

Sixth Semester B.E. Degree Examination, June/July 2015
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks: 100

- Note: 1. Answer any TWO full questions from part – A and ONE from part - B.**
2. Use of IS – 456 and SP – 16 is permitted.

PART – A

- 1** A simply supported two way slab is supported on all sides by 230 mm thick wall. The dimensions of two way slab is 3 mts × 4 mts (clear). Following are the reinforcement particulars :
- Along short span ϕ 10 mm @ 125 mm c/c
 - Along long span ϕ 10 mm @ 150 mm c/c
 - Negative steel for short span ϕ 10 mm @ 250 mm c/c
 - Negative steel for long span ϕ 10 mm @ 300 mm c/c
 - Alternative rods are cranked
 - Corner mats are ϕ 8 mm @ 150 mm c/c along short span and ϕ 8 mm @ 200 mm c/c along long span
 - Thickness of slab is 150 mm
- Draw to a suitable scale :
- Plan showing reinforcement particulars. (08 Marks)
 - Cross section at mid span along short span. (06 Marks)
 - Cross section at mid span along long span. (06 Marks)
- 2** A dog legged staircase is proposed for a building with the following data :
- Clear dimension of stair hall (2.5 m × 5 m)
 - Vertical distance between the floors 3.6 m
 - Thickness of waist slab is 150 mm
 - Wall thickness is 230 mm
 - Main reinforcement ϕ 12 mm @ 100 mm c/c
 - Distribution reinforcement ϕ 8 mm @ 150 mm c/c
 - Use M20 grade concrete and Fe415 grade Steel
- Draw to a suitable scale :
- Plan of staircase. (05 Marks)
 - Sectional elevation of first flight which starts from foundation showing reinforcement details. (10 Marks)
 - Sectional elevation of second flight. (05 Marks)
- 3** A rectangular RCC column and footing have the following details :
- Dimension of column – 230 mm × 450 mm
 - Size of footing – 1.2 m × 1.5 m
 - Depth of footing at the face of column 450 mm
 - Depth of footing at the edges 150 mm
 - Depth of foundation below ground level is 1.2 m
 - Details of reinforcement
 Column : ϕ 16 mm – 8 no's as main bars ϕ 8 mm @ 150 mm c/c as lateral ties
 - Footing : 10 mm ϕ @ 90 mm c/c – shorter direction 10 mm ϕ @ 120 mm c/c – longer direction
 - Use M20 grade concrete and Fe415 grade Steel
- Draw to a suitable scale :
- Sectional plan of column and footing. (05 Marks)
 - Sectional elevation of column and footing. (10 Marks)
 - Prepare the bar bending schedule for footing steel and column steel up to 3 m height above ground level. (05 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 malpractices.

PART – B

- 4 Design a slab type rectangular combined footing for supporting two columns 400 mm x 400 mm in size to carry a load of 1000 kN each. Center to center distance between the columns is 3.5 m. The projection of footing on either side of the columns with respect to center of columns is 1 m. Safe bearing capacity of soil can be taken as 190 kN/m². Use M20 grade concrete and Fe415 grade Steel. (40 Marks)

Draw to a suitable scale :

- Plan of footing. (05 Marks)
 - Longitudinal section of footing. (10 Marks)
 - Transverse section of footing. (05 Marks)
- 5 Design a single bay portal frame having an effective span of 7 m and an effective height of 4 m. The portal frames are spaced at 3.5 m c/c. Take live load as 1.6 kN/m² on the slab. Assume safe bearing capacity of soil as 120 kN/m². Use M20 grade concrete and Fe415 Steel. Design the beam, column and footing. (40 Marks)

Draw to a suitable scale :

- Section elevation of half the portal frame. (10 Marks)
- Cross – sectional details of column. (05 Marks)
- Cross – sectional details of beam at support and midspan. (05 Marks)
