



- Notes :
1. All questions carry equal marks.
 2. Due credit will be given to neatness and adequate dimensions.
 3. Illustrate your answers wherever necessary with the help of neat sketches.
 4. I.S.I. Hand Book for structural steel section, I.S. Code 800/2007, I.S. 456 (Revised), I.S. 875 may be consulted.
 5. Use of D. A. Law's "Pocket book for Mechanical Engineers" is permitted.
 6. Due credit will be given to neatness and adequate dimensions.
 7. Answer all questions.
 8. Assume suitable data wherever necessary.

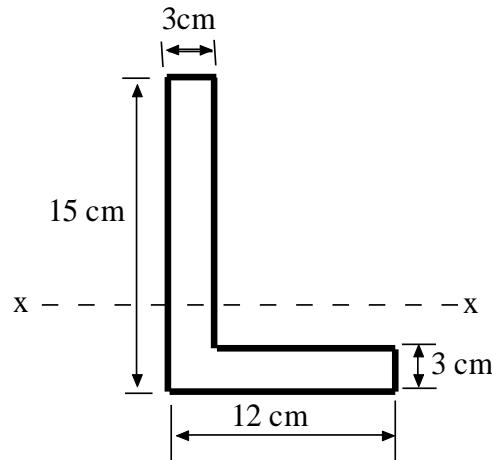
- 1.** Design a tension member consisting of 2 ISA (tacked) on same side of 12 mm thick gusset plate with longer leg outstanding to carry axial load of 200KN using 20 mm dia Bolt. **13**
Fy = 250MPa. Sketch the structure details. C/C length of member is 5.0m.

OR

- 2.** Design a double angle discontinuous strut to carry 30kN load. The length of strut between Center to center of intersection is 3.2m. Design the connection of angles with the gusset plate by welding. Use IS 800-2007. **13**
- 3.** Two plates 250mm x 12mm and 150mm x 12mm are lap-joined to carry axial force of 150kN by using 22mm dia. bolt fy = 250 MPa. Design the connection, find the efficiency of the joint. Sketch the structural details, IS 800-2007. **13**

OR

- 4.** Find shape factor for the following cross-section. **13**

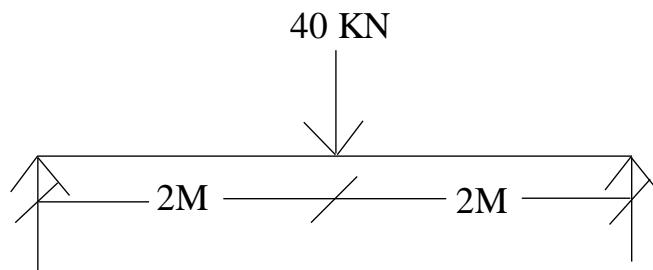


(Figure NOT to scale)

5.

Find collapse load factor for following beam. Select the section for design.

14

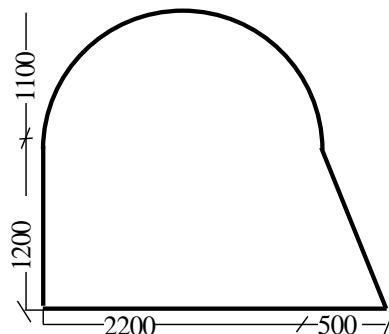


OR

6.

Find shape factor for the following cross-section.

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7.

A welded plate girder of span 20m is laterally restrained through-out its length. It has to carry a load of 50kN/m over the whole span besides its weight. Design the girder with Intermediate stiffeners.

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8.

Design a Laced column to carry axial load of 750 kN and shear force of 70 kN consisting of two channels back to back. $F_y = 250$ MPa. Unsupported length 5m. Column ends are effectively held in position and free to rotation about both axes. Use load factor 1.5. Sketch structural details.

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9.

A beam ISMB 400 @ 616 N/m transfers 200 kN end reaction and 50 kNm end moment to the flange of ISHB 350 @ 674 N/m. Design suitable beam-column connection using 22 mm. $F_y = 250$ MPa, Load Factor = 1.5. Sketch structural details.

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10.

Design a slab base to column ISHB 400 @ 822 N/m carrying axial load of 900 kN and B.M. of 25 kNm about major axis. Concrete block is of M20 grade concrete. SBC of soil is 300 kN/m² $F_y = 250$ MPa. Load factor is 1.5. Sketch structural details.

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