R13

Code No: 126DY

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 stiffners and end bearing stiffners 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/mm^2. [10]

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