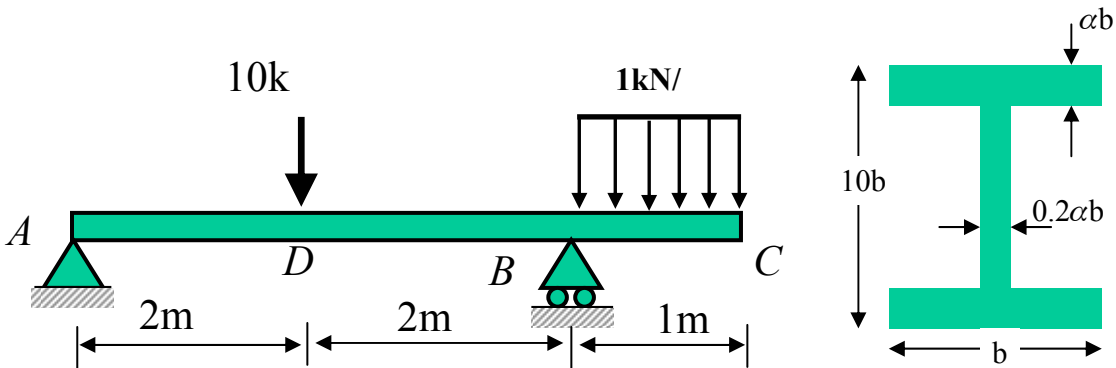


AE3120 Section-A
 Bonus Problem
 Due on Thursday, February 7



A simply supported beam carries a distributed load of intensity 1kN/m over a 1m long overhang and a concentrated load of 10kN at point D.

- i) Determine the location and magnitude of the maximum bending moment on the beam.
- ii) Starting from a rectangular section as a base design with height $10b$ and width b you wish to achieve an optimum cross-sectional design by producing an I-beam with flange thickness αb and web-thickness $0.2\alpha b$, where $0 < \alpha < 5$. Each percent reduction in weight relative to the base design saves \$1 while each percent increase in maximum stress or reduction in bending stiffness costs \$1. Determine the optimum “ α ” for which the maximum saving in cost can be obtained.

