

R15

Code No: 126WY

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, April - 2018

STEEL STRUCTURES DESIGN AND DRAWING

(Common to CEE, CE)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

Use of IS: 800-2007 code, steel table and extracts from code is permitted.

PART - A

(25 Marks)

- 1.a) Enumerate the different limit states as per code. [2]
- b) List the failure modes that may control the strength of a bolted joint. [3]
- c) List the checks to be made before, during and after welding to maintain quality control. [2]
- d) Distinguish between lacing and battening. [3]
- e) List the defects in weld. [2]
- f) Write down the assumptions involved in the design of purlins. [3]
- g) Generally purlins are placed at the panel points. Why? [2]
- h) List the forces acting on the web splice of a plate girder. [3]
- i) Explain briefly about failure of bolted joints. [2]
- j) Explain under what circumstances intermediate vertical stiffeners and end bearing stiffeners need to be provided in plate girder. [3]

PART - B

(50 Marks)

- 2.a) What are the various types of structural steel? Discuss their mechanical properties.
- b) Sketch the various types of Bolted connections and Welded connections. [5+5]

OR

3. A bridge truss diagonal carries a pull of 200 kN. The length of the diagonal is 3 m. The member is connected to a gusset plate 10 mm thick. Design a suitable section using.
 - a) Single angle section.
 - b) Double angle section. [5+5]

4. Design a column having an effective length of 6 m and subjected to a factored axial load of 2400 kN. Provide the channels back-to-back connected by welded lacing. Assume Fe410 grade steel. [10]

OR

5. A column ISHB350@661.2 N/m carries an axial compressive factored load of 1700 kN. Design a suitable welded gusset base. Assume M20 grade concrete. [10]

6. Design a simply supported plated rolled steel beam section to carry a uniformly distributed load of 20 kN/m inclusive of self weight. Effective span of the beam is 3 m. The compression flange of the beam is laterally supported. [10]

OR

7. Design a purlin of a roof truss covered by roof sheeting: [10]
- | | | | |
|--------------------|------------------------|---------------------------|-------------------------|
| Spacing b/n truss | : 5m. | Spacing b/n purlin | : 1.2 m |
| Span of truss | : 10m. | Self Wt. of roof sheeting | : 171 N/m ² |
| Self Wt. of purlin | : 125N /m ² | Live Load | : 0.4 kN/m ² |
| Wind Load | : -2 kN/m ² | | |

8. A bridge truss diagonal carries a pull of 200 kN. The length of the diagonal is 3 m. The member is connected to a gusset plate 10 mm thick. Design a suitable section using. a) Single-angle section. b) Double-angle section. [10]

OR

9. Design a splice for joining tension member sections 160 × 10mm and 320 × 16mm. The member is subjected to a factored tensile load for 360 kN. Assume Fe 410 grade of steel. Provide 20mm diameter bolts of grade 4.6 for making the connections. [10]

10. Design intermediate transverse stiffeners and connections without using tension field action for the welded plate girder section as follows; Web plate = 3000 mm × 8 mm; Flange plates = 500 mm × 20 mm; Factored bending moment and shear force are 4500 kN-m and 900 kN respectively. [10]

OR

11. A railway steel bridge girder of span 18 m carrying a uniformly distributed load of 50 kN/m. Design a welded thin web plate girder with no intermediate transverse stiffeners. Assume depth to thickness ratio of web as 150. Take yield stress of steel as 250 N/mm². [10]

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