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10CV62

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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 from PART-B.*
2. *Use of IS 456, IS 3370 and SP16 are permitted.*

PART – A

1   A two way slab for a hall of internal dimensions 3.5 × 4.5m has the following details :
   i)   Thickness of the of slab   = 150mm
   ii)   Wall thickness   = 230mm
   iii) 10mm φ bar at 120mm C/C along short span
   iv)   8mm φ bar at 140mm C/C along long span
   v)   6mm φ bar at 120mm C/C along torsional steel
   vi)   8mm φ bar at 300mm C/C along edge strip
   vii) Grade of concrete and steel : M_{20} and Fe415

   Draw to a suitable scale the following :
   a. Plan showing reinforcement detail :   **(08 Marks)**
   b. C/S of slab at mid span along short span   **(06 Marks)**
   c. C/S of slab at mid span along long span.   **(06 Marks)**

2   A doglegged staircase has to be provided for a public building with the staircase room of internal dimensions 2.60 × 5.0m supported on wall on either end. The following detail are given :
   i)   Widths of tread   = 250mm
   ii)   Rise   = 180mm
   iii)   Floor height   = 3.60m
   iv)   Number of steps in each flight   = 10
   v)   Waist slab thickness   = 160mm
   vi)   Wall thickness   = 230mm
   vii)   Main reinforcement   = 12mm φ ω 120 mm C/C
   viii) Distribution reinforcement   = 12mm φ ω 120mm C/C
   ix)   Grade of concrete and steel   = M_{20} and Fe 415

   Draw to a suitable scale the following :
   a. Plan of stair   **(06 Marks)**
   b. Sectional elevation along first flight   **(07 Marks)**
   c. Sectional elevation along second flight.   **(07 Marks)**

3   An isolated column and footing has the following details.
   i)   Dimension of column   - (300×300)mm
   ii)   Height of column   - 3m
   iii)   Main reinforcement in column   - 4 – 16mm φ
   iv)   Lateral ties in column   - 6mm φ ω 150mm C/C
   v)   Size of footing   - 1.20m × 1.20m
   vi)   Thickness of footing at face of column   - 450mm
   vii)   Thickness of footing at edges   - 150mm
   viii) Dept of foundation below G.L   - 1.20m
   ix)   Main reinforcement of footing in both ways - 100mm φ ω 90mm C/C
   x)   Grade of concrete and steel   - M_{20} and Fe 415

   Draw to a suitable scale, the following :
   a. Sectional plan of column and footing   **(06 Marks)**
   b. Sectional elevation of column and footing   **(08 Marks)**
   c. Prepare the bar bending schedule.   **(06 Marks)**

10CV62

PART – B

4 Design a cantilever retaining wall to retain earth for a height of 4m. The backpill is horizontal. The density of the soil is 18kN/m³. Safe bearing capacity of the soil 200 kN/m². Take co-efficient of friction between concrete and soil as 0.6. Angle of internal friction is 30°. Use M_{20} concrete and Fe 415 steel. **(40 Marks)**

Draw the following to a suitable scale :

a. C/S of retaining wall showing reinforcement details **(10 Marks)**
b. Longitudinal section of the stem showing curtailment **(06 Marks)**
c. Half plan of top and half plan of bottom of base slab. **(04 Marks)**

5 A single bay fixed portal frame has an effective span of 7m and an effective height of 4.2m spacing of the portal frame is 4.2m. consider a live load of 3kN/m² on the slab. Column size is 230mm × 750mm shall be adopted. Design the portal frame considering M_{20} concrete and Fe 415 steel. SBC of soil is 130kN/m². **(40 Marks)**

Draw to a suitable scale :

a. The sectional elevation of half the portal frame showing the detail of reinforcement is beam, column and footing. **(12 Marks)**
b. C/S of column **(04 Marks)**
c. Plan of footing. **(04 Marks)**

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