6.18.

Dane:

$I = 1\,\mu A = 10^{-6}\,A$

$\lambda = 280\,nm = 280 \cdot 10^{-9}\,m = 2{,}8 \cdot 10^{-7}\,m$

$c = 3 \cdot 10^{8}\,\frac{m}{s}$

$n_e = \frac{1}{4} n_f$

$h = 6{,}63 \cdot 10^{-34}\,J \cdot s$

$e = 1{,}6 \cdot 10^{-19}\,C$

Szukane:

$P = ?$

a)

E_f - energia pojedynczego fotonu

$E_f = \frac{hc}{\lambda}$

$P = \frac{n_f \cdot E_f}{t}$

$P = \frac{n_f \cdot \frac{hc}{\lambda}}{t}$

$P = \frac{n_f hc}{\lambda t}$

$I = \frac{q}{t}$

$q = n_e \cdot e$

$I = \frac{n_e \cdot e}{t}$

$I = \frac{\frac{1}{4} n_f \cdot e}{t}$

$t = \frac{\frac{1}{4} n_f \cdot e}{I}$

$P = \frac{n_f \cdot hc}{\lambda \cdot \frac{1}{4} n_f \cdot e}$

$P = \frac{4hcI}{\lambda e}$

b)

$P = \frac{4 \cdot 6{,}63 \cdot 10^{-34} \cdot 3 \cdot 10^{8} \cdot 10^{-6}}{2{,}8 \cdot 10^{-7} \cdot 1{,}6 \cdot 10^{-19}} = 18\,\mu W$