EX 2

Structural Design I – HS 17

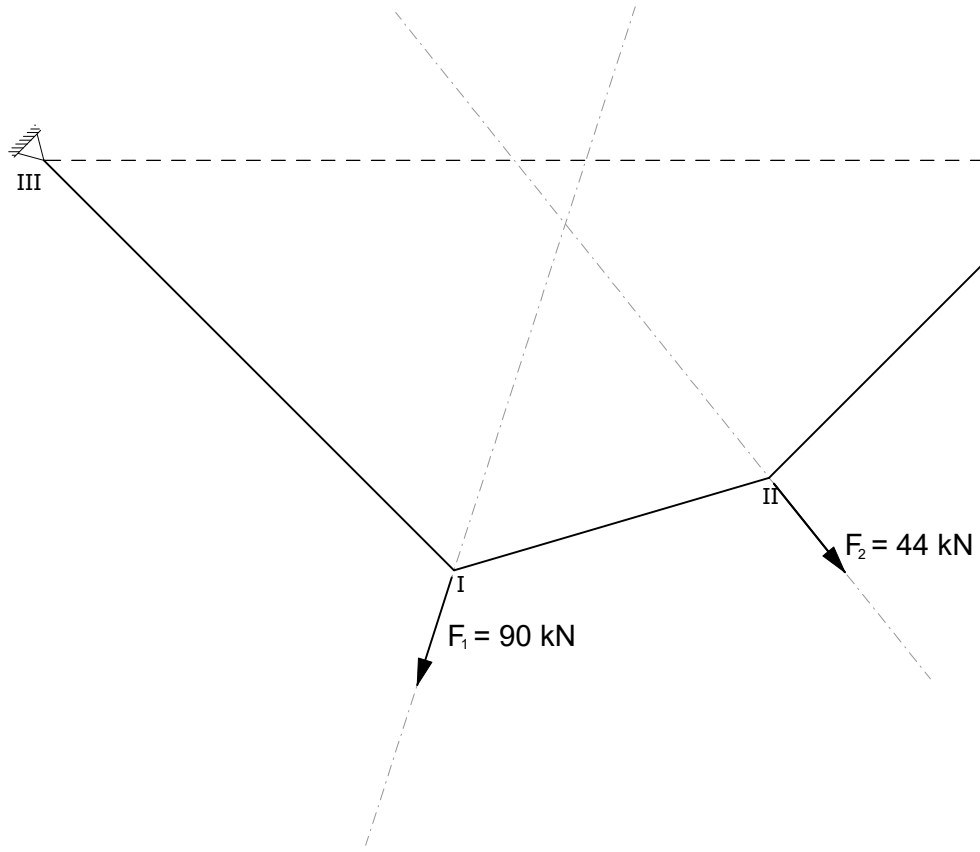
Dimensioning and Graphic Statics

Name:

Koje:

Task 1 Cable with Multiple Loads

Draw a corresponding subsystem and a force diagram for the given case. Determine the magnitude of the reaction forces and the maximum force in kN. Draw the direction of the reaction force in the form diagram. In both form and force diagram, find the position of the resultant and indicate its magnitude in kN.



form diagram
1:50

node I

node III

node II

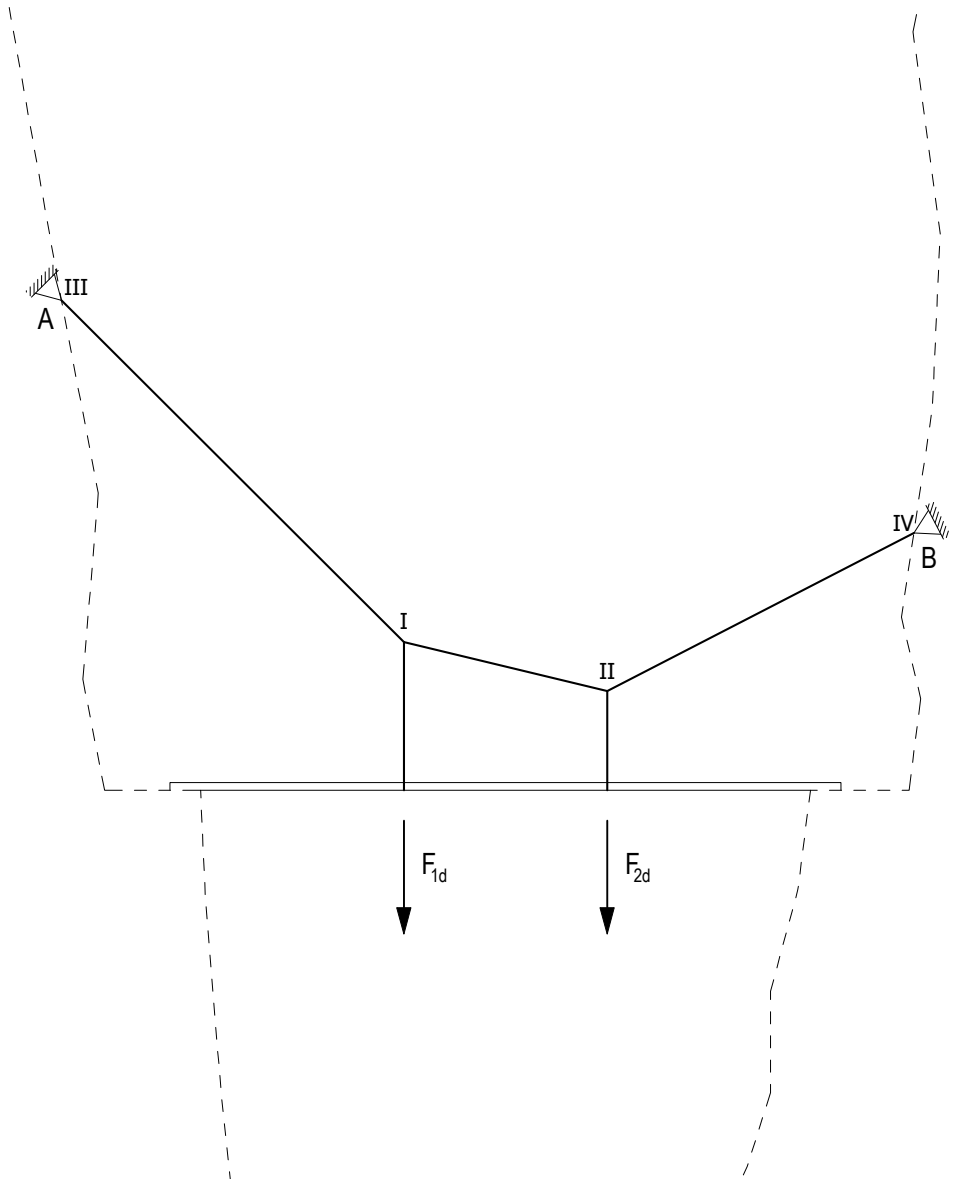
node IV

subsystem

force diagram
1cm ≙ 10kN

Task 2 Dimensioning of a hanging bridge

Draw the force diagram for the hanging bridge and enter the force in the main cable. Calculate the rope diameter due to the stress for the member made of steel S235. $F_{1d} = F_{2d} = 40$ kN



form diagram
1:500

node I

node III

node II

node IV

subsystem

force diagram
1cm ≙ 10kN

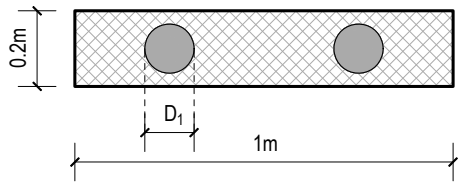
Task 3 Dimensioning of elements in tension

Given is the normal force N_d = 5900kN, which is distributed on several steel cables (steel S235) as shown in sections a) and b). (Assumption: the cables carry the full tension load, i.e. the stresses on the concrete can be neglected)

a) Calculate the minimum cable diameter D1 and D2 in steel S235 for the two cases shown in a) and b) (rounded to the next higher mm). The material values can be found in the formula sheet.

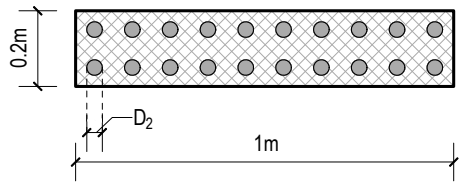
b) What could possible advantages and disadvantages of constellations a) and b) be? Specify your favorite choice and justify it.

Option 1



cross section
1:20

Option 2

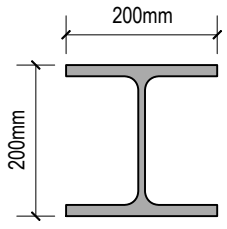


cross section
1:20

b)

Task 4 Stress check

Find the stresses for the steelprofile S235 for the given values.



Cross section
1:10

N_d = 1'500 kN
A_{ef} = 7810 mm²