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R 3174

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

Sixth Semester

(Regulation 2004)

Civil Engineering

CE 1352 — DESIGN OF STEEL STRUCTURES

(Common to B.E. (Part-Time) Fifth Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Use of IS 800, Steel Tables are permitted.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw a neat sketch of ISMB 400 and mention its various properties.
2. What are the advantages of riveted connections?
3. Explain shear lag effect.
4. Define (a) Gross area (b) Net area.
5. Draw a neat sketch of base plate connection.
6. A single angle ISA 60 × 60 × 8 mm, 3.0 m long is used as a strut. The ends are welded to the gusset plate. Calculate the slenderness ratio.
7. Draw a neat sketch of plate girder and indicate the vertical and horizontal stiffeners.
8. Under what circumstances, load bearing stiffeners are used in plate girder?
9. List the various types of roof sheetings commonly used.
10. Calculate the permissible deflection for a truss of 10 m span.

PART B — (5 × 16 = 80 marks)

11. (a) A 6 mm thick angle section is jointed to a 10 mm thick gusset plate. The angle is supporting a load of 60 kN. Find out the number of 16 mm diameter rivets.

Or

- (b) A tie member 75 mm × 8 mm is to transmit a load of 90 kN. Design the fillet weld and calculate the necessary overlap.
12. (a) Determine the tensile strength of a roof truss diagonal 100 × 75 × 10 mm connected to the gusset plate by 20 mm diameter power driven rivets in one row along the length of the member. The short leg of the angle is kept outstanding.

Or

- (b) The main tie of a roof truss consists of ISA 150 × 115 × 8 mm and is connected to a gusset plate by 18 mm diameter rivets. Find out the maximum load it can carry.
13. (a) Design a built up column 8 m long to carry an axial load of 400 kN. The column is restrained in position but not in direction at both the ends. Provide single lacing system with riveted connections.

Or

- (b) Design a built up column 6 m long to carry an axial load of 400 kN. The column is provided with Batten system. The ends of the columns are pinned. Design the battens.
14. (a) A simply supported steel joist with a 4.0 m effective span carries a udl of 40 kN/m over its span inclusive of self weight. The beam is laterally unsupported. Design a suitable section. Take $f_y = 250 \text{ N/mm}^2$.

Or

- (b) Write the step by step procedure for design of vertical and horizontal stiffeners in a plate girder.

15. (a) Design a purlin for a roof truss having the following data :

Span of the truss = 6.0 m

Spacing of truss = 3 m c/c

Inclination of roof = 30°

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 as purlin.

Or

(b) Design a gantry girder to be used in an industrial building carrying an EOT crane for the following data :

Crane capacity = 200 kN

Total self weight of all components = 240 kN

Minimum approach at the crane hook of gantry girder = 1.2 m

Wheel base = 3.5 m

C/c distance between gantry rails = 16 m

C/c distance between columns = 8 m

Self weight of rail section = 300 N/m

Yield stress = 250 N/mm^2

Design the main gantry section. Connection design not required.
