Total Pages—5

(Set-R_1)

B.Tech-6th

Steel Structure

Full Marks : 70

Time : 3 hours

Answer Q. No. 1 and any five from the remaining

The figures in the right-hand margin indicate marks

Use of IS : 800-2007 and steel table are permitted

1. Answer the following questions : 2×10

(*i*) Write any four advantages bolted connection over welded connection.

(*ii*) Explain briefly shear failure of bolt.

(*iii*) Define the following terms :

(*a*) Tie.

(*b*) Post.

(*iv*) Define the terms 'pitch' and 'gauge' used in the bolted connection.

(*Turn Over*)

(v) An angle section ISA 100 × 75 × 8 mm is used as a tension member with its longer leg connected by 20 mm diameter black bolt. Calculate the net cross-sectional area.

(vi) Differentiate between symmetrical and unsymmetrical bending.

(vii) Explain the tearing failure of plates in a bolted connection.

(viii) Find out the shape factor of rectangular section (100 mm × 50 mm).

(ix) Under what situation the gusseted base is preferred over slab base.

(x) What are the advantages of parallel flange steel sections over tapered flange section ?

2. A bracket plate 12 mm thick is connected to a flange of a column ISHB 350 @ 661 N/m. The bolts of 20 mm diameter are arranged in two vertical rows 75 mm apart and pitch of bolts is

(*Continued*)

75 mm. The number of bolts per vertical row is 2. The bracket transmits a vertical load of 25 kN at an eccentricity of 120 mm to the column. The load lies in the plane of bolts. Calculate the stress on each bolt. 10

3. Design the welded connection between the bottom chord (AO & OB) and gusset plate using fillet weld. Also design the gusset plate. 10

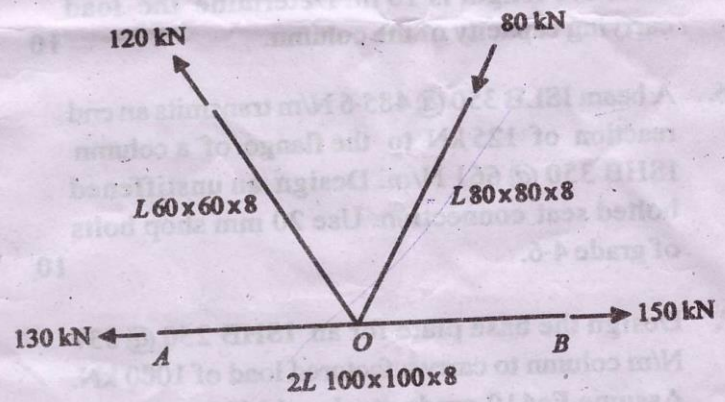

Figure 1 joint in the bottom chord discontinuous member of the truss.

4. Design a single angle tension member to carry a factored load of 180 kN. The length of the tension member is 4 m. The member is subjected to the possible reversal of stress due to the action of wind. Use 20 mm shop bolts of grade 4·6. 10

5. A built-up column is made of four ISA 150 × 150 × 15 mm angles with their backs 500 mm apart. The column is double laced and the effective length is 10 m. Determine the load carrying capacity of the column. 10

6. A beam ISLB 350 @ 485·6 N/m transmits an end reaction of 125 kN to the flange of a column ISHB 350 @ 661 N/m. Design an unstiffened bolted seat connection. Use 20 mm shop bolts of grade 4·6. 10

7. Design the base plate for an ISHB 250 @ 537 N/m column to carry a factored load of 1000 kN. Assume Fe410 grade steel and M25 concrete. Use welded connection between column and base plate. 10

(*Continued*)

8. Design a laterally unrestrained beam to carry a load of 25 kN/m. The beam is simply supported and the effective span is 5 m. 10
