Important Note: 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.

## Sixth Semester B.E. Degree Examination, June/July 2018 Design and Drawing of RCC Structures

Time: 4 hrs.

Max. Marks: 100

Note: 1. Answer any TWO full questions form Part - A ONE full question from Part -B. 2. Use of IS: 456 - 2000 and SP - 16 is permitted.

## PART - A

A square RCC column and footing has the following details: 1

Column size

 $= 300 \times 300 \text{ mm}$ 

Size of footing

=  $1.5 \text{ M} \times 1.5 \text{ M}$ , thickness of footing 450mm near column face

and tapered to 200mm near the edges

Depth of foundation below ground level = 1M

Height of column to be shown above ground level = 1M

Column reinforcement

= 8 numbers of 16mm  $\phi$  as main bars with 8mm  $\phi$ @ 150mm

c/c lateral ties

Footing reinforcement

= 12 mm  $\phi$  @ 150mm c/c on both ways

Draw to a suitable scale, the following:

Sectional plan of column and footing

Sectional elevation of column and footing

- A rectangular beam of size 230mm × 500mm is continuous over number of columns spaced 2 at 4.5 M c/c. The width of column is 300 mm main reinforcement.
  - @ mid span of +ve steel  $\rightarrow$  4 # 20
  - @ support of –ve steel  $\rightarrow$  4 # 20

Shear reinforcement: 2L 8 mm  $\phi$  vertical stirupps @ 140mm c/c

Draw to a suitable scale, the following:

- a. Longitudinal sectional elevation of beam
- b. Cross section of beam @ mid span and end section.

(20 Marks)

3 A RCC doglegged staircase has the following details:

> Staircase bars size (clear)  $=5m\times2.5m$ Floor to floor height  $= 3.15 \text{m} \text{ s}^{2}$ = 150mm Rise =250mm Tread Waist slab thickness = 150 mm

= 1.2mWidth of staircase = 230 mmBearing

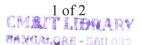
 $= 12 \text{mm} \phi @ 150 \text{ mm c/c}$ Main steel  $= 10 \text{ mm} \phi @ 180 \text{ mm c/c}$ Dist. Steel

Two landing beams of size 230mm × 250mm are provided with 2# 12mm \$\phi\$ steel @ top and bottom, stirupps: 8mm \( \phi \) 200mm c/c.

Draw to a suitable scale, the following:

- a. Plan
- Sectional elevation of two flights.

(20 Marks)





## PART - B

- Design a RCC cantilever retaining wall to retain the levelled earth embankment 5m high above the ground level. The unit weight of earth is 16 kN/m<sup>3</sup> and its angle of repose is 30°. The S.B.C of soil is 145 kN/m<sup>2</sup>. The co-efficient of friction between soil and concrete is 0.55. Use M20 grade of concrete and steel grade Fe415. (40 Marks) Draw the following to a suitable scale:
  - a. Sectional elevation of retaining wall showing the details of steel in stem, and base slab.

    (10 Marks)
  - b. Longitudinal section for 2m showing reinforcement of stem and base slab. (06 Marks)
  - c. Plan of base slab through center showing all reinforcements. (04 Marks)
- Design combined footing for two RCC columns A and B, separated by a distance of 4m c/c column A is 500mm × 500mm and carries a load of 1250 kN and column B is 600mm × 600mm and carrier a load of 1600 kN. Take S.B.C of soil as 200 kN/m². Use M20 grade concrete and Fe415 steel.

Draw the following to a suitable scale:

a. Sectional elevation

(10 Marks)

b. Plan of bottom and top reinforcement

(05 Marks)

c. c/s at two different places to show the maximum details of reinforcement.

(05 Marks)

MART LIDELARY