OLE-3205

B. Tech. 5th Semester (Civil Engg.) Examination – April, 2021

DESIGN OF STEEL STRUCTURE

Paper : PCC-CE-309-G

Time : Three Hours]   *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note :   Q. **1** is **compulsory**. Each question carries equal mark (15 marks). Students have to attempt 5 questions in total at least one question from each section. Use of IS 800- 1984 or 2007 is allowed. Use of Steel Table is allowed. Assume suitable data.

1. Explain the following : $2.5 \times 6 = 15$

   (a) Differentiate between web buckling & web crippling.

   (b) Sketch different types of bolted connections.

(c) Define Lap joint and Butt Joint.

(d) Write the use of Lug Angle in tension members.

(e) List the various component of a Gantry Girder with neat sketch.

(f) What do you mean by eccentrically loaded column ?

SECTION – A

2. (a) What are the composition and properties of structural steel ? 7.5

(b) What are the types of load to be .account for steel design ? 7.5

3. (a) Design a double cover lap joint between the two plates of width 180 mm, if the thickness of both plate is 10 mm. The joint has to transfer a working load of 110 kN. The plates are of Fe 410 grade. Use bearing type bolts. 7.5

(b) Define bolt. Write about the advantages of bolting. List the various types of bolted connection. 7.5

SECTION – B

4. Design a tension member to carry a load of 450 kN. Use a double angle rolled steel section connected (at site) to each side of a gusset plate of 10mm thick using 20mm diameter bolts of grade 4.6.   **15**

5. Design a built-up column with two channel sections placed back to back. The column is of 10 m effective length and supports a load of 1500 kN. Both the ends of the column are effectively restrained in direction and position.   **15**

SECTION – C

6. An ISMB500@111.1 N/m has been used as a simply supported beam over a span of 5.5 m. Determine the safe uniform load that the beam can carry in flexure if the compression flange of the beam is restrained against lateral buckling.   **15**

7. A column 7 m long is to support a load 2800 kN. The ends of the column are effectively held in position and direction. Design the column if rolled steel beams and 16 mm plates are only available.   **15**

SECTION – D

8. A portal frame is shown in figure. Find the value of W at collapse. 15
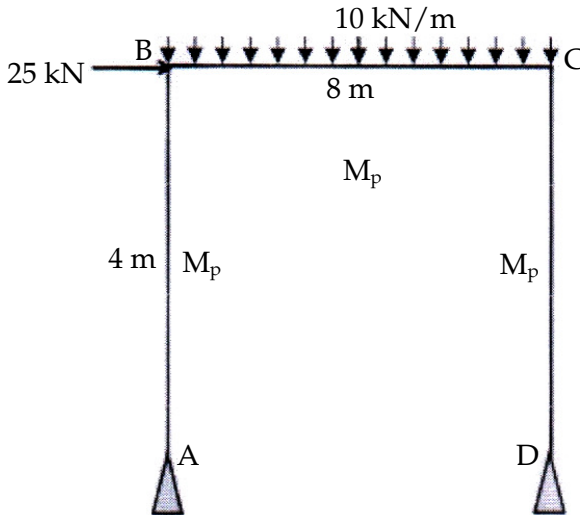
9. A Gantry crane exerts a load of 150 kN on each of its wheels, excluding Impact and other loads, the wheel distance is 3 m. The span of the gantry is 9 m. Design the girder assuming lateral support. 15

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