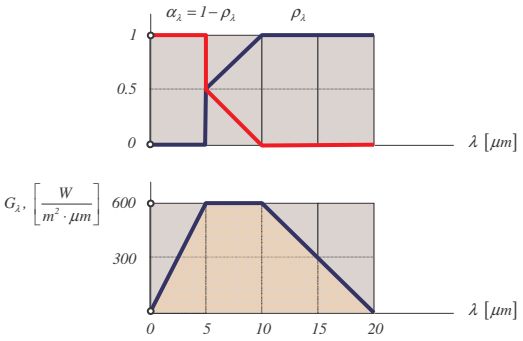
12.43



a $\alpha_\lambda = 1-\rho_\lambda$

b $$G = \int_0^\infty G_\lambda\, d\lambda = \overbrace{\frac{5\cdot 600}{2} + 5\cdot 600 + \frac{10\cdot 600}{2}}^{\text{area under curve}} = 7500\ \left[\frac{W}{m^2}\right]$$

c $$G_{\lambda,abs} = \alpha_\lambda \cdot G_\lambda$$

$$G_{abs} = \int_0^\infty G_{\lambda,abs}\, d\lambda = \int_0^\infty \alpha_\lambda G_\lambda d\lambda = \int_0^5 \alpha_\lambda G_\lambda d\lambda + \int_5^{10} \alpha_\lambda G_\lambda d\lambda + \int_{10}^{20} \alpha_\lambda G_\lambda d\lambda$$

$$= \int_0^5 (1) G_\lambda d\lambda + \int_5^{10} \alpha_\lambda (600)\, d\lambda + \int_{10}^{20} (0) G_\lambda d\lambda$$

$$= \int_0^5 G_\lambda d\lambda + 600 \cdot \int_5^{10} \alpha_\lambda\, d\lambda$$

$$= \frac{5\cdot 600}{2} + 600 \cdot \frac{5\cdot 0.5}{2} = 2250\ \left[\frac{W}{m^2}\right]$$

d $$\alpha = \frac{G_{abs}}{G} = \frac{2250}{7500} = 0.3$$