INTERNATIONAL CENTRE FOR APPLIED SCIENCES
MAHE, MANIPAL

B.Sc. (Applied Sciences) in Engg.

End – Semester Theory Examinations – May 2021

IV SEMESTER – BASIC STRUCTURAL STEEL DESIGN (ICE 244)

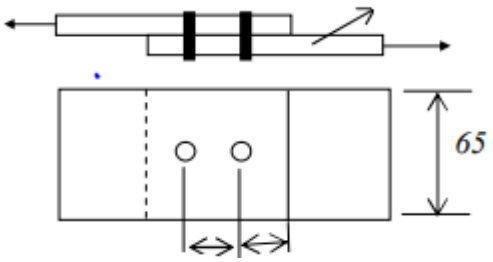
(Branch: CIVIL)

Time: 3 Hours **Date: 19 May 2021** **Max. Marks: 50**

- ✓ **Answer ALL the questions.**
- ✓ **Missing data, if any, may be suitably assumed**
- ✓ **Use of IS 800-2007 and SP-6 is Permitted**
- ✓ **All plates are Fu 4l0(Fy 250) grade and bolts are grade 4.6 unless specified in the question.**

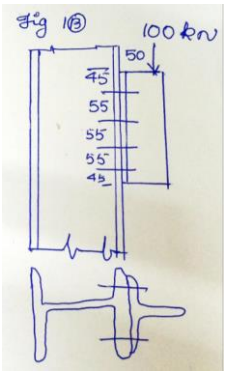
1A. A working load of 60 kN is to be transferred using a lap joint between two plates of 65 x 12 mm using suitable bolts of grade 4.6. Design the joint and find efficiency. A reference sketch is shown below. Number of bolts may not be same as reference sketch.

65x 12 mm plate



Pitch end distance **(5)**

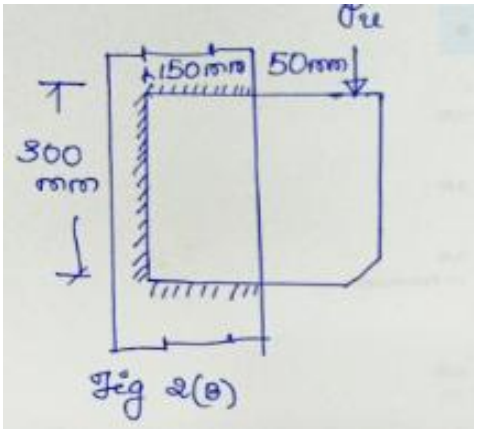
1B. Flange of a column consisting of an ISHB section having flange thickness of 9.7 mm is connected to a TEE section having flange thickness of 9.2 mm. The load/moment is acting in a plane perpendicular to the plane of bolts. The load of 100 kN is acting at an eccentricity (distance)of 50 mm from the plane of the bolts. Find out the maximum force in the bolt.



(5)

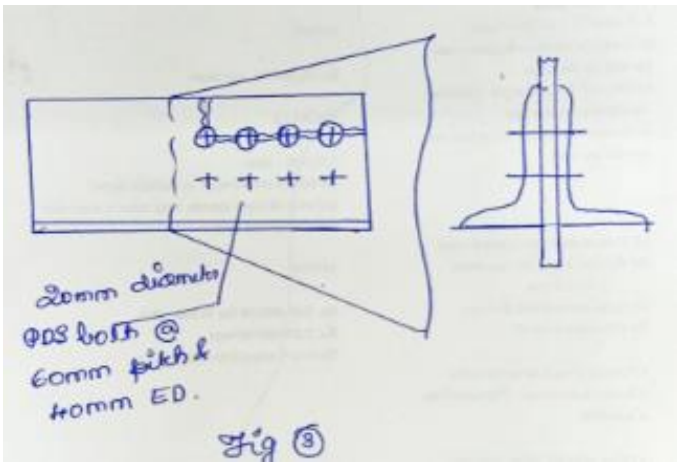
2A. Define briefly (i) Throat thickness (ii) Size of the weld (iii) Minimum size of the weld (iv) Allowable stress in the weld (v)Effective length of the weld. **(5)**

2B. Flange of a vertical column ISHB 250 @51 kg/m is connected to a bracket plate of 12 mm thick using 6 mm size shop weld. The vertical load is acting at a distance of 50 mm from the edge of a flange. The horizontal length of the weld at top and bottom of bracket is 150 mm and vertical length of the weld at the edge of bracket is 300 mm. Find the allowable load.



(5)

3. A double angle section is to be designed for tension member connected on each side of a 20 mm thick gusset plate to carry an axial working load of 450 kN. Use 20 mm diameter shop bolts of 4.6 grade. Take a yield stress of 250N./mm^2.

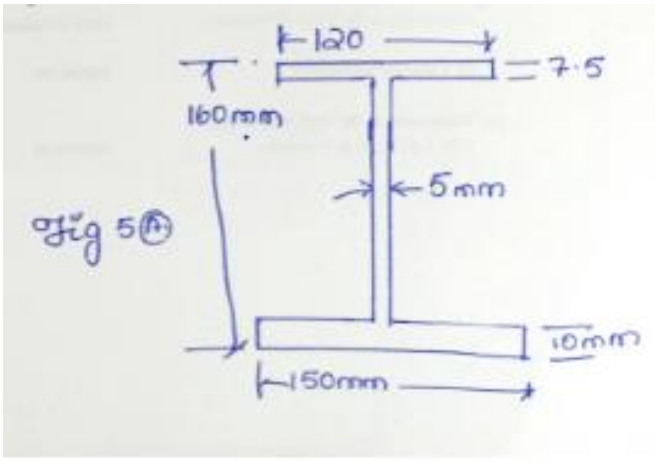


(10)

4. Design a Column and lacing using 2 channels back to back to carry a factored load of 1300 kN. The length of the column is 10m. The ends are restrained for rotation as well as restrained in position at both ends.

(10)

5A. Determine the plastic section modulus (Zp) and Plastic moment(Mp) of the cross section shown in the figure.



(5)

5B. Write steps of design of welded connection where load is acting out of the plane. Also write design steps to design in plane eccentric bolted Connections. **(5)**

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