

PART B — (5 × 16 = 80 marks)

11. (a) Design riveted connections for a bracket as shown in Fig. 11 (a), carrying an eccentric load of 250 kN at a distance of 300 mm from the centre line. Adopt limit state design concepts.

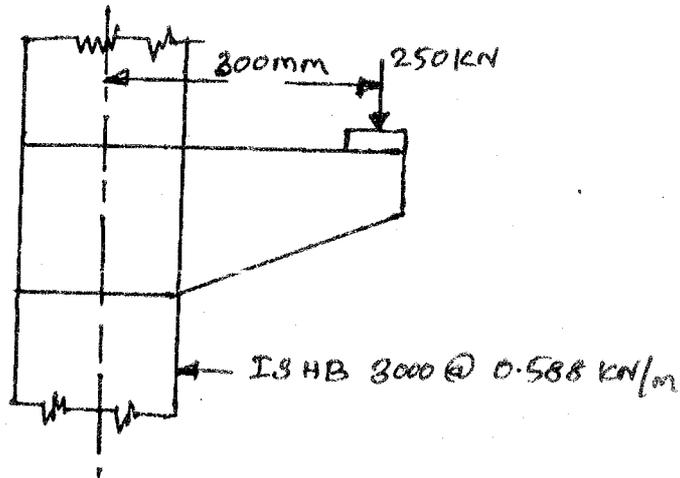


Fig. 11 (a)

Or

- (b) (i) Explain the advantages and disadvantages of bolted connections. (8)
- (ii) Two plates of 15 mm thickness have been connected in a lap joint using high strength friction grip bolts. Design the joint so as to transmit a pull equal to full strength of the plate. (8)
12. (a) Design a tension member consisting of
- (i) A pair of angles (back to back) and connected by the short legs to the same side of gusset plate. (8)
- (ii) The angles are connected to each side of the gusset plate. (8)

The member is to carry a pull of 250 kN.

Or

- (b) The main tie of a roof truss has to carry a load of 800 kN. Design a suitable double angle section for it. Determine also the number of 18 mm diameter rivets required to connect the member to the gusset plates at ends.

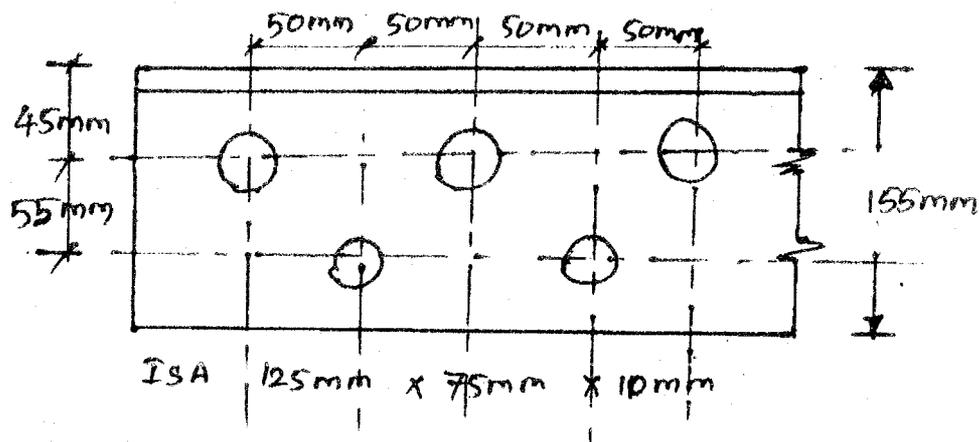


Fig. 12 (b)

13. (a) A column 5 m long is to support a load 3500 kN. The ends of the column are effectively held in position and direction. Design the column if rolled steel beams and 16 mm plates are only available.

Or

- (b) A steel column 12 m long carries an axial load of 1250 kN. The column is hinged at both the ends. Design an economical built-up section with double lacing. Design the lacing also.
14. (a) A beam of effective span of 12 m carries UDL of 150 kN/m inclusive of its own weight. Design the section if only 12 mm thick plates are available. Assume that the beam is laterally restrained at mid span and each end is restrained against torsion. Use 20 mm dia Power driven rivets.

Or

- (b) A welded plate girder is simply supported over an effective span 15 m. The girder is effectively supported in lateral direction. It carries an UDL of 65 kN/m including its self weight and two concentrated loads of 250 kN at 3 m from either support. Design the mid section of plate girder.

15. (a) Design an angle iron purlin for a trussed roof from the following data :

Span of roof truss = 12 m

Spacing of roof trusses = 5 m

Spacing of purlins along the slope of roof truss = 1.2 m

Slope of roof truss = 1 vertical to 2 horizontal

Wind load on roof surface normal to roof = 1.04 kN/m^2

Vertical load from roof sheeting = 0.2 kN/m^2 .

Or

(b) A roof truss-shed is to be built in Jodhpur city area for an industrial use. The size of shed is $20 \text{ m} \times 30 \text{ m}$ and it is proposed to be constructed near a hillock of 160 m and the slope is 1 in 2.5. The roof shed is to be built at a height of 120 m from the base of the hill. Determine the design wind pressure on the slope. The height of roof shed shall be 12 m.