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10CV82

Eighth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Design and Drawing of Steel Structures

Time: 4 hrs.*

Max. Marks:100

- Note: 1. Answer any ONE full question, each from PART-A and PART-B.**
2. Use of IS800:2007 and steel table are permitted.

PART – A

- 1 a. Two secondary beams ISMB400@ 61.6kg/m are connected to main beam ISMB500@ 86.9kg/m. Angles used are ISA 100 × 100 × 8mm. 5 bolts of 20mm diameter are used to connect the angles to the web of ISMB400. Ten bolts of 20mm diameter are used (five on each side) to connect the angles and web of ISMB500. Top of flanges of the beams are at the same level.
 Draw to a suitable scale:
 i) Elevation of secondary beams and cross section of main beam connection.
 ii) Elevation of main beam and cross section of secondary beam connection. (15 Marks)
- b. A beam ISMB500 @ 0.869kN/m is connected to the flange of column ISHB250@ 0.51kN/m by stiffened seated welded connection. Dimensions of seat plate is 80mm wide (bearing width) 200mm long and 18mm thick. Stiffening plate is 12mm thick, 80mm wide and 250mm long, 10mm size continuous fillet weld connects both edges of stiffener plate and bottom edge of seat plate to the column flange. Top clip angle ISA 100 × 100 × 8mm, 150mm long is connected by 6mm size fillet weld for full length of both legs. Draw to a suitable scale:
 i) Elevation showing all details
 ii) Side view showing all details. (15 Marks)
- 2 a. A built-up column is composed of 2-ISMC 400 @ 49.4kg/m placed back to back at a clear distance of 300mm. The column is provided with single lacing system consisting of 65mm × 10mm flat at 45° and is connected by 6mm size welding of 60mm length on each side of flat. Draw to a suitable scale: i) Plan of column ii) Typical elevation (15 Marks)
- b. Following are the details of gusseted base:
 i) Built-up column: 2-ISWB400 at a spacing of 325mm between webs
 ii) Size of base plate: 600mm × 750mm
 iii) Thickness of base plate: 28mm
 iv) Gusset angles ISA150 × 100 × 12mm with longer leg connected to gusset plate
 v) Thickness of gusset plate: 12mm
 vi) 16 bolts of 20mm diameter connect gusset angles to gusset plate. 16 bolts of 20mm diameter connect gusset angles to the column.
 vii) Anchor bolts 20mm diameter 4 numbers.
 Draw to a suitable scale.
 i) Elevation showing flange of column
 ii) Sectional plan. (15 Marks)

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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.

PART – B

- 3 Design a roof truss shown in Fig.Q.3 with forces in each member along with its nature. Also design end with gusset plate using black both of property class 4.6. Also design the supports consisting of shoe angle and bearing plate by considering support reaction of 150kN. Anchor both are subjected to an uplift of 15kN at each support. M20 concrete is used at the supports. Draw to a suitable scale:

- Elevation of truss greater than half span.
- Enlarged view of apex joint of the truss.
- Enlarged view of the left support A.

(70 Marks)

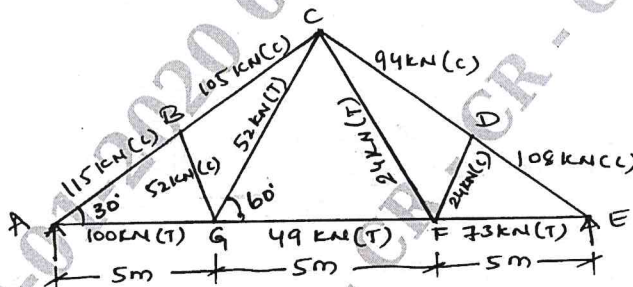


Fig.Q.3

- 4 Design a gantry girder for a mill building to carry an electric overhead travelling crane having the following data:

- Crane capacity = 250kN
 - Weight of crane excluding crab = 200kN
 - Weight of crab = 60kN
 - Span of crane between rails = 20m
 - Minimum hook approach = 1.1m
 - Wheel base = 3.4m
 - Span of gantry girder = 7m
 - Mass of rail section = 30kg/m
 - Height of rail section = 75mm
- Take $f_y = 250\text{N/mm}^2$ and $E = 2 \times 10^5\text{N/mm}^2$

Draw to a suitable scale

- Cross section of gantry girder
- Plan details
- Elevation.

(70 Marks)

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