The cantilever beam having length $L = (2.4 + 2a)$ m is made of the elastic perfectly-plastic material characterized by the yield strength $\sigma_0 = (250 + 10c)$ MPa. The rectangular hollow cross section is assumed where $b = 0.2$ m, $h = 0.4$ m, $t_1 = (16 + a)$ mm and $t_2 = (10 + b)$ m. The beam is loaded by the force $F = 4ac$ kN and by the constant distributed load q with varying intensity. Determine the distributed load intensity for:

a) The elastic limit state (q_{el})
b) The state in which any point of the top and bottom flanges reached the yield strength (q_{ep})
c) The plastic limit state (q_{pl})
d) Draw the distribution of normal stress in the most loaded cross section for these three stress states
e) Determine the length of the plastic hinge for the plastic limit states.
f) Draw the position and shape of the plastic hinge.

The checked values are:

- Intensity of the constant distributed load (q_{el}, q_{ep}, q_{pl}) [kN/m]
- Corresponding bending moments in the most loaded cross section (M_{el}, M_{ep}, M_{pl}) [kNm]
- Length of the plastic hinge (x_{pl}) [m]