Assignment I-1: Civil and Structural Engineering 1

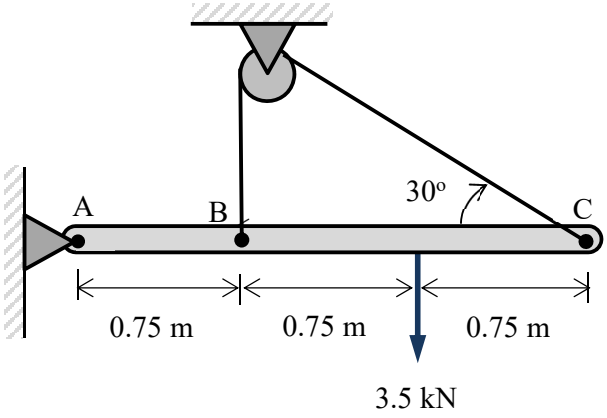
Assigned: 20 February 2024 (Tue) Due date: 27 February 2024 (Tue) 11:59 pm

NOTE 1. Submit your completed assignment online to Canvas. Submit your work in a PDF file. Late submission will not be accepted.

NOTE 2. Show your work with steps clearly. When appropriate, illustrate your work with diagrams and/or figures and write down any assumptions you made.

NOTE 3. Use the sign conventions taught in lectures. Take $g = 9.81$ m/s^2 when necessary.

1.1 A structural beam AC, supported as shown, is under an applied load of 3.5 kN. Point A is a pin support. Points B and C are connected with a cable, hanging over a smooth pulley. Neglect the self-weight of the beam. Determine the tension force in the cable and reactions at the support A.



1.2 A structural beam ABC is supported by a pin support at A and a roller support at B. Determine the reactions at these two supports under the two applied loads (100 kN and 200 kN) as shown in the figure.

If the roller support is moved from point B to point D which is at the middle of span AB, determine the support reactions again? Describe how the support reactions will change when the roller support moves from point B towards point A.