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10CV62

Sixth Semester B.E. Degree Examination, June/July 2017
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

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

PART – A

- 1** A rectangular beam of cross section $300 \times 450\text{mm}$ is supported on 5 columns which are equally spaced at a c/c distance of 3.3m. The columns are $300 \times 300\text{mm}$ in section. The reinforcement in beam consists of 4 bars of 16mm dia (+ve reinforcement) at midspan and 4 bars of 16mm dia at all supports (-ve reinforcement). 2 bars of +ve reinforcement have been curtailed near each support. Anchor bars consists of 2 – 16mm dia. Stirrups are of 8mm dia. 2 legged vertical at 200 c/c. Draw longitudinal section and important cross sections. Grade of concrete M20 and steel Fe 415 grade. (20 Marks)
- 2** A dog legged staircase is to be detailed with the following particulars :
- | | |
|------------------------------------|---------------------------------|
| Size of stair case room | = $2200 \times 4600\text{mm}$ |
| Width of flight | = 1050mm |
| Width of landing | = 1050 mm |
| Number of treads in each flight | = 10 |
| Thread | = 250mm and |
| Rise | = 150mm |
| Wall thickness | = 230mm all-round |
| Waist slab thickness | = 150mm |
| Main steel | = 120mm HYSD bars @ 100 c/c and |
| Distribution steel for each flight | 8mm = @ 200 c/c |
- First flight starts from ground floor level (GFL) and foundation is 750mm below GFL :
Second flight rests on wall. Draw to a suitable scale
- a. Plan
b. Section along first flight
c. Section along second flight. (20 Marks)
- 3** A square column of size $300\text{mm} \times 300\text{mm}$ is provided with square isolated footing of size $3\text{m} \times 3\text{m}$.
- | | |
|--------------------|--------------------------------|
| Details of column | : height of column 3m above GL |
| Longitudinal steel | : 8 no.'s of 12mm dia |
| Transverse steel | : 8mm dia lies at 200 c/c |
- (One square tie connecting corner bars + another diamond tie connecting inner bars).
- | | |
|---------------------------------|---|
| Details of footing | : depth of footing 1.2m below GL |
| Depth of footing at column face | : 520mm |
| Depth of footing at the edge | : 230mm |
| Reinforcement | : a mesh of 12mm dia HYSD bars at 150mm c/c |
- Provide suitable cover to steel reinforcement
Draw to a suitable scale :
- a. Plan
b. Sectional details
c. Prepare bar bending schedule. (20 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 malpractice.



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PART – B

- 4 Design a cantilever retaining wall to retain earth embankment 4.75m height above ground level. The density of earth 18kN/m^3 and its angle of repose - 30° . The embankment is horizontal at the top. SBC of the soil may be taken as 200 kN/m^2 available at 1.25m below ground level the coefficient of friction between soil and concrete is 0.5. Adopt M20 grade of concrete and Fe 415 steel. (40 Marks)

Draw to a suitable scale :

- Cross sectional elevation
- Longitudinal section showing stem reinforcement and curtailment—for a length of 2m.
- Section showing heel and toe reinforcement. (20 Marks)

- 5 Design an RCC combined footing for two columns 3.2m apart.
Column A– $300\text{mm} \times 300\text{mm} = P_A = 825\text{ kN}$
Column B– $300\text{mm} \times 300\text{mm} = P_B = 930\text{ kN}$
Safe bearing capacity of soil may be taken as 175 kN/m^2 . The boundary line is at a distance of 0.8m from the centre line of column A. Use M20 grade concrete and Fe 415 grade steel. (40 Marks)

Draw to a suitable scale :

- Sectional elevation
- Plan of bottom reinforcement
- Cross-sections at salient points. (20 Marks)
