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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.
a. Plan showing reinforcement details. **(10 Marks)**
b. C/S at midspan along shorter span. **(05 Marks)**
c. 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:
a. Plan **(06 Marks)**
b. 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:

a. Plan of column and footing showing reinforcement. **(06 Marks)**
b. Sectional elevation. **(10 Marks)**
c. 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/m^2. 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/m^2
Density of soil = 18 kN/m^3
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:

a. Cross section through counterfort. **(10 Marks)**
b. Cross section mid way between counterforts. **(05 Marks)**
c. Sectional plan. **(05 Marks)**

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