CE388 - FUNDAMENTALS OF STEEL DESIGN

2013-2014 Spring Term

Homework II

Due date: 27 March 2014, 17:00

Submit your homeworks to the "CE388 Dropbox" throwing which is located in basement of K2 building until 27 March 2014, 17:00. Fifty percent penalty applies to homeworks submitted from 27 March 2014, 17:00 until 28 March 2014, 17:00. Homeworks submitted thereafter will receive no credit.

1. Consider a pin ended I-section column. Assuming that the material fully yields at 250 MPa (σ_y=250 MPa), calculate the following: (50 points)

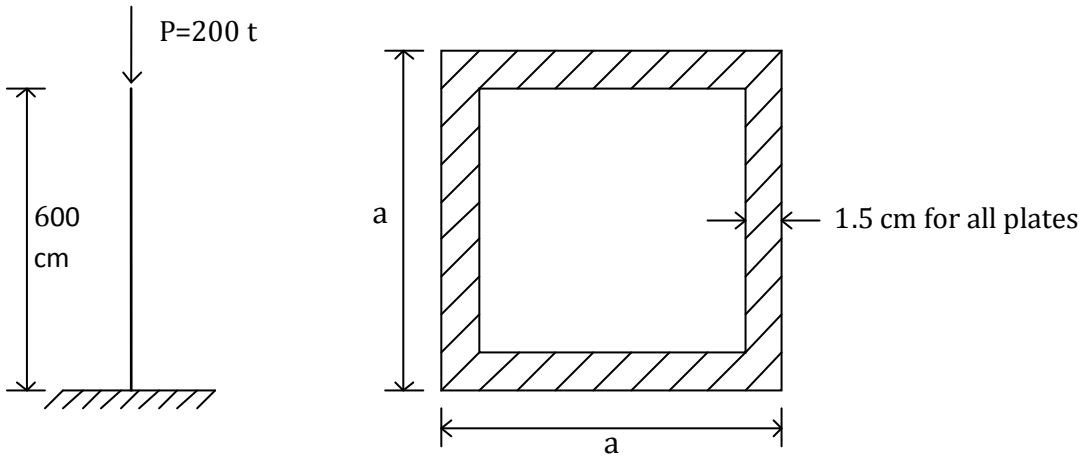
a) Determine the initial elastic modulus (E) for this type of steel.

b) On a single graph plot normalized stress (critical stress divided by the yield stress) versus slenderness (L/i) for the following cases:

Case 1: Consider the elastic critical stress
Case 2: Consider the tangent modulus critical stress
Your (L/i) values should change between zero and 300 for case 1 and between 80 and 300 for case 2.

Strain (10^{-4})	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	30
Stress (MPa)	0	20	40	60	80	100	119	137	154	169	183	196	207	217	226	233	239	244	247	249	250	250	250	250

2. For the box column shown below determine the value of ''a'' such that the column can safely carry a load of 200 tons according to TS 648 Provisions. EY Loading, St52 Steel. Use recommended K values. (50 points)



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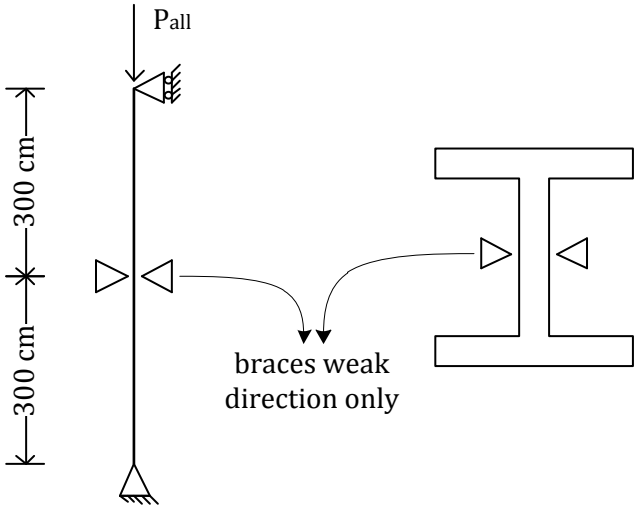
3. For the HEA 500 column shown below determine the allowable load P (P_{all}) according to TS 648 Provisions. EY Loading, St52 Steel. Use recommended K values. (50 points)



4. All columns HEB 600 and all beams HEA 400 (strong axis bending). Out of plane all columns are supported at story levels. Use K=1 out of plane. All members are St 52 Steel. Determine allowable axial loads P_1, P_2, P_3 and P_4 according to TS 648 provisions. All beam to column connections are rigid except for one. (50 points)