

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

P. Pages : 2
Time : Four Hours



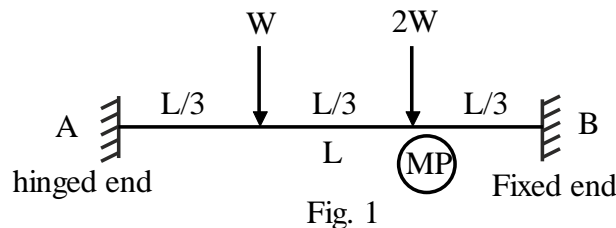
NRT/KS/19/3459
Max. Marks : 80

- 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. Assume suitable data whenever necessary.
 7. Illustrate your answers whenever necessary with the help of neat sketches.
 8. Use of non programmable calculator is permitted.
 9. Use of structural steel table and IS 800:2007 is permitted.

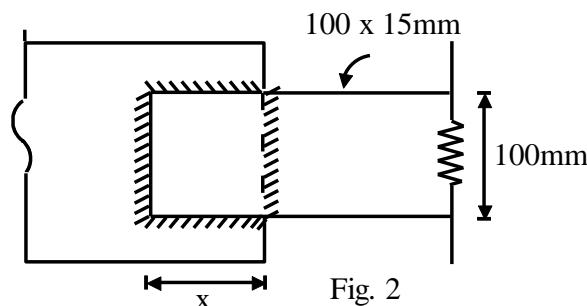
1. a) A tension member is subjected to a factored load of 275kN. Design the section using two angles provided on same side of gusset plate. Length of the member is 2.5m. Provide bolted connection. **13**
- b) Determine the shape factor and plastic moment of resistance about centroidal x – x axis for an I – section having Top flange 150 x 20mm, bottom flange 220 x 20mm & web 8 x 450mm. (Take x – x axis parallel to the width of flange). **7**

OR

2. a) Design a discontinuous strut to carry a factored axial load of 300kN. Length of the member between intersections is 3.0m. Section of the member shall consist two angles provided on either sides of gusset. Provide welded connection Take $f_y = 250 \text{ N/mm}^2$. **12**
- b) Find the value of 'W' at collapse for the beam of uniform section shown in fig. 1. **8**



3. a) A tie FLAT 100mm × 15mm is welded to another plate as shown in Fig. 2 It is subjected to a factored pull of 300kN Find the minimum overlap required if 8mm fillet welds are used. **10**



- b) A double cover butt joint, with bolts arranged in chain pattern is to be provided for connecting two tie bars in steel grade Fe 410, each 240mm wide and 12mm thick. Design the joint and determine the strength and efficiency of joint. Assume cover plates 8mm thick, ordinary bolts of dia. 20 mm. **10**

OR

4. a) A beam ISMB 400 transfers a factored reaction of 275kN to a supporting column Flange ISHB 200. Design a stiffened seat angle connection. Use bolts of grade 4.6. **10**
- b) Design a splice connection for a beam ISMB 400 to transfer a factored bending moment of 120kNm and factored shear of 80kN. Use ordinary bolts of grade 4.6 and E 300 (Fe 440) grade steel. **10**
5. Design a laterally unsupported beam having clear span of 4.5m simply resting over the end bearings 250mm wide. It carries a service udl of 20kN/m. **20**

OR

6. A welded plate girder of span 30m is laterally restrained throughout its length if has to carry a load of 110kN/m over the whole span besides its self weight. Design:
1) CIS of Girder
2) End Bearing stiffener
3) Connection of flange to web **20**
7. Design a built up column using two channels back to back. The length of the member is 7.5m between intersections which is effectively held in position but not restrained against rotation at one end. The factored axial load on the member is 2100 kN. Assume Fe410 grade steel. also design double lacing system using bolted connection. **20**

OR

8. a) Design a gusseted base to support ISHB 400 @ 77.4 Kg/m carrying a factored axial load of 2000kN. Use bolted connection. The design bearing strength of the concrete pedestal is 10 N/mm^2 . **10**
- b) A beam-column of effective length 6m carries a factored axial load of 600kN and equal end factored moments of 75 kN-m each about the major axis. Design the member using single rolled section. Assume no sway condition. **10**
