Remarks: See §6.2, pages 415 till 426
See §6.4, example 2, pages 448 till 453

Answers:

a. $\tau_{\text{max}} = 37,7\ \text{N/mm}^2$
b. $\varphi_{\text{B}} = 1,77 \times 10^{-3}\ \text{rad}$
c. $\varphi_{\text{C}} = 30,06 \times 10^{-3}\ \text{rad}$

Explanation:

$I_{\text{p}}^{\text{AB}} = 405\pi \times 10^3\ \text{mm}^4$; $I_{\text{p}}^{\text{BC}} = 25,31\pi \times 10^3\ \text{mm}^4$

a. The maximum shear stress is at BC:

$$\tau_{\text{max}} = \frac{(200 \times 10^3\ \text{Nmm})(15\ \text{mm})}{25,31\pi \times 10^3\ \text{mm}^4} = 37,7\ \text{N/mm}^2$$

b. $$\varphi_{\text{B}} = \frac{(200 \times 10^3\ \text{Nmm})(900\ \text{mm})}{(80 \times 10^3\ \text{N/mm}^2)(405\pi \times 10^3\ \text{mm}^3)} = 1,77 \times 10^{-3}\ \text{rad}$$

c $$\Delta\varphi^{\text{BC}} = \frac{(200 \times 10^3\ \text{Nmm})(900\ \text{mm})}{(80 \times 10^3\ \text{N/mm}^2)(25,31\pi \times 10^3\ \text{mm}^3)} = 28,29 \times 10^{-3}\ \text{rad}$$

Therefore: $\varphi_{\text{C}} = \varphi_{\text{B}} + \Delta\varphi^{\text{BC}} = 30,06 \times 10^{-3}\ \text{rad}$