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Question Paper Code: 1036164

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024

Sixth Semester

Civil Engineering

CE8601-DESIGN OF STEEL STRUCTURAL ELEMENTS

(Regulation 2017)

(Note: Use of IS 800-2007, IS 875 Part-I ,II, III and Structural Steel Tables are permitted. Unless otherwise specified use Fe 410 grade steel and assume suitable data wherever necessary)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. Recall the value of live loads to be adopted in the design for residential and commercial buildings.
2. Contrast working stress and limit state design.
3. Classify bolts.
4. Write the formula to find the Efficiency of joints in bolts.
5. Illustrate any four tension members.
6. Translate the use of Lug Angles.
7. Compare short column and long column.
8. Tell effective length of column.
9. What is the use of plate girder?
10. Recall web buckling.

PART – B

(5 x 13 = 65 Marks)

11. (a) Outline the concept of allowable stress method for steel structures and discuss its advantages and limitations. (13)

(OR)

- (b) Explain the concept of limit state design methods for steel structures and discuss its advantages and limitations. (13)

12. (a) Solve for efficiency of lap joint shown in Fig.12a given M20 bolt of grade 4.6 and a plate of grade Fe 410 steel are used. (13)

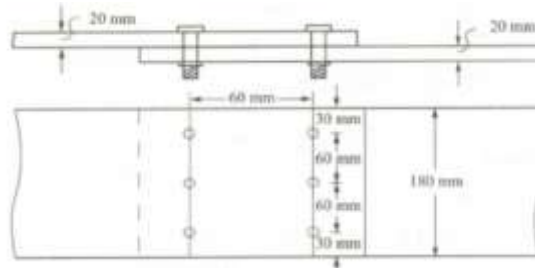


Fig. 12a

(OR)

- (b) Find the efficiency of lap joint for the problem given in Fig.12a if instead of lap joint, double cover butt joint is used. Two cover plates each of size 12 mm and 6 Nos. of bolts are provided on each side. (13)

13. (a) A single unequal angle ISA 90 x 60 x 6 mm is connected to 10 mm thick gusset plate at the ends with 5 No.s of 16 mm dia bolts to transfer tension. Determine the design tensile strength of the angle if gusset is connected to 90 mm leg as shown in Fig. 13a. (13)

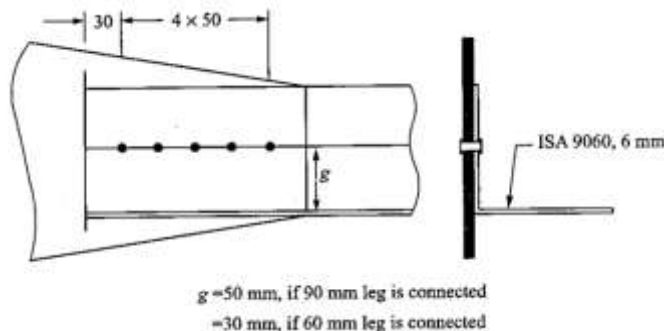


Fig. 13a

(OR)

- (b) Design a splice to connect a plate of size 300 x 20 mm width to a plate of size 300 mm x 10 mm. The design load is 500 kN. Use 20 mm black bolts fabricated in the shop. Provide a double-cover butt joint with a thickness of cover as 10 mm. (13)

14. (a) Design a column 4 m long to carry a factored load of 6000 kN column is effectively held at both ends and restrained in direction at one end. Design the column using beam section ISHB 450@ 907 N/m. (13)

(OR)

- (b) Design a laced column with two channels back-to-back of length 10m to carry an axial factored load of 1400Kn. The column may be assumed to have restrained in position but not in direction at both ends. (13)
15. (a) Design a simply supported beam of 10m effective span carrying a total load of 60 kN/m the depth of the beam should not exceed 500mm. The compression flange of the beam is laterally supported by floor construction. Assume the stiff end bearing is 75mm. (13)

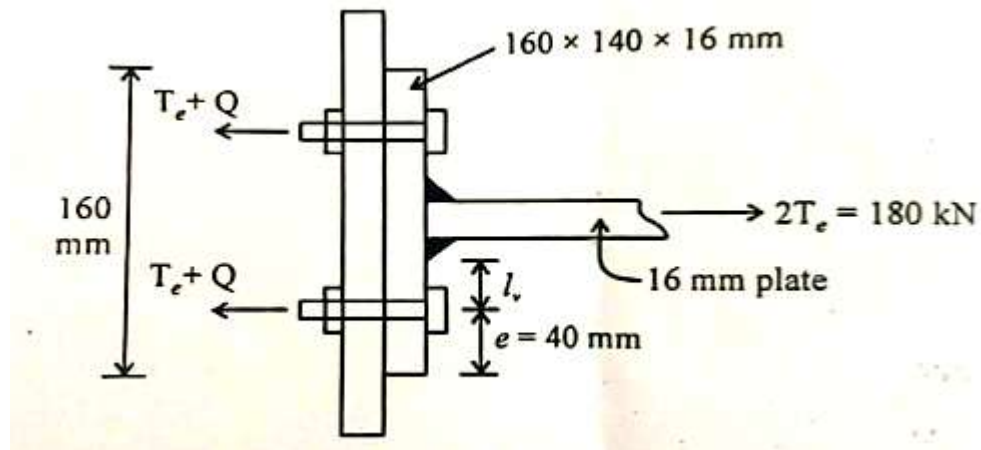
(OR)

- (b) An ISMB 500 section IA is used as a beam over a span of 6 m, with simply supported ends. Determine the maximum factored uniformly distributed load that the beam can carry if the ends are restrained against torsion but the compression flange is laterally unsupported. (13)

### PART – C

(1 x 15 = 15 Marks)

16. (a) (a) The figure shows the joint in the bottom chord continuous member of the truss. Design the connection using M16 black bolt of property class 4.6 and grade Fe410 steel. Assume edge distance of 35 mm and minimum pitch. The joint shown in fig, has to carry a factored load of 180kN. End plate is used of size 160mm x 140 mm x 16 mm. The bolts used are M20 HSFG of grade 8.8. Check whether is safe. (15)



(OR)

- (b) (b) Design a built-up beam section for a span of 8m to carry a uniformly distributed (15) load of 15 kKN/m and a central concentrated load of 100 KN. The beams is laterally supported through out. Show the curtailment of plates also. (15)

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