, which need the provision of doubly reinforced beams. (06 Marks)
 b. Determine the ultimate moment of resistance of a doubly reinforced beam with $b = 300$ mm, $D = 600$ mm $A_{st} = 6$ bars of 20 mm, $A_{sc} = 6$ bars of 16 mm effective cover = 50 mm for both steels. M25 concrete and Fe 415 steel are used. (14 Marks)

PART – B

- 5 Design a R.C. slab for a room of clear size 4 m x 5 m. The slab is supported on walls of 300 mm thickness with two adjacent edges continuous and other two edges discontinuous. Live load is 3 kN/m². Assume floor finish as 0.6 kN/m² and ceiling finish as 0.4 kN/m². Use M20 concrete and Fe 415 steel. Sketch the reinforcement details. (20 Marks)
- 6 a. Design a column 4 m long restrained in position and direction at both ends to carry an axial load of 1600 kN. Use M20 concrete and Fe 415 steel. (10 Marks)
 b. A column of size 300 mm x 400 mm has an effective length of 3.6 m and is subjected to $P_u = 1100$ kN and $M_u = 150$ kN-m about its major axis. Design the column using M25 concrete and Fe 415 steel. Provide the steel on four sides. (10 Marks)
- 7 Design a square footing of uniform depth for a short axially loaded column of size 300 mm x 300 mm. The column carries an axial service load of 600 kN in compression. SBC of foundation soil is 180 kN/m². Use M20 concrete and Fe 415 steel. Sketch the details of reinforcement. (20 Marks)
- 8 Design a dog-legged stairs for an office building in a room of clear size of 2.8 m x 5.8 m. The vertical distance between the floors is 3.6 m, width of each flight is 1.25m. Take a live load of 3 kN/m². The stairs are so provided that the landing slabs are supported on 230 mm wide beams at their outer edges, leading to a structural arrangement of landing slab spanning in the direction of going. Use M20 concrete and Fe 415 steel. Sketch the reinforcement details. (20 Marks)
