The beam in the figure below is loaded by the constant distributed load (*f*) and the non-uniform temperature change (ΔT). The beam and cross section dimensions are shown in the figure. The material of the beam is characterized by the Young modulus $E = (10 + a)$ GPa and the coefficient of thermal expansion $\alpha_T = 12 \cdot 10^{-6}\ \mathrm{K}^{-1}$. The cross section is symmetrical about the vertical axis.

a) Draw the internal force and bending moment diagrams for the given uniform distributed load.
b) Determine the deflection of the free end "c" and the cross-section rotation at point "b" caused by the distributed load only.
c) Plot the deflection along the beam caused by the distributed load only.
d) Determine the temperature change ΔT (i.e., the temperature change which is applied to heat up the bottom fibers and to cool down the top fibers) which must be employed together with the uniform distributed load such that the deflection of the free end "c" is equal to zero. Plot again the deflection along the beam and calculate the rotation at support "b" caused by this loading.