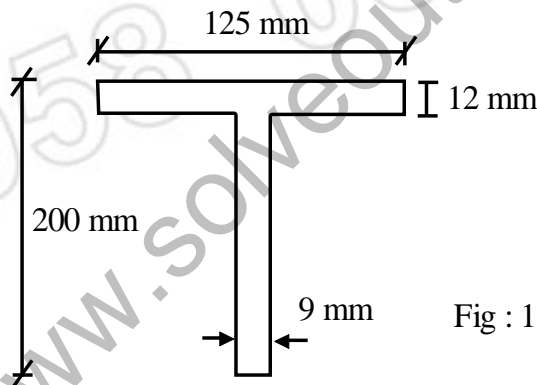




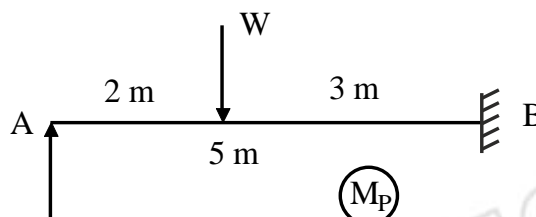
- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Question No. 2
 3. Solve Question 3 OR Question No. 4
 4. Solve Question 5 OR Question No. 6
 5. Solve Question 7 OR Question No. 8
 6. Assume suitable data whenever necessary.
 7. Diagrams should be given whenever necessary.
 8. Illustrate your answers whenever necessary with the help of neat sketches.
 9. Use of non programmable calculator is permitted.
 10. Use of IS 800-2007 and steel table is permitted.

1. a) A 3m long member is carrying a service tensile load of 325kN. Design the member using two angles provided on same side of gusset plate. Provide bolted connection. Use E250 (410) B grade steel and ordinary bolts of grade 4.6. **12**
- b) Find the shape factor and plastic section modulus of the section shown in Fig: 1 **8**



OR

2. a) Design a single angle discontinuous strut to carry a working load of 150kN. Length of the member between intersections is 2.9m. Use welded connection and ϵ 250(410)A grade steel. **12**
- b) Determine the collapse load of the propped cantilever loaded as shown in fig : 2. **8**



3. a) An ISF 180 × 16 mm is bolted to a gusset plate 16 mm thick by a double cover butt joint with 20 mm diameter bolts as shown in fig: 3 Find design strength of the member and its efficiency. **10**
- Take $f_y = 250 \text{ MPa}$
 $f_u = 410 \text{ MPa}$

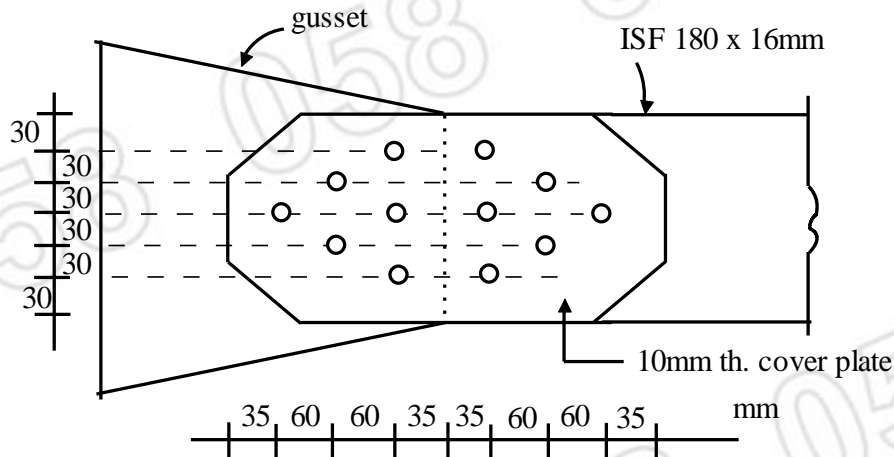


Fig.3

- b) A bracket connection is shown in fig : 4. Find the size of the bolt required if thickness of the bracket plate is 10 mm. **10**

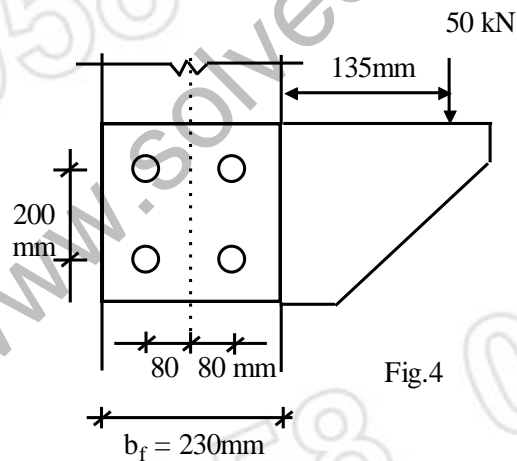


Fig.4

OR

4. a) A beam ISMB 400 transfers a factored reaction of 275 kN to a supporting column flange ISHB 200. Design a stiffened seat angle connection. Use bolts of grade 4.6. **10**
- b) Design a welded splice for an ISMB 400 to transfer a factored bending moment of 150kNm and a factored shear of 100kN. Assume that the flange splice carries all the moment and web splice carries only the shear. **10**

5. A beam of clear span 4.5 m is simply rested over the end bearings 200 mm wide. It carries a service udl of 20 kN/m. Design the beam if its lateral movement is not restricted. **20**

OR

6. Design a welded plate girder using E250 (Fe410w) A grade steel. The effective span of the girder is 25m. It carries a service udl of 50 kN/m and a point load of 400kN at mid span. Assume the girder to be laterally supported. **20**
7. Design a built up column using two channels face to face. The effective length of the member is 8.0 m and is subjected to a factored load of 1100 kN. Assume Fe410 grade steel. Also design battens. **20**

OR

8. a) Design a gusseted base to support ISHB 400 @ 77.4 kg/m carrying a factored axial load of 2000 kN. Use bolted connection. The design bearing strength of the concrete pedestal is 10 N/mm^2 . **8**
- b) A beam-column of effective length of 6 m carries a service axial load of 450 kN and equal end moments of 50 kN-m each about the major axis. Design the member using single rolled section. Assume that the sway of the member is prevented and the column bends either in single or in double curvature. **12**



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