B.E. Civil Engineering Sixth Semester

CE601 - Design of Steel Structures

P. Pages : 2 **GUG/W/18/1667**

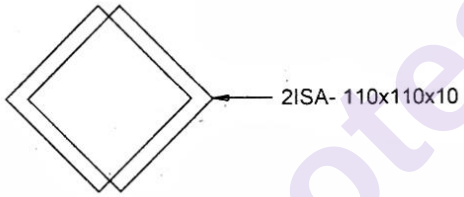
Time : Four Hours * 1 3 1 1 * Max. Marks : 80

Notes : 1. Answer **All** questions.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. I.S.I. Hand Book for structural steel sections, I.S. Code 800/2007 or 1964, I.S. 456 (Revised), I.S. 875 May be consulted.

1. Design a butt connection with one cover plate to connect two plates 120x10mm to carry factored axial load of 140 KN using 20 mm dia. bolts (grade 4.6). Fy = 250 MPa, Fu = 410 MPa. Find the efficiency of joint. Sketch the structural details. **13**

OR

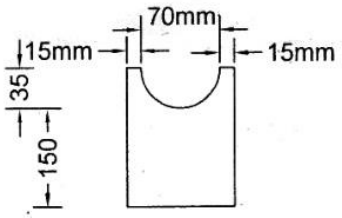
2. Find the axial load carrying capacity of following c/s of strut having both end hinged about major axis & fixed about minor axis with 5.50 m c/c length √ = 1.5, Fy = 260 MPa, Fu = 410 MPa. **13**



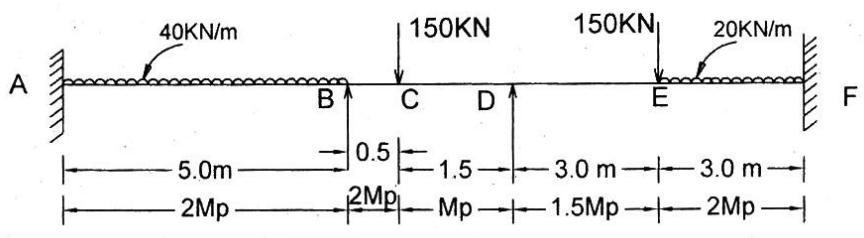
3. Design a tie using tacked 2 ISA with longer leg outstanding on one side of 12 mm thick gusset plate to carry 300 KN load C/C length of member is 5.0m. Use 20 mm dia. bolts of 4.6 grade Fy = 260 MPa Fu=410 MPa. Use load factor 1.5. **14**

OR

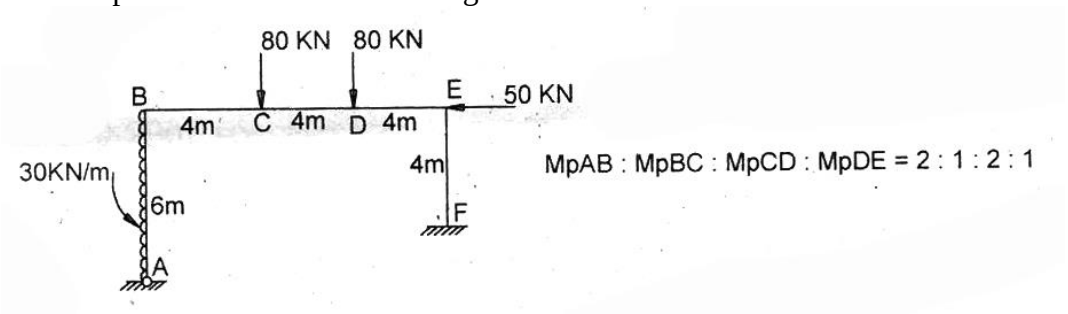
4. Find the shape factor for following cross section. **14**



5. Find the collapse load factor for following beam. **13**



6. Find the collapse load factor for following frame. **13**



7. Design a simply supported built up laterally unsupported beam having eff. Span of 10 m to carry factored udl of 40 KN/m on RHS half span & fact. point load 40 KN at midspan. Use IS 800-2007 specifications. Width of supp. is 300mm. Width of bearing plate under pt. load is 250 mm. Only 10 mm thick cover plates are available. Fy = 260 MPa. Use 22mm ϕ bolts of 4.6 grade. Sketch all structural details. **20**

OR

8. Design a laced column consisting of 2 channels face to face carry Pu=1000 KN, Mu = 200 kN/m about major axis using 22 mm dia bolts of 4.6 grade C/C length of column is 7.0m, Column top is held in position about both axes. Column bottom is held in position about minor axis and held in position & restrained against rotation about major axis. Fy = 250 MPa, Fu = 410 MPa Sketch all structural details. **20**

9. Design a base plate to column ISHB 300@63 Kg/m carrying 1200 KN axial load, 100 KNm B.M. and 50KN S.F. in web Concrete grade of block is M20. SBC of soil is 200 KN/m^2 Use IS 800-2007 specifications Fy=250 MPa Fu=410 MPa Use 20 mm ϕ bolts of 4.6 grade. **20**
Sketch all structural drawing Use load factor 1.5

OR

10. Design a beam – column connection to transfer the shear force 400KN and BM 180 KNm from beam to flange of column. **20**
Fy = 250 MPa. Use load factor 1.5. Use 20 mm ϕ bolts of 4.6 grade Beam – ISMB 400 @ 61.62 Kg/m
Column – ISMB 400 @ 61.62 Kg/m. Sketch all structural drawing.

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