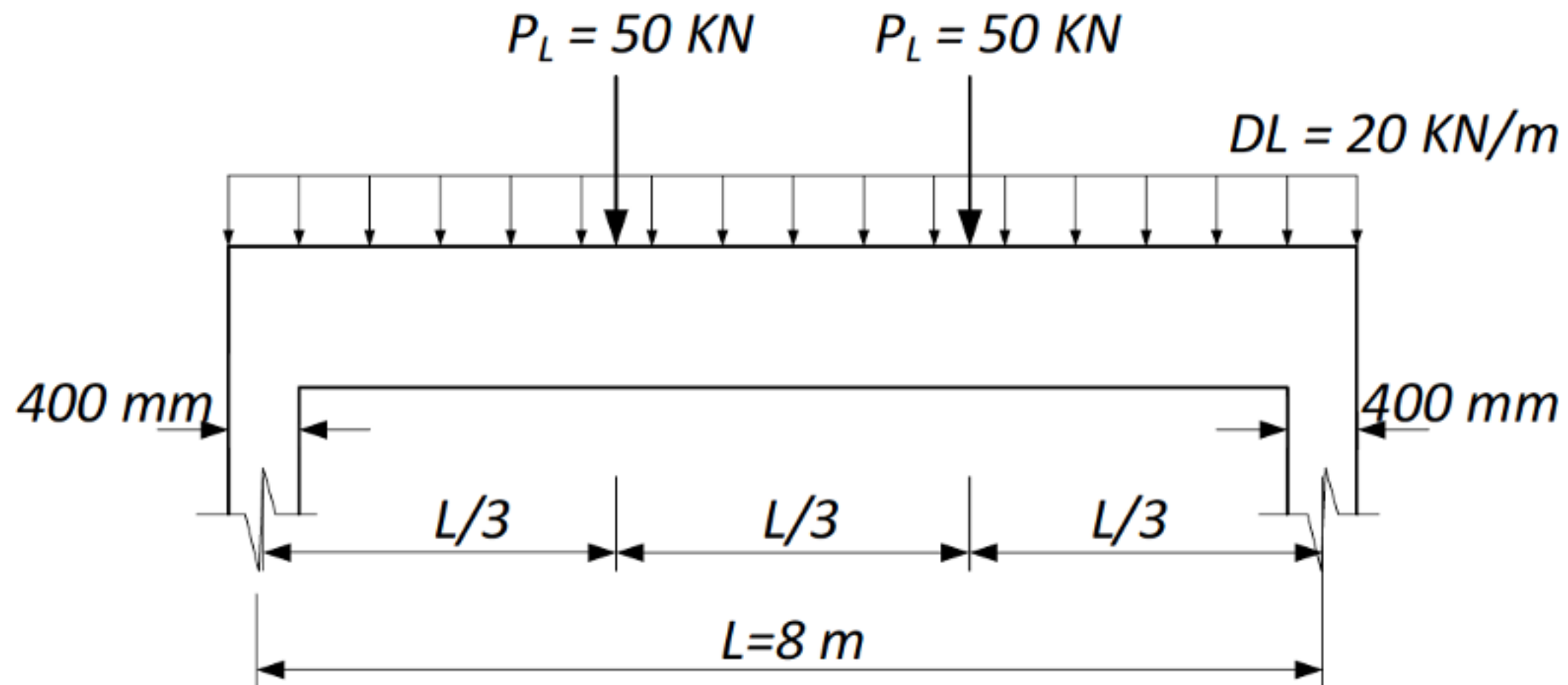


A simply supported reinforced concrete beam with a span of 8 m is shown in the figure below. The beam has a rectangular cross-section and supports a uniform dead load (DL) of the 20 kN/m (excluding the self-weight). There are two 50 kN point loads due to the live load located at the third points along the length. The beam width is restricted to 400 mm. Use 10M stirrups and 25M bars for tension steel. The maximum aggregates size is 20 mm. The beam is located in the interior of a building. The concrete and steel material properties are given as:

Given: *Normal density concrete*,  $\gamma_c = 2450 \text{ kg/m}^3$ ,  $f'_c = 25 \text{ MPa}$ ,

*Steel*:  $f_y = 400 \text{ MPa}$



- Find the minimum required beam depth, such that CSA A23.3 requirements are satisfied without a detailed deflection calculation.
- Design the required tension reinforcement for the beam such that it can carry the design loads. Use the beam depth determined in part a). Confirm that the design meets the pertinent CSA A23.3 requirements for flexural design.
- Provide a design summary