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15CV72

Seventh Semester B.E. Degree Examination, July/August 2022
Design of RCC and Steel Structures

Time: 3 hrs.

Max. Marks: 80

- Note :** 1. Answer TWO full questions, choosing atleast ONE full question from each module.
2. Use of IS 456, SP16, IS 800 and steel tables are allowed.
3. Assume any missing data suitably.

Module-1

- 1 Design a cantilever retaining wall to retain an earth embankment with a horizontal top 3.5m above ground level. Density of earth = 18 kN/m^3 . Angle of internal friction $\phi = 30^\circ$. SBC of soil is 200 kN/m^2 . Take coefficient of friction between soil and concrete = 0.5. Adopt M₂₀ concrete and Fe 415 steel. (40 Marks)

OR

- 2 Design a portal frame for the following details :
Spacing of portal frame = 4m ; Span of portal frame = 8m ; Height of columns = 4m
L.L of roof = 1.5 kN/m^2 ; D.L of Finishes = 0.75 kN/m^2 .
Assume 120mm slab. Design the beam, column and footing of portal frame. Base of the column may be assumed to be fixed. (40 Marks)

Module-2

3

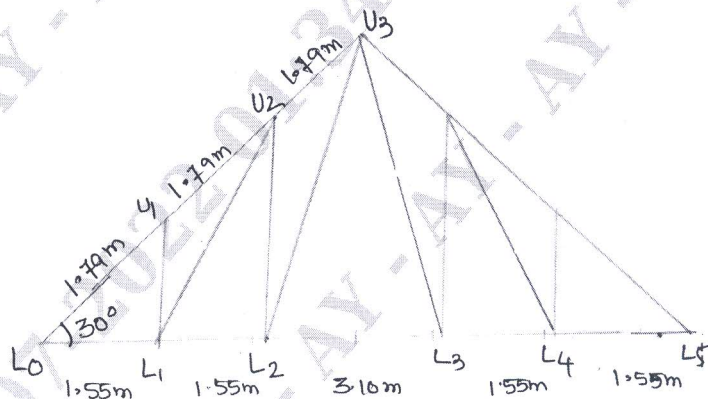


Table Q3

Members	Force (kN)	
	Compression (-ve)	Tension (+ve)
L ₀ U ₁ , U ₁ U ₂ , U ₂ U ₃	- 17.4	20.9
L ₀ L ₁ , L ₁ L ₂ , L ₂ L ₃	14.9	- 14.0
U ₃ L ₂	6.0	- 8.7
U ₂ L ₂	- 5.3	7.4
U ₂ L ₁	4.6	- 6.7
U ₁ L ₁	- 3.5	5.0

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.

The forces in the members of the roof truss of an industrial building are shown in table. The truss is supported on 40mm thick masonry. End reaction due to DL and LL is 10.558 kN. Members are to be connected at the joint with 16mm ϕ bolts and 8mm thick gusset plates. Design the members and the base plate. Assume the permissible bearing pressure on masonry = 0.8N/mm^2 . Size of the shoe angles ISA $75 \times 75 \times 6\text{mm}$ on each side of gusset plate. (40 Marks)

OR

- 4 Design a simply supported gantry girder to carry an electric overhead travelling crane, given
- Span of gantry girder = 6.5m
 - Span of crane girder = 16m
 - Crane capacity = 250 kN
 - Self weight of crane girder excluding trolley = 200kN
 - Self weight of trolley = 50 kN
 - Minimum hook approach = 1.0m
 - Distance between wheels = 3.5m
 - Self weight of rails = 0.3 kN/m.

(40 Marks)
