

Code: 9A01501

R09

B.Tech III Year I Semester (R09) Supplementary Examinations June 2016

DESIGN & DRAWING OF REINFORCED CONCRETE STRUCTURES

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Use of IS 456:2000, SP16 Design aided charts only and IS:875 (Part 1 & Part 2) books is permitted in the examination hall.

PART – A

(Answer any one question, 1 X 28 marks)

- 1 The assembly hall floor in a club building at first floor is to be constructed in reinforced concrete. The size of a hall is 8 m x 6 m. In order to provide a plain ceiling effect in the ground floor, the slab is to be laid without the provisions of the beams. The slab is to be finished with 25 mm thick mosaic flooring to the super-imposed loads. Use M20 and Fe415.
Draw a dimensioned plan and section of the slab, showing the position of reinforcement.
- 2 Design and detail a reinforced concrete square isolated footing for a column of size 700 x 500 mm carrying an axial service load of 5000 kN inclusive of its own weight. The test bearings and plate load test indicate that soil is composed of medium compacted and gravelly sands with the safe bearing capacity at the level of the footing base as 200 kN/m². Use M25 and Fe 415.
Sketch the details showing the design.

PART – B

(Answer any three question, 3 X 14 marks)

- 3 (a) Derive the expressions for the neutral axis, lever arm and moment of resistance of a singly reinforced balanced rectangular section.
(b) An RC beam 300 mm wide and 600 mm deep is reinforced with 4 bars of 22 mm dia. Find the stress in steel if the concrete is to be stressed to its maximum allowable limit. Use working stress methods.
- 4 Determine the moment capacity of a doubly-reinforced rectangular cross-section beam for the following data: $b = 400$ mm, $d = 800$ mm, $A_{st} = 1226$ mm², $f_y = 415$ N/mm², $f_{ck} = 25$ N/mm², $A_{sc} = 686$ mm².
- 5 A simply supported RC rectangular beam of 300 mm x 600 mm overall size carries an udl of 15 kN/m over an effective span of 6 m. It is reinforced with 4 numbers of 20 mm dia. HYSD bars in tension with a clear cover of 30 mm throughout its length. The concrete is of M25 grade. Design the shear reinforcement in the form of vertical stirrups for the maximum shear force using 8 mm dia. Mild steel bars.
- 6 Design a short column 40cm square in cross-section for an axial load of 500 kN and moments of 50 kNm and 30 kNm about the two axes. Use M20 concrete and Fe415 steel.
- 7 A simply supported beam of span 8 m is subjected to a working superimposed dead load of 10 kN/m and live load of 25 kN/m. The width, effective depth and overall depth of the beam are 300 mm, 600 mm and 650 mm. The beam is made of M20 concrete with 200 mm² HYSD-Fe415 steel reinforcement. Determine the deflection due to live load and total load. The creep coefficient for the beam is 2.1. Compute the deflections caused by shrinkage and creep.
