Task 1 Internal Force Flow in a Beam: Qualitative

Five beams with the same loading case but with different support conditions are given. Sketch a possible internal force flow for the beams a) to e). Tip: For b), c) and d), divide the line load at the supports.

Task 2 Internal Force Flow in a Beam: Quantitative

Find the resultant(s) for each of the five beams and determine the global equilibrium with the help of the force diagram. Starting at the largest span width, draw the force diagrams to their internal force flow and construct them neatly in the form diagram. Indicate tension forces with red, compression forces with blue and reaction forces with green.

a) $q_d = 15 \text{kN/m}$



form diagram 1:100

force diagram 1cm ≙ 20kN

ο

0

b) f = 15 kN/m







form diagram 1:100

force diagram 1cm $\triangleq 20kN$

ο

d) d = 15 kN/m



form diagram 1:100

force diagram 1cm ≜ 20kN



form diagram 1:100

o

force diagram $1cm \triangleq 20kN$

Task 3 Internal Force Flow in a Beam with Openings

The following two beams have openings for installation pipes as well as doors and windows. Find a possible force flow within the material. Draw this

qualitatively into the beams and mark the elements in the according colour.



form diagram 1:100

form diagram 1:100

Name: Koje:

Creative Open-Air Cinema

Task For an open-air cinema, a roof is to be designed that protects the spectators in the stands from rain. The roofing should protect the entire area under the given load and must not protrude into the spectators' viewing area. In addition, the top of the roof shall have a minimum inclination of 15°. The roofing is to be supported on a series of parallel beams, which in turn are supported on two supports.

Design the form of such a bearing beam in the form diagram. Find a possible internal force flow with the aid of the force diagram. Indicate tension forces with red, compression forces with blue and reaction forces with green.





form diagram 1:100

force diagram 1cm $\triangleq 20kN$