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10CV82

Eighth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Design and Drawing of Steel Structures

Time: 4 hrs. Max. Marks:100

Note: *1. Answer ONE question, each from Part-A and Part-B.*
2. Use of IS-800, SP6(1) and steel tables is permitted.

PART – A

1 a. A secondary beam ISLB 300 @ 369.8 N/m is connected to the web of the main beam ISMB 450 @ 710.2 N/m using two framing angles ISA 150 × 115 × 10mm with top flanges of beams at the same level. Three bolts of 20mm are used to connect the each framing angle to the main beam, ISMB 450 and six bolts of 20mm dia are used to connect the framing angles to secondary beam ISLB 300. Draw to a suitable scale i) Front view; ii) Side view. **(15 Marks)**

b. An ISMB 250 @ 365.9 N/m beam is connected to the flange of the column ISHB 200 @ 365.9. Use cleat angle of ISA 100 × 75 × 8mm and seat angle of ISA 150 × 75 × 12mm. Use 4 number of 20mm dia bolts to connect seat angle to the flange of column and 2 number of 20mm dia bolts to connect seat angle to the flange of beam. Use 2 number of 20mm dia bolts to connect the cleat angle to both flange of beam as well as of column. Draw to a suitable scale. i) Side view; ii) Front view. **(15 Marks)**

2 a. A built up column consisting of 2-ISMC 300 @ 351.2 N/m placed back to back at a spacing of 200mm. The individual members of built up column are connected by single lacing system consisting of lacing flats 50 ISF 12mm (width = 50mm and thickness = 12mm). One bolt of 16mm diameter is used to connect the lacing to each component. Draw to a suitable scale i) Plan ii) Front elevation showing at least four lacings. **(15 Marks)**

b. Following are the details of gusseted base:
i) Column: ISHB 350 @ 661.2 N/m
ii) Base plate: 650mm × 450mm with thickness 20mm
iii) Gusset angles: ISA 150 × 115 × 15mm
iv) Gusset plate: 12mm thickness
v) 12 bolts of 20mm dia connect gusset angles to gusset plate
vi) 8 bolts of 20mm dia connect gusset angles to column. Anchor bolts-20mm diameter – 4 numbers. Draw a suitable scale: i) Elevation showing flanges of column; ii) Sectional elevation showing section of gusset angles, plate and column. **(15 Marks)**

PART – B

3 Design the principal rafter, principal tie and a strut member for the given forces in these members. Design the end connections also (either bolted or welded) Refer Fig.Q.3.

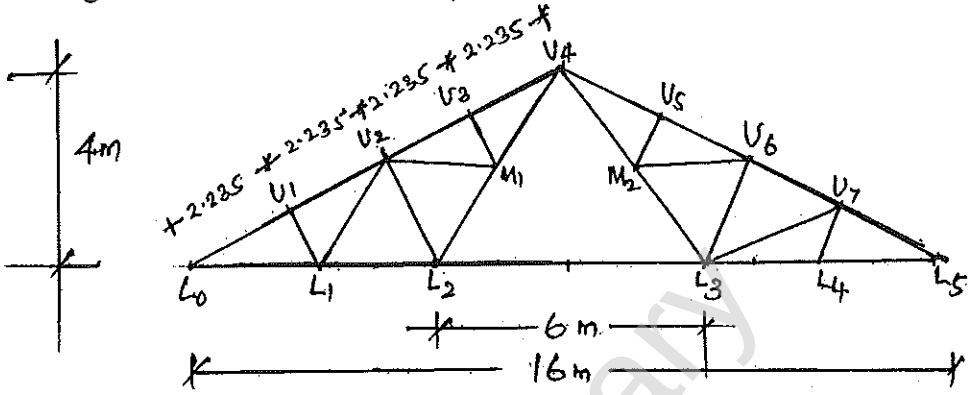

Fig.Q.3

Member	Factored design force		Length
	Compn (kN)	Tension (kN)	
Principal rafter (U_1, U_2)	165 kN	60 kN	2.235 m
Principal tie (L_2, L_3)	40 kN	150 kN	6m
Strut member (U_2, L_2)	50 kN	17.8 kN	2.24 m

(40 Marks)

Draw to a suitable scale:

a. Elevation of roof truss greater than half
b. Joint U1 to a greater scale
c. Support details at L0 (Assuming bearing plate etc). **(30 Marks)**

4 Design a gantry girder to be used in an industrial building carrying a manually operated overhead travelling crane for the following data:

Crane capacity	: 200 kN
Self wt of crane (excl. trolley)	: 200 kN
Self wt of trolley incl. hook	: 40 kN
Min-approach of crane hook to gantry	: 1.20m
Wheel base	: 3.5m
c/c between gantry rails	: 16m
c/c between gantry columns (span of gantry girder)	: 8m
Self wt. of rail section	: 300 N/m
Diameter of crane wheels	: 150 mm

(40 Marks)

Draw to a suitable scale:

a. Cross section of the gantry girder and its attachment to gantry column and bracket.
b. Plan details of layout of gantry girder, crane girder and gantry column assuming sizes for gantry column. **(30 Marks)**

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