

USN

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

10CV62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018

Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

Note: 1. Answer any TWO full questions from PART-A and any ONE question PART-B.

2. Use of IS-456(2000) and SP-16 is permitted.

PART - A

- 1 A simply supported two way slab with clear dimensions 5.0m × 6.0m is supported on all sides by 230 mm thick wall. Following are the reinforcement details:

Short span : Positive steel = #12 mm @ 125 mm c/c

Negative steel = #12 mm @ 125 mm c/c
for a length of 1.5 m.

Longer span : Positive steel = #12 mm @ 140 mm c/c

Negative steel = #12 mm @ 140 mm c/c
for a length of 1.5 m.

Torsional reinforcements in the form of corner mat # 10 mm at 150 mm c/c is provided at top and bottom in all corners.

Edge strip reinforcement #8 @ 230 mm c/c

Thickness of slab 150 mm.

Draw to a suitable scale.

- Plan showing reinforcement details. (10 Marks)
- C/S at midspan along shorter span. (05 Marks)
- C/S at midspan along longer span. (05 Marks)

- 2 A dog legged staircase is to be detailed with the following details:

Size of staircase room 2100 mm × 4500 mm

Width of flight = 1000 mm

Width of landing = 1000 mm

Number of treads in each flight = 10

Tread = 250 rise = 150 mm

Wall thickness = 230 mm

Waist slab thickness = 160 mm

Main steel 12 mm HYSD bars at 100 mm c/c and distribution steel for each flight = 8 mm @ 200 c/c. First flight starts from ground floor level and foundation 750 mm below GFL and second flight rests on wall.

Draw to a suitable scale:

- Plan (06 Marks)
- Sectional details of 1st and 2nd flight. (14 Marks)

- 3 A rectangular column of size 300 mm × 450 mm is provided with square isolated footing of size 2.60 m × 2.60 m. Height of column above GL = 3.6 m. Depth of foundation = 1.2 m below GL.

Details of Column:

Longitudinal steel = 10 numbers of 16 mm dia HYSD bars

Transverse steel = 8 mm dia ties at 200 mm c/c.

Details of footing:

Depth of footing at column face 600 mm and is tapered to 300 mm at the edge of footing.

Reinforcements = #12 mm HYSD bars at 150 mm c/c.

Draw to a suitable scale:

- Plan of column and footing showing reinforcement. (06 Marks)
- Sectional elevation. (10 Marks)
- Bar bending schedule. (04 Marks)

PART - B

- 4 Two reinforce columns A = 350 mm × 350 mm and B = 400 mm × 400 mm in size carry axial service loads of 600 kN and 850 kN respectively. The columns are spaced at 3.6 m c/c. SBC of soil is 150 kN/m². The property line is 0.9 m from the centre of column A. Design the beam and slab type combined footing. (40 Marks)

Draw longitudinal section, plan and typical cross sections to a suitable scale. Use M20 grade of concrete and Fe 415 steel. (20 Marks)

- 5 Design a counter fort retaining wall with the following details.

Height of wall above GL = 6.0 m

Depth of hard soil level = 1.2 m

Angle of repose of the soil = 30°

SBC of the soil = 180 kN/m²

Density of soil = 18 kN/m³

Spacing between counterforts = 3.0 m c/c

Length of base slab = 4.5 m

Length of toe = 1.1 m

Coefficient of friction, $\mu = 0.55$

Materials: concrete M20 grade, Steel Fe415. (40 Marks)

Draw to a suitable scale:

- Cross section through counterfort. (10 Marks)
- Cross section mid way between counterforts. (05 Marks)
- Sectional plan. (05 Marks)

* * * * *