

**Sixth Semester Examination – 2008**

**STEEL STRUCTURE**

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory  
and any **five** from the rest.

The figures in the right-hand margin  
indicate marks.

1. Answer any ten questions :  $2 \times 10$
- (i) Write any four advantages of steel structure construction.
  - (ii) Define the following terms :
    - (i) Gross diameter of rivet
    - (ii) Gauge distance of rivets.



- (iii) Differentiate between lap joint and butt joint.
- (iv) How do you avoid the splitting failure of plates in a riveted connection ?
- (v) A double riveted double cover butt joint is used to connect plates 16 mm thick. The power driven shop rivets of nominal diameter of 22 mm are used. Determine the rivet value. Take  $f_y = 250$  Mpa.
- (vi) Differentiate between the fillet weld and butt weld.
- (vii) An angle section ISA 6040 × 8 mm is used as a tension member with its longer leg connected by 12 mm diameter rivets. Calculate the net cross sectional area.

(viii) Define the following terms :

(i) strut

(ii) boom

(ix) A rolled steel beam section ISHB 200 @ 37.3 kg/m is used as a column and has an unsupported length of 3.5 m. It is effectively held in position and restrained against rotation at one end and at the other end partially restrained against rotation but not held in position. Determine the maximum slenderness ratio.

(x) Differentiate between the bending failure and shear failure of a steel beam.

(xi) What do mean by web buckling of steel column ?

2. A bracket plate is connected to the flange of a stanchion ISHB 400 @ 77.4 kg/m as shown in Figure 1. Design the riveted connection between angle section and flange of the stanchion. 10

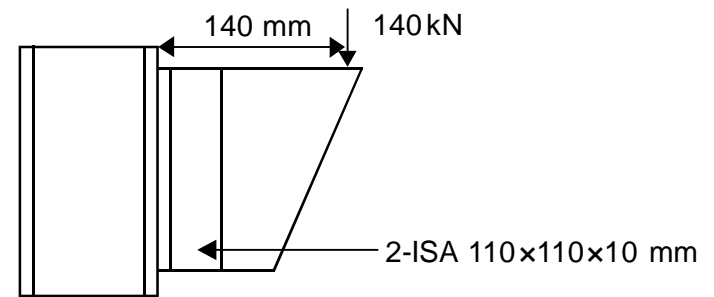


Figure – 1

3. A tie member in a roof truss is 1.6 m long and carries an axial load of 120 kN. Design a suitable single unequal angle section if fillet weld is used at the joint. 10
4. A double angle discontinuous strut ISA 125 x 95 x 10 mm @ 21.02 kg/m long legs back to back is connected to both the sides of a

gusset plate 10 mm thick with two rivets. The length of strut between centre to centre of intersections is 3.8 m. Determine the safe load carrying capacity of the section. 10

5. Design a gusseted base for a column ISHB 400 @ 77.4 kg/m, carrying an axial load of 2100 kN. The allowable bearing pressure on concrete is 4000 kN/m<sup>2</sup>. 10

6. Design a simply supported beam, having an effective span of 6.5 m and carrying a uniformly distributed of 55 kN/m. The beam is laterally supported.  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $f_y = 250 \text{ N/mm}^2$ . 10

7. Derive an expression for economical depth of a riveted plate girder subjected to a maximum bending moment, M. 10

8. An overhead steel rectangular water tank has a capacity of 75,000 litres. The height of columns of staging is 14 m. Design the T-covers and flats provided inside and outside, respectively of the bottom plate, at each joint. 10