Remarks: See §5.4.2, example 3, pages 339 till 344
See §6.4, example 7 and 8, pages 463 till 468

Answers:

a. $V_z = 4800\text{N}$

$M_\text{t} = 72\times 10^3 \text{ Nmm}$

b. $I_{zz} = 2,76\times 10^6 \text{ mm}^4$

c. $\tau_{\text{max};web} = 4,5 \text{ N/mm}^2$

$\tau_{\text{max;flange}} = 5 \text{ N/mm}^2$

d. $I_\text{t} = 18,36\times 10^3 \text{ mm}^4$

e. $\tau_{\text{max;web}} = 23,5 \text{ N/mm}^2$

$\tau_{\text{max;flange}} = 11,8 \text{ N/mm}^2$

f. $\tau_{\text{max}} = 28,0 \text{ N/mm}^2$

Explanation:

The normal centre NC is located 48 mm above the flange.

c. The shear stress distribution is parabolic in the webs with:

$$\tau_{\text{max}} = \frac{(4800 \text{ N})(15,55\times 10^3 \text{ mm}^3)}{(6 \text{ mm})(2,76\times 10^6 \text{ mm}^4)} = 4,5 \text{ N/mm}^2 \text{ at the NC}$$

$$\tau_{\text{cornerpoint}} = \frac{(4800 \text{ N})(8,64\times 10^3 \text{ mm}^3)}{(6 \text{ mm})(2,76\times 10^6 \text{ mm}^4)} = 2,5 \text{ N/mm}^2$$

The shear stress in the flange varies linearly with:

$\tau_{\text{max}} = 5 \text{ N/mm}^2$ in the corner points (‘inflow’ = ‘outflow’)

$\tau = 0$ in the middle of the flange

e. $$\tau_{\text{max};web} = \frac{(72\times 10^3 \text{ Nmm})(3 \text{ mm})}{\frac{1}{2}(18,36\times 10^3 \text{ mm}^3)} = 23,5 \text{ N/mm}^2$$

$$\tau_{\text{max;flange}} = \frac{(72\times 10^3 \text{ Nmm})(1,5 \text{ mm})}{\frac{1}{2}(18,36\times 10^3 \text{ mm}^3)} = 11,8 \text{ N/mm}^2$$

f. $\tau_{\text{max}} = (4,5 \text{ N/mm}^2) + (23,5 \text{ N/mm}^2) = 28,0 \text{ N/mm}^2$

This occurs at the left side of the two webs at the height of the N.C.