

CIV-E4050 Prestressed and Precast Concrete Structures

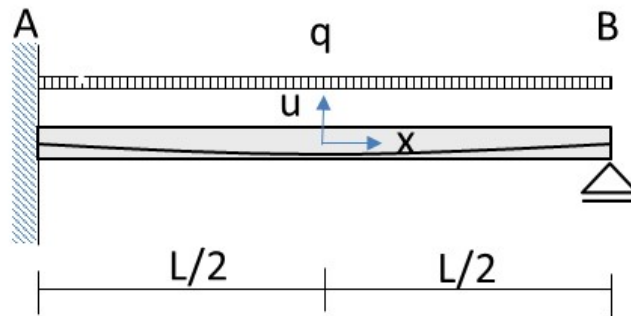
Examination 21.10.2020 (remote examination using My Course)

A precondition for the participation in the examination is the fulfilment of compulsory parts of the course in the autumn 2020 or earlier.

Question 3b

Scan your handwritten answers and upload the scanned document as a pdf-file within the period given for this task.

The beam below has a parabolic tendon with the axis of symmetry at the middle of the span. The ends of the tendon lie at the neutral axis. In determining the tendon profile $u(x)$, it has been assumed that the approximation $u''(x)=q/F$ is valid. (7p in total).



$$u(x) = \frac{q}{2 \cdot F} \cdot x^2 - \frac{q \cdot L^2}{8 \cdot F}$$

- Define the primary moment diagram produced by the tendon geometry specified in the figure. (2p)
- Define the secondary moment diagram produced by the tendon geometry specified in the figure. (2p)
- Define the support reactions produced by the tendon force F with the geometry $u(x)$. (2p)
- If the beam has a rectangular section with the width b and height h , define the requirement for the ratio q/F relative to the height h and the concrete cover c . (1p)

(Vertical support reactions created by load q are: $A=5qL/8$ and $B=3qL/8$)