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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; July - 2021

RCC and Steel Structural Design

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer any **TWO** full questions.*
ii) Use IS 456-2000, SP-16 and IS 800-2007, steel tables are permitted.
iii) Missing data, if any, may be suitably assumed.

1. Design a RCC cantilever retaining wall to retain earth embankment 4.5 m high above ground level. The unit weight of earth is 18 kN/m^3 and angle of repose is 30°. The embankment is horizontal at its top. The SBC of soil is 200 kN/m^3, coefficient of friction between soil and concrete is 0.5. Use M20 concrete and Fe415 steel. 50

   Draw the following to a suitable scale and show reinforcement details:

   i) Cross section of retaining wall

   ii) Longitudinal section of stem and base slab

2. Two reinforced concrete column of size 400 mm × 400 mm is to carry a load of 1000 kN each inclusive of the self weight. Design a combined footing having central beam joining the columns. The center-to-center of column is 4.0 m. The SBC of soil is 150 kN/m^2. Use M20 concrete and Fe415 steel. 50

   Draw the following to a suitable scale;

   i) Plan of the footing showing reinforcement details

   ii) Longitudinal and cross section of footing showing reinforcement

3. Design a welded plate girder for an effective span of 18 m to support an udl of 60 kN/m addition to a pair of point loads of magnitude 600 kN each at one-third span. Design the web and flange plates, end bearing stiffness and weld connection, check for moment capacity and shear capacity. 50

   Draw the following to a suitable scale;

   i) Cross section of plate girder

   ii) Half elevation and Half plan of welded plate girder

4. Design the roof truss as shown in Fig. Q(4). The forces include in various member along its nature, design the end connections using welded.

   Draw to a suitable scale the following; 50

   i) Halt Elevation of the truss

   ii) Enlarged views of joints L_0 connection details at the joints

   Assume reaction at support 13 kN and f_y = 250 MPa

Contd… 2

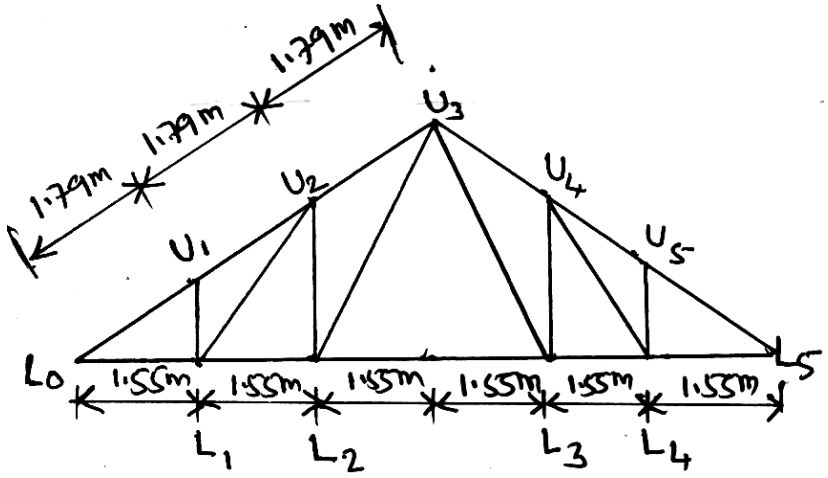

Fig. Q(4)

Member	Design Tensile load kN	Design Compression load kN
L_0U_1	35.1	26.1
L_0 L_1	22.35	28.05
L_1 L_2	17.85	19.2
L_2 L_3	13.65	10.00
U_1 U_2	41.70	26.1
U_2 U_3	37.35	21.0
U_1 L_1	9.96	5.26
U_2 L_2	14.85	7.95
U_3 L_2	9.00	17.41
U_2 L_1	7.00	13.40

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