R16

Code No: 136BB

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, May - 2019

DESIGN OF STEEL STRUCTURES

(Common to CE, CEE)

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.

IS 800-2007 and steel tables are permitted.

PART - A

(25 Marks)

1.a)	Differentiate nominal diameter and gross diameter of bolt.	[2]
b)	List the various types of welded joints.	[3]
c)	List the various types of tension members.	[2]
d)	Evaluate the effective length of column based on end conditions.	[3]
e)	Under what conditions should a beam be checked for shear.	[2]
f)	Sketch the failure mode of laterally unsupported beams.	[3]
g)	What is the minimum thickness of a plate girder when it is exposed to weather but accessible for painting?	[2]
h)	What do you mean by web buckling?	[3]
i)	Define end bearing in roof trusses.	[2]
j)	What are the loads acting on the roof truss and for what load combinations the truss is to be designed.	[3]

PART - B

(50 Marks)

2. Identify the number of bolts required for a lap joint between two plates of size 100mm × 16mm and 100mm × 12mm thick so as to transmit a factored load of 150 kN using a single row of M20 bolts of grade 4.6 and grade 410 plates. [10]

OR

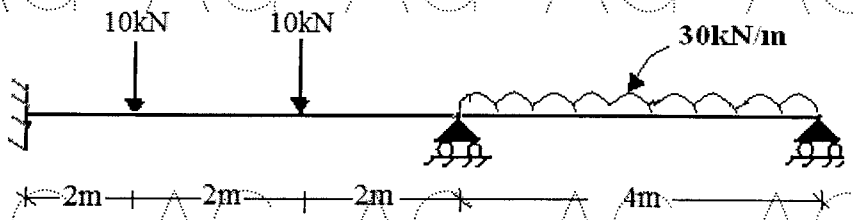
3. A tie in a truss of 2 ISA 90 × 60 × 10mm is welded on either side of 10mm gusset plate through the longer legs. Design the welded joint if permissible stresses in angle and fillet welds are 150MPa and 107MPa respectively. [10]

4. Bridge truss carries an axial pull of 500 KN. It is to be a gusset plate 20mm thick by a double cover butt joint with 20 mm diameter power driven rivets. Design an economical joint. Determine the efficiency of the joint. [10]

OR

5. Design a column with single lacing system to carry a factored axial load of 1000kN. The effective length of column is 4m. Use two channels placed toe to toe. [10]

6. A two span continuous beam of uniform section loaded with ultimate loads as shown in figure. Determine the required plastic moment of resistance. [10]



OR

7. A simply supported beam (laterally supported) of span 10m carries a UDL of 60kN/m. In addition to UDL the beam is carrying a central point load of 40kN. Design the section and check the section for shear and deflection. [10]

8. Design a welded plate girder for an effective span of 35m carrying a UDL 25kN/m and two concentrated loads of 100kN each, acting at 10m from both the ends. The girder is simply supported and fully restrained against lateral buckling throughout the span. [10]

OR

9. Design a bearing stiffener for a welded plate girder with the following specifications. Web = 1000mm × 8mm thick. Flanges = 2 Nos. of 300×20mm plate on each side. Support reaction = 300kN. Width of the support = 300mm. [10]

10. Design a purlin for a roof truss having the following data: Span of the truss = 9.0m, Spacing of truss = 3m c/c, Inclination of roof = 30^0 Spacing of Purlin = 2m c/c Wind pressure = 1.5 kN/m^2, Roof coverage= A.C Sheeting weighing 200 N/m^2, Provide a channel section for Purlin. [10]

OR

11. Explain in detail the steps involved in the design of a roof truss. [10]

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