

B.E. (Civil Engineering) Sixth Semester (C.B.S.)  
**Steel Structures - I**

P. Pages : 3

Time : Four Hours



**TKN/KS/16/7463**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Due credit will be given to neatness and adequate dimensions.
  7. Assume suitable data whenever necessary.
  8. Use of non programmable calculator is permitted.
  9. Use of structural steel table and I.S. 800-2007 is permitted.

1. a) Determine the shape factor and the plastic moment of Resistance about the centroidal x-x-axu for the section shown in figure 1. Take  $f_y = 250N/mm^2$ . **6**

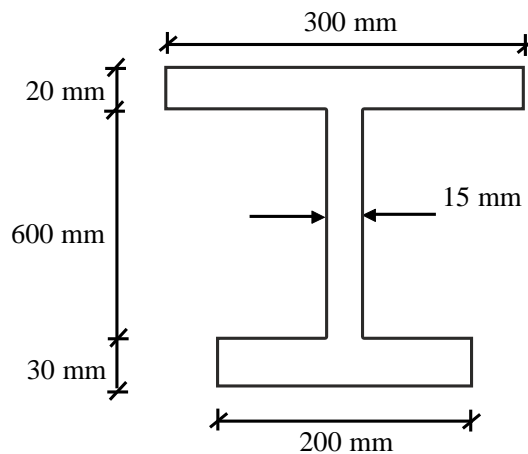


Figure 1

- b) Design a single Angle Tie Member to Carry a safe load of 150kN. The length of member is 2.5m. Provide bolted connection. **14**

**OR**

2. a) A 2.5m Long discontinuous strut is subjected to a factored load of 300kN. Design the section using two angles provided on either sides of the gusset 15mm thick. Use Bolted connection. **14**
- b) Find the collapse load for the beam loaded as shown in figure 2. **6**

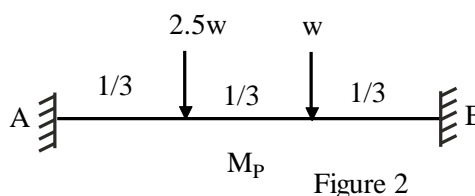
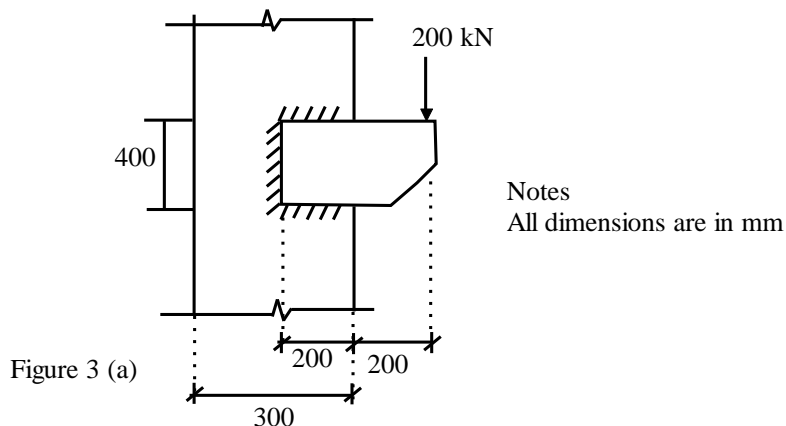
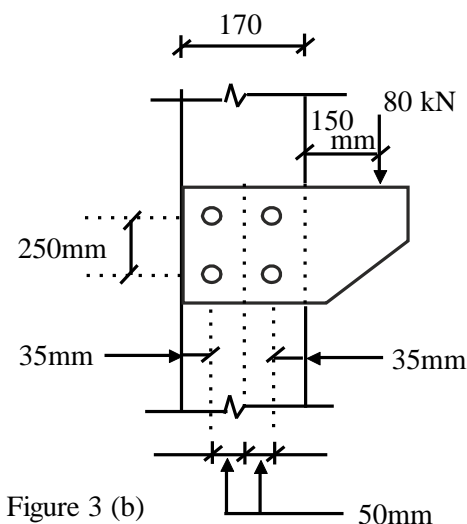


Figure 2

3. a) Design a Bracket connection to transfer a factored Load of 200kN as shown in figure 3 (a). **10**



- b) A bracket connection is shown in figure 3 (b). Find the size of Bolt required if thickness of the bracket is 12mm. **10**



**OR**

4. a) A secondary Beam ISLB 350 @49.5 kg/m is to be connected to a main Beam. ISMB 600 @ 122.6 kg/m. The secondary beam transfers a safe reaction of 400 kN. Design the connection. **10**
- b) Design a welded seat angle connection between a beam ISMB 350 @ 49.5 kg/m and column ISHB 225 @ 46.8 kg/m. for a reaction of Beam 150 kN assuming Fe410 grade of steel with  $f_y=250$  MPa and welding is done at site. **10**
5. A beam, simply supported over an effective span of 8m, carries a U.d.L. of 80 kN/m, inclusive of self weight. The depth of the beam is restricted to 450 mm. Design the Beam assuming that the compression flange of the beam is laterally supported by floor construction. Assume width of support 230 mm. **20**

**OR**

6. A welded plate Girder of span 30m is Laterally restrained throughout its length. It has to carry a load of 110 kN/m over the whole span besides its self weight. **20**  
Design.  
i) C/s of Girder.  
ii) End Bearing stiffener and  
iii) Connection of flange to web.

7. Design a Built up column consisting of four rolled steel angles of Grade Fe410 steel for a 5m high Laced column to carry a factored Load of 2000 kN. The column is effectively held in position but not restrained against rotation at both ends. **20**

**OR**

8. a) A column is subjected to a factored load of 1000 kN and a factored moment of 80 kN-m @ one of its planer axes and 40 kN-m about the other axis respectively. Design the section using single rolled section if its effective length is 5m. **10**
- b) Design the Base plate for the column with section ISHB 225 @ 46.8 kg/m to carry a factored load of 900 kN. Assume Fe410 grade steel and M25 concrete. **10**

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