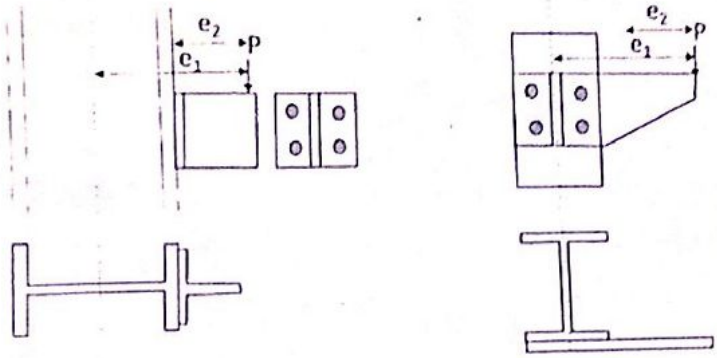
CEL332 Steel Structures Minor I

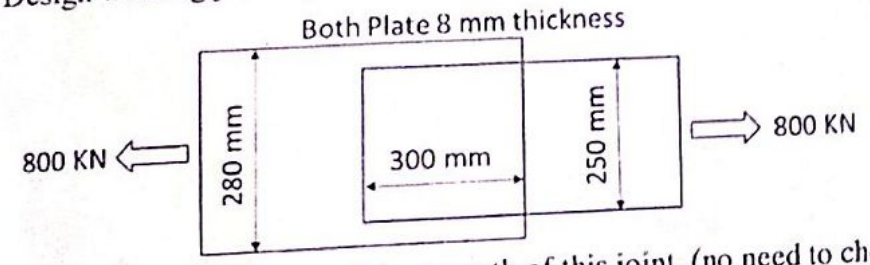
IS code is allowed. Underlining is acceptable, notes are not OK.

Draw neat Diagram, the diagram provided in the question paper may not be fully technically correct.

1. Explain why Rivets and HSFG Bolts are good for railway bridges. Use of technical words are important while answering. 10
2. Explain the role of slag in welding. 5
3. Draw single and double x lap and but joint 5
4. Explain the method of analysis for the two case. Assume all data symbolically. 10



5. Design welding joint. (Check block shear also) 10



6. Find x and maximum possible strength of this joint. (no need to check block shear). 20

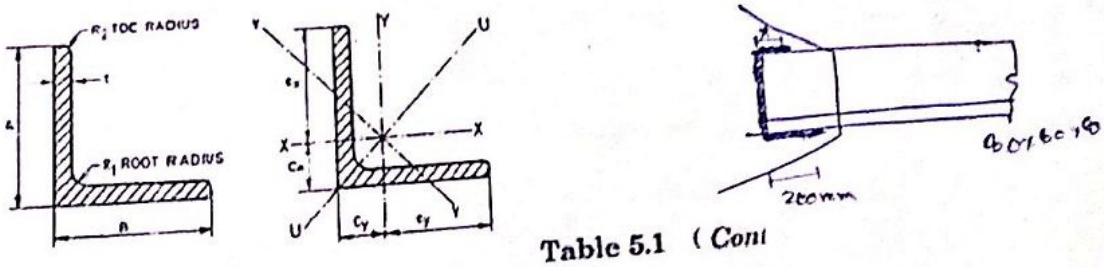


Table 5.1 (*Cont*

Designation	Mass M	Sectional area, a	Dimensions A×B	t	R_1	R_2	C_x	C_y	I_x
	Kg/m	Cm^2	mm×mm	mm	mm	mm	cm	cm	cm^4
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
								2.18	56.0
								2.27	72.5
∠ 80 80 × 6	7.3	9.29	80×80	6.0	8.0			2.34	87.7
× 8	9.6	12.2		8.0				2.42	102
×10	11.8	15.0		10.0					
×12	14.0	17.8		12.0					

7. Design a double but joint for two plates of 200mm width and 10 mm thickness for maximum possible load. (Check block shear also) 40

Sample Calculations:

Area of the connected leg = $(100 - 6/2) \times 6 = 582$ mm^2

Area of the outstanding leg = $(75 - 6/2) \times 6 = 432$ mm^2

$$A_g = 1010 \text{ mm}^2$$

a) ***Strength governed by yielding of cross section***

$$T_{dg} = A_g f_y / \gamma_{mo} = (1010 \times 250/1.10) \times 10^{-3} = 229.55 \text{ kN}$$

b) ***Strength governed by rupture of critical section***

$$T_{dn} = 0.9 f_u A_{nc} / \gamma_{m1} + \beta A_{go} f_y / \gamma_{m0}$$

Assuming average length of weld $L_w = 225$ mm

$$\beta = 1.4 - 0.076(w/t)(f_y/f_u)(b_s/L_w)$$

Us minimum pitch = 2.5 d and minimum edge distance = 1.6 d