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**Eighth Semester B.E. Degree Examination, June/July 2015**  
**Design and Drawing of Steel Structures**

Time: 4 hrs.

Max. Marks: 100

**Note: 1. Answer ONE question, from Part-A and ONE question from Part-B.**  
**2. Use of IS:800-2007 and steel table are permitted.**

**PART - A**

- 1 a. A secondary beam ISLB 450 @ 640 N/m is connected to a main beam ISLB 500 @ 975 N/m with top flanges of the beams at the same level. Two angles ISA 100 × 100 × 8 mm are used for connection 5 bolts of diameter 20mm are used to connect each angle to the web of the main beam, 5 bolts of diameter 20mm are used to connect angles with web of secondary beams:  
 Draw to a suitable scale:  
 i) Sectional elevation. (08 Marks)  
 ii) Side view. (07 Marks)
- b. An upper storey column ISHB300 @ 577 N/m is to be spliced with a lower storey column ISHB400 @ 758.5 N/m. The two columns are coaxial. Provide 50mm thick bearing plate and 6mm thick flange splice plate. Use 10 bolts of 20mm diameter on each side of the joint in two lines of 5 bolts each for connecting flanges of the columns to flange splice plate.  
 Draw to a suitable scale:  
 i) Sectional elevation. (08 Marks)  
 ii) Side view with details. (07 Marks)
- 2 a. A beam ISMB400 @ 604 N/m is to be connected to the flange of the column ISHB400 @ 907 N/m by means of stiffened connection. Provide top cleat angle ISA 75 × 75 × 8 mm and use 4mm fillet weld for connection. Provide 120 × 140 × 16 mm bearing plate and stiffening plate 220 × 120 × 12 mm. Reduce the width of the stiffening plate to 50mm at the bottom. Use 5mm fillet weld all around for connection.  
 Draw to a suitable scale:  
 i) Elevation. (16 Marks)  
 ii) Side view. (06 Marks)
- b. A gusseted base is to be detailed for a column ISHB 450 @ 855.4 N/m built up with one cover plate of section 250 × 12mm on each flange size of the base plate is 800 × 100 × 20mm. The gusset angles are ISA 150 × 150 × 12mm. The gusset plates are 12mm thick with one plate at each face of the column. Provide 4 bolts of 30mm diameter in 2 rows along one face of column to connect the flange of column, gusset plate and gusset angle. 6 bolts of 20mm diameter, in 2 rows are used to connect gusset plate with each flange of the column. Nominal bolts of 20mm diameter shall be provided for connecting gusset plate and gusset angle on the sides.  
 Draw to a suitable scale.  
 i) Plan (06 Marks)  
 ii) Sectional elevation (07 Marks)  
 iii) Side view. (05 Marks)

Important Note : 1. On completing your answers, you must only draw diagonal cross lines on the remaining blank spaces.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**PART – B**

- 3 The centre line of a roof truss is as shown in the Fig.Q.3, The magnitude and nature of forces under service conditions are  
 Top chord members – 120 kN compression  
 Bottom tie members – 100 kN tension  
 Interior member – 60 kN tension and 50 kN compression.  
 For all the interior members use similar single angle section. Design all the members and use black bolt of grade 4.6 for end connections. Also design a bearing plate and anchor bolts, 4 in numbers for a pull of 60kN to connect the truss to an RCC column 300 × 300 mm of M<sub>20</sub> grade concrete. (40 Marks)  
 Draw to a suitable scale.
- Elevation of truss greater than half space. (10 Marks)
  - Elevation of joint C to a larger scale. (10 Marks)
  - Elevation of support A. (10 Marks)

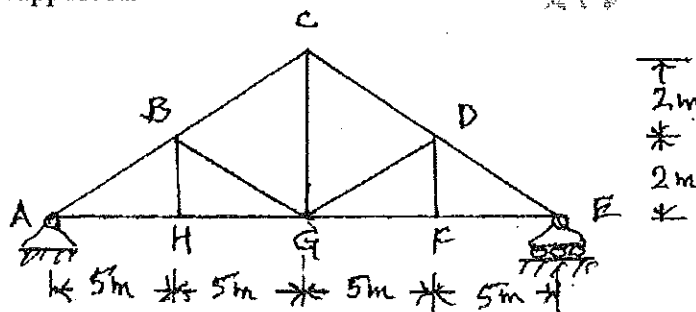


Fig.Q.3

- 4 Design a simply supported Gantry girder for an industrial shed to support an electric overhead crane using the following data:
- |  |          |
|--|----------|
| Span Gantry girder                     | - 4m     |
| Crane capacity                         | - 160 kN |
| Weight of the crane excluding the crab | - 250 kN |
| Weight of the crab                     | - 60 kN  |
| Minimum hook approach                  | - 0.8m   |
| Wheel base                             | - 5.3m   |
| Span crane girder                      | - 20m    |
| Height of the rail                     | - 105mm  |
- (40 Marks)
- Draw to a suitable scale
- Cross section of gantry girder (05 Marks)
  - Plan details (10 Marks)
  - Elevation. (15 Marks)

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