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Sixth Semester B.E. Degree Examination, June/July 2016
Design and Drawing of RC Structures

Time: 4 hrs.

Max. Marks:100

- Note:** 1. Answer any TWO full questions from Part-A and ONE full question from Part-B.
 2. Use of IS456 2000, SP 16 is permitted.
 3. Assume any missing data suitably.

PART – A

- 1 Prepare a centre line drawing showing foundation trench layout for walls of the building and footing for columns as shown in Fig.Q1.
 All columns C1 230mm × 450mm in size
 Columns C2 300mm × 300mm in size.
 Size of footing for C1 columns = 1.2m × 1.5m.
 Size of footing for C2 columns = 1.0m × 1.0m.
 Concrete bed for footing 100 mm thick, projecting 75mm beyond the footing.
 Width of foundation trench for walls = 900 mm
 Width of trench for corridor basement = 750 mm.
 Also prepare the slab and beam layout with suitable dimensions, notations and with appropriate grids. Use M20 grade concrete and Fe415 grade steel. (20 Marks)

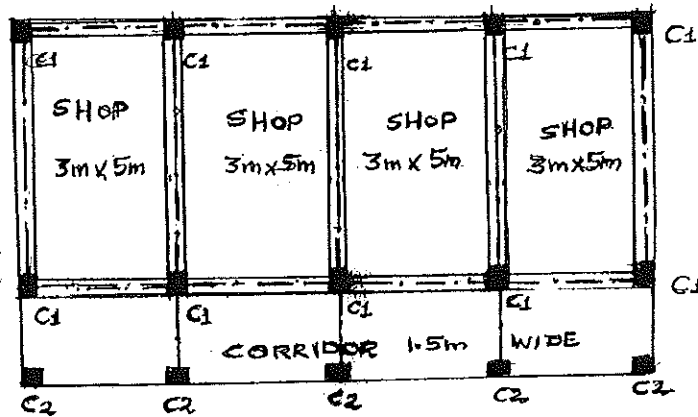


Fig.Q1

- 2 A rectangular R.C. Beam of cross-section 300mm × 450mm is supported on four columns spaced at 4 m centre to centre. The beam reinforcement consists of 4 bars of 16 mm dia at midspan out of which two bars are curtailed near each support at bottom (+ve reinforcement). The reinforcement at all supports consists of 4 bars of 16 mm diameter -ve reinforcement. The beam has 2 Nos 16 mm diameter hanger bars at top. Shear reinforcement consists of 8mm diameter 2 legged vertical stirrups at 150 mm c/c at 1 m from face of supports and at 230 mm c/c in the remaining span. Use M20 concrete and Fe 415 grade steel. Draw to a suitable scale.
- Longitudinal section of continuous beam (07 Marks)
 - Cross section of beam at mid span. (04 Marks)
 - Cross section at support. (04 Marks)
 - Bar bending schedule for beam. (05 Marks)

- 3 An R.C.C column and footing has the following details:
 Size of column = 300 mm × 450 mm Size of footing = 1500 mm × 2250 mm
 Thickness of footing near column face = 450 mm Thickness of footing at edges = 200 mm
 Depth of foundation below GL = 1 m
 Height of column to be shown above GL = 1 m

Details of reinforcement:

Column longitudinal reinforcement = 8 Nos # 16 mm dia bars.

Lateral Ties = #8mm dia bars at 150 mm c/c

Footing reinforcement: #16mm @ 150 mm c/c along longer direction.

12mm @ 200 mm c/c along shorter direction.

Use M20 concrete and Fe 415 grade steel. Draw to a suitable scale.

- (i) Sectional plan of column and footing. (07 Marks)
 (ii) Sectional elevation of column and footing. (08 Marks)
 (iii) Prepare bar bending schedule for footing steel and column steel upto 1 m above G.L. (05 Marks)

PART - B

- 4 Design a cantilever retaining wall to retain an earthen embankment 5 m high above ground level. The backfill is horizontal. The following details are available.
 Density of backfill = 18 kN/m³ Angle of internal friction $\phi = 30^\circ$
 Co-efficient of friction between soil and base slab = 0.5. SBC of soil = 200 kN/m²
 Adopt M20 grade concrete and Fe415 grade steel. (40 Marks)
 Draw to a suitable scale.
 (i) Cross section of retaining wall. (10 Marks)
 (ii) Longitudinal section of stem showing the curtailment of reinforcement. (06 Marks)
 (iii) Sectional plan showing the details of reinforcement in heel slab. (04 Marks)
- 5 Design a combined footing for two R.C.C. columns A & B separated by a distance of 4 m c/c. Column A is 500 mm × 500 mm and carries a load of 1250 kN and column B is 600mm×600mm and carries a load of 1600 kN. Take SBC of soil is 200 kN/m² and use M20 concrete and Fe415 grade steel. (40 Marks)
 Draw to a suitable scale.
 (i) Longitudinal sectional elevation. (14 Marks)
 (ii) C/s at Mid span locations to show details of reinforcement. (06 Marks)

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