B.Tech III Year I Semester (R15) Supplementary Examinations June 2018
DESIGN & DRAWING OF RCC STRUCTURES
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Use of IS 456:2000 and only design charts for columns (sp-16) is allowed.

PART – A
(Answer any one question: 01 X 28 = 28 Marks)
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1   Design a reinforced concrete slab for a room of clear dimension 4 m x 5 m. The slab is supported on walls of width 300 mm. The slab is carrying a live load of 4 kN/m^2 and floor finish is 1 kN/m^2. Use M20 concrete and Fe415 steel. The corners of the slab are held down. Sketch the layout of the reinforcement.

2   Design an isolated square footing for a column 450 mm x 450 mm reinforced with 8.25 mm diameter bars carrying a service load of 2000 kN. The bearing capacity of the soil is 250 kN/m^2 at a depth of 1.2 m below ground. The footing is restricted to 2 m in one direction. Assume M20 grade concrete and Fe415 steel for footing, M25 grade concrete and Fe415 steel for column. Draw to scale:
(i) Longitudinal section showing the reinforcement details.
(ii) The plan showing the reinforcement details.

PART – B
(Answer any three questions: 03 X 14 = 42 Marks)

3   A rectangular reinforced concrete beam is simply supported on two masonry walls 230 mm thick and 6 m apart (c/c). The beam is carrying an imposed load of 15 kN/m. Design the beam with all necessary checks. Use M25 and Fe415 steel.

4   Draw stress block diagram and evaluate the following expressions for limit state design:
     (i) Neutral axis depth. (ii) Lever arm. (iii) Cover depth. (iv) Moment of resistance.

5   A simply supported RCC beam 200 mm x 400 mm (effective) is reinforced with 4 bars of 22 mm diameter on tension side. The beam is carrying a load of 10 kN/m over a clear span of 8 m. Design the shear reinforcement. Use M20 concrete and Fe415 steel.

6   Design a RCC column to carry an axial load of 2000 N. The size of the column is restricted to 600 mm square. The effective height of column is 9 m. Use M20 concrete and σ_{sc} = 190 N/mm^2.

7   Design the waist slab type stair case consisting of straight flight of stairs resting on two stringer beams along the two sides. Assume the span of the slab as 2 m with risers of 160 mm and treads of 270 mm. Live load 3 kN/m^2. Adopt M20 concrete and Fe415 grade steel.

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