CIV-E4050 Prestressed and Precast Concrete Structures Examination 15.12.2020 (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 1

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

- 1 (Althogether 8 cr)
 - a) The figure represents a prestressed section of a concrete beam. Determine the maximum distance for a tendon force of 1500 kN if the prestressing is not allowed to cause any tension within the section. The elastic modulus of the concrete is 40000 MPa (**3cr**). What is the maximum distance if the value of the tendon force is 750 kN? (**1cr**)



b) The figure represents the concrete beam prestressed with a parabolic tendon. At the beam ends, the eccentricity of the tendon from the section neutral plane is e₀. Define the force resultant distributions (M, N and Q) that the tendon force F creates for the beam (the losses of F can be omitted and the approximation y"=q/F is valid)). (**3 cr**) Are there any external loads or their combinations that can be balanced by this tendon? (**1 cr**)



F≈H; y=qx²/(2H)