Remarks: See §5.4.2, example 1, pages 322 till 335

Answers:

a. $\tau^{(I)} = 5 \text{ N/mm}^2$
b. $\tau^{(II)} = 4 \text{ N/mm}^2$
c. $\tau^{(III)} = 1 \text{ N/mm}^2$

Explanation:

$I_{zz} = 1,89 \times 10^9 \text{ mm}^4$

The shear stress distribution in the web is parabolic.

a. $\tau^{(I)} = \dfrac{(42 \times 10^3 \text{ N})(3,375 \times 10^6 \text{ mm}^3)}{(15 \text{ mm})(1,89 \times 10^9 \text{ mm}^4)} = 5 \text{ N/mm}^2$

b. $\tau^{(II)} = \dfrac{(42 \times 10^3 \text{ N})(2,7 \times 10^6 \text{ mm}^3)}{(15 \text{ mm})(1,89 \times 10^9 \text{ mm}^4)} = 4 \text{ N/mm}^2$

The shear stress in the flange varies linearly.

c. $\tau^{(III)} = \dfrac{(42 \times 10^3 \text{ N})(1,35 \times 10^6 \text{ mm}^3)}{(30 \text{ mm})(1,89 \times 10^9 \text{ mm}^4)} = 1 \text{ N/mm}^2$