A 192

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Fifth Semester

Civil Engineering

CE 332 — STRUCTURAL DESIGN — I

Time : Three hours Maximum : 100 marks

Use of relevant BIS–codes is permitted.

Assume missing data if necessary.

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. How the rolled steel beams are classified?

2. Define permissible stresses and working stresses.

3. Define 'Rivet value'.

4. State any two common defects in welding.

5. What is net sectional area of a tension member? How it is calculated in chain riveting?

6. What are the purposes of 'lacing's in built up columns?

7. Under what situations plated beams are used?

8. Why intermediate stiffner's are required for plate girders?

9. How the species of timber in India are classified according to modulus of elasticity?

10. What are 'Flitched Beams'?

PART B — (5 × 16 = 80 marks)

11. (i) A bracket plate is welded to the flange of a column as shown in Figure 1. Design the connection. (12)

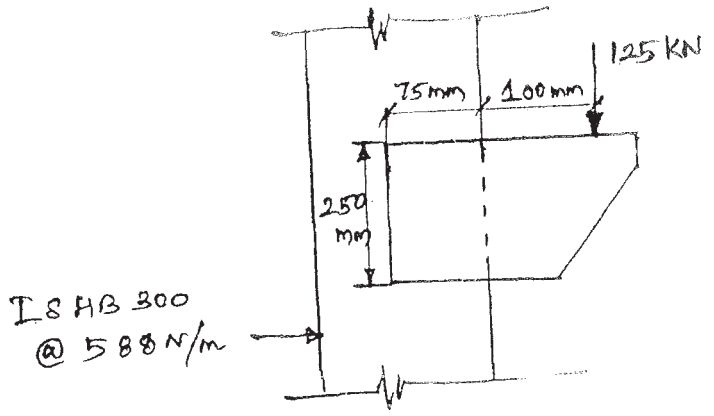

Figure 1

(ii) Explain with a neat sketch a riveted light moment connection. (4)

12. (a) (i) Explain the general design requirements of a steel structure. (10)

(ii) What are cold formed light gauge steel sections? Sketch any four typical cross sections. (6)

Or

(b) A riveted bracket connection is shown in Figure 2. Check the adequacy of the fasteners provided.

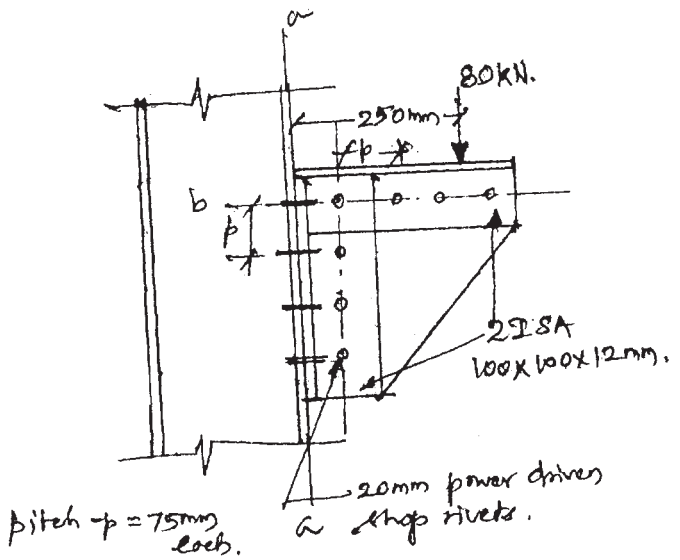

Figure 2

13. (a) A single angle ISA 90 × 90 × 10 mm is used as a tension member. Estimate its tensile capacity and design the respective connection if it is

(i) Connected through welding to a gusset plate 5 mm fillet weld

(ii) Connected through power driven shop rivets of 20 mm diameter.

Or

(b) A steel stanchion has to carry an axial load of 400 kN. The unsupported length of the stanchion is 5 m. The ends are unrestrained in direction only. It is resting on a concrete pedestal having a capacity of 4 MPa. Design the stanchion, suitable base plate and the required connections.

14. (a) A steel floor beam of a building has a span of 6.0 m. It is supported at ends and carries a uniform load of 40 kN/m inclusive of its self weight. Adopting Fe 250 grade steel. Design the beam if the lateral supports for compression flange are provided only at ends.

Or

(b) A plate girder is fabricated from the following elements.

Web plate	—	2000 mm × 6 mm (With 5 mm clearance at top and bottom)
Flange angles	—	2 nos. 150 mm × 150 mm × 12 mm at each flange
Flange cover plates	—	2 nos. 400 mm × 10 mm at each flange
Connections	—	using 22 mm power driven shop rivets.

Design the intermediate stiffeners required for the girder for a shear of 150 kN.

15. (a) Teak wood floor beams are used at spacing of 3 m c/c. The span of the beam is 4.5 m. Assuming a D.L of 3 kN/m^2 and L.L of 1.5 kN/m^2 design the beam and check its safety.

Or

(b) A timber column is 4 m long. It has to carry a load of 120 kN. Using BABUL wood, design a suitable spaced column.

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