

**Total Pages—4**

**M.Tech(SE) - 2**  
**ADSS**

**Set-2**

*Full Marks : 70*

*Time : 3 hours*

**Answer any six questions including Q. No. 1**

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

**( IS-800-2007 and Steel Tables are permitted )**

- 1. Answer *all* questions : 2 × 10**
- (a) State the advantages of limit design over elastic design.**
  - (b) Differentiate between plastic hinge and mechanical hinge.**
  - (c) With the help of figures, show different types of failures in a shear connection.**
  - (d) What do you mean by web buckling ?**
  - (e) Differentiate between a tension connection and tension plus shear connection with sketch.**

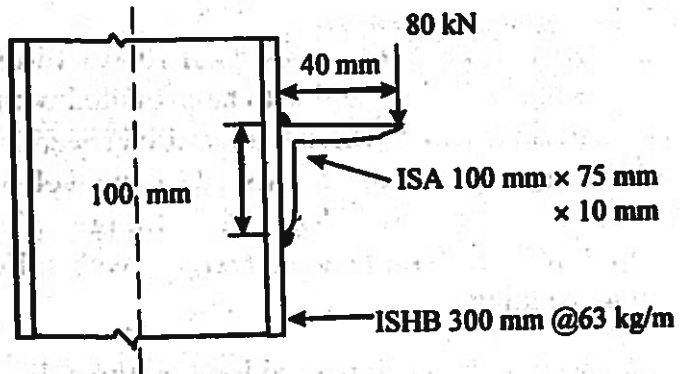
*( Turn Over )*

( 2 )

- (f) Define shear center.
  - (g) State the difference between fillet and butt welds.
  - (h) Which type of column base is preferred in soil having very low bearing capacity?
  - (i) Shear is resisted by the flanges of plate girder—comment.
  - (j) What do you mean by the principal axes of a section?
2. Design a lap joint between plates of 100 mm × 8 mm to transmit a factored load of 100 kN using black bolts of 12 mm dia. and grade 4.6. The plates are made of steel of grade ST-42-S. 10
3. Design a suitable I beam for a simply supported span of 5 m. and carrying a dead load of 20 kN/m and imposed load of 40 kN/m. Take  $f_y = 250$  MPa. 10

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4. An ISA 100 mm × 75 mm × 10 mm is welded with the flange of a column ISHB 300, @63 kg/mm. The bracket carries factored load of 80kN at a distance of 40 mm from the face of the column. Design the bracket connection. Factored yield stress of steel is 227.3 N/mm<sup>2</sup>. 10



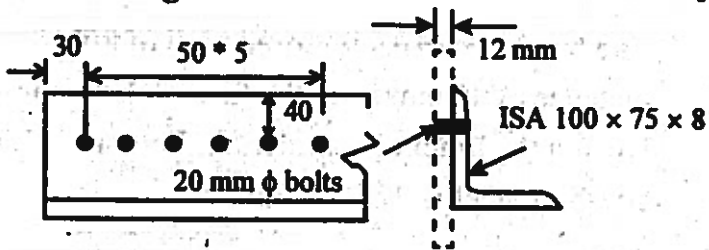
Welded bracket connection

5. A single unequal angle ISA 100 × 75 × 8 mm is connected to a 12 mm thick gusset plate at the ends with 6 nos. 20 mm dia bolts to transfer tension. Determine the design tensile strength

( 4 )

of the angle, if the gusset is connected to the 100 mm leg.

10



6. A web of a plate girder consists of  $1000 \times 16$ -mm plate of grade  $Fe_{410}$  and is to be provided with a splice at a section where the factored shear and bending moment to be resisted by the web are 1000 kN and 350 kN-m. The flange plate thickness is 50 mm each. Design a web splice with welding. 10
7. Determine the design axial load on the column section ISMB 350 given that the height of the column is 3.0 m. and it is pin ended. Take,  $f_y = 250 \text{ N/mm}^2$ ,  $f_u = 410 \text{ N/mm}^2$ ,  $E = 2 \times 10^5 \text{ N/mm}^2$ . 10
8. Calculate the moment carrying capacity of a laterally unrestrained ISMB 400 member of length 3m. 10