

Code: 9A01501

**R9**

B.Tech III Year I Semester (R09) Supplementary Examinations, May 2013

**DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES**

(Civil Engineering)

Time: 3 hours

Max Marks: 70

Use of IS 456-2000, IS-800 code books to be permitted in the examination hall.

**PART - A**

(Answer any one question, 1 × 28 marks)

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- 1 Design and detail a reinforced concrete square isolated footing for a column of size 600 × 400 mm carrying a axial service load of 2700 kN inclusive of its own weight. The safe bearing capacity at the level of the footing base as 250 kN/m<sup>2</sup>. Use M25 and Fe 415.  
Draw the reinforced details in plan and also cross section details of footing.

- 2 Design reinforced concrete slab for a room measuring 5 m × 5 m. The slab is to rest upon 1<sup>1</sup>/<sub>2</sub> brick thick walls constructed all round. The flooring is to consist of 25 mm thick cement concrete layer. The flooring may be assumed to be subjected to a uniformly distributed super imposed load of 4 kN/m<sup>2</sup>. The following data may be assumed in the design:  
Use M 20 grade of concrete and Fe 415 grade steel.  
Draw a cross section of the designed slab showing clearly the bar bending schedule of the reinforcement.

**PART – B**

(Answer any three questions, 3 × 14 marks)

- 3 A reinforcement concrete cross section of 250 mm width and 450 mm effective depth is provided with 4 numbers of 22 mm bars in tension zone and 3 numbers of 18 mm bars in the compression zone at depth 40 mm from the compression fiber. Determine whether the cross-section is capable of resisting limit moment.
- 4 The critical section of an RC rectangular beam is subjected to a bending moment of 28 kNm, a torsional moment of 15 kNm and a shear force of 32 kN. The overall size of the section is 350 mm × 700 mm, provide effective cover to reinforcement as 50 mm, concrete grade M25 and steel grade Fe 415 are used. Design the necessary reinforcements for the section.
- 5 (a) Enumerate the functions of the transverse reinforcement in a reinforced concrete column.  
(b) A short column is 230 × 300 mm and is reinforced with four rods of 20 mm, one at each of the corners and two rods of 16 mm one each at the middle of the longer sides. Calculate the value of P and M for tension failure of steel by bending on the major axis. Assume cover = 40 mm and use M20, Fe 415.
- 6 (a) Define: (i) Neutral axis. (ii) Lever arm. (iii) Moment of resistance.  
(b) A simply supported rectangular RC beam of 275 mm × 500 mm (effective) is reinforced with 3 numbers of 16mm dia. steel bars in tension. Determine the safe uniformly distributed load that the beam can carry including its self weight on an effective span of 4 metres. Use working stress method.
- 7 A cantilever beam of span 5m is subjected to a working superimposed dead load of 10 kN/m and live load of 15 kN/m. The beam is made of M20 concrete and HYSD-Fe 415 bars. Design the beam by limit state design with a width equal to 300mm and compute the deflection due to live load

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