

(Set-1)

**B.Tech - 6th**  
**Steel Structure**

*Full Marks : 70*

*Time : 3 hours*

**Q. No. 1 is compulsory and answer any  
five from the rest**

*The figures in the right-hand margin indicate marks*

**Use of IS 800-2007 is allowed**

- 1. Answer the following questions : 2 × 10**
- (a) What is rolled steel section ? Explain.**
  - (b) What do you mean by structural steel ?**
  - (c) State four advantages of steel structures compared to other materials.**
  - (d) What do you mean by a built up section ?  
What are its advantages ?**
  - (e) What are the various types of connections**

*( Turn Over )*

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commonly adopted in steel structures ?  
Which type is more preferable and why ?

- (f) State the characteristics of HSFG bolts.
  - (g) Distinguish between slab base and gusseted base.
  - (h) A gantry girder consists of a plate girder. Is the statement correct ? Comment.
  - (i) What do you mean by a tacking bolt ?
  - (j) For smaller spacing of trusses, which type of purlins are used normally ?
2. Design a lap joint between the two plates each of width 120 mm and of thickness, 12 mm using bearing type bolts. The joint has to carry a design load of 150 kN. Use Fe 410 grade of steel and M16 bolts of grade 4-6. Draw the c/s and the top view. 10
3. A tie member of a roof truss consists of 2 ISA 90 × 60 × 19 mm, connected on the either side

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of 12 mm gusset plate and is subjected to a factored tensile force of 300 kN. Design the welded connection considering the weld to be made in the workshop. 10

4. Calculate the tensile strength of a roof truss diagonal  $100 \times 75 \times 10$  mm. The longer leg is connected to the gusset plate with 20 mm diameter bolts in one row. The no of bolts used is 4 and the edge distance is 30 mm. Assume a pitch of 40 mm. 10
5. If ISHB 400 @759 N per m is used as a column of effective length 4 m, with both ends pinned, calculate the design axial load capacity of the column. Use  $f_y$  as 250 N per sq mm and  $f_u$  as 410 N per sq mm. 10
6. (a) Classify the four different types of beam cross sections. 4
- (b) If ISMB 400 @604 N/m is used as a beam, find out the class of section to which it belongs. 6

7. A steel column ISHB 250@537 N/m supports a total factored load of 1000 kN. Design a slab base for the column. The column is supported on a pedestal made of M20 concrete. Show the c/s of the slab base. 10
8. Write short notes on the following (any four) :
- (i) HSFG bolt of grade 8.8  $2\frac{1}{2} \times 4$
  - (ii) Block shear failure
  - (iii) Laced column
  - (iv) Web crippling of beams
  - (v) Elements of a plate girder.
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