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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Eighth Semester, B.E. - Civil Engineering

Semester End Examination; Aug. / Sep. - 2020

RCC and Steel Structural Design

Time: 3 hrs

Max. Marks: 100

Note: i) Answer **TWO** full questions, choosing from **UNIT - I** and **UNIT - II**.

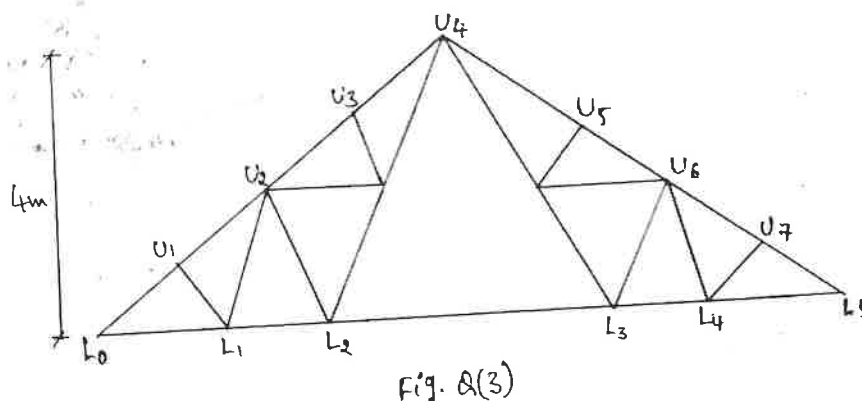
ii) Use of IS: 456, IS:800, sp:16 and steel tables are permitted iii) Assume missing data if any.

UNIT - I

- Design a rectangular combined footing with a central beam for supporting two columns 400 x 400 mm in size to carry a load of 1000 kN each. Centre to centre distance between the column is 3.5 m. The projection of the footing on either side of the column with respect to centre is 1 m. Safe bearing capacity of the soil can be taken as 190 kN/m^2 . Use M20 concrete and Fe415 steel. Draw;
 - Cross section showing slab reinforcement
 - Longitudinal section showing beam reinforcement
- Design a cantilever retaining wall to retain earth for a height of 4 m. The backfill is horizontal. The density of soil is 18 kN/m^3 . Safe bearing capacity of soil is 200 kN/m^2 . Take the coefficient of friction between concrete and soil as 0.6. The angle of repose is 30° . Use M20 concrete and Fe415 steel. Draw;
 - Cross section of wall
 - Longitudinal section of wall

UNIT - II

- Design the roof truss shown in Fig. Q(3). The forces induced in various members are shown in table below. Also design the end connections with gusset plate using black bolts of property class 4.6. Also design supports consisting of shoe angles and bearing plate by considering the support reactions 150 kN. The anchor bolts are subjected to an uplift force of 15 kN at supports. M20 concrete is used at supports. Draw;
 - Half elevation of truss
 - Enlarge view of left support



Members	Factored design forces in kN		Length in <i>m</i>
	Compression	Tension	
Principal rafter (U_1U_2)	165	60	2.235
Principal tie (L_2L_3)	40	150	6
Strut member (U_2L_2)	50	17.8	2.24

4. Following data refers to gantry girder which is having an electrically operated crane of capacity 300 kN.

Span of gantry girder is 6 m

Span of crane girder is 18 m

Self weight of crane girder = 180 kN

Self weight of trolley = 60 kN

Minimum hook approach = 1 m

Distance between the wheels = 3.5 m

Self weight of rails = 0.3 kN/m

Design the gantry girder and draw the plan and cross section of the gantry girder to an enlarged view.

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