

Opto-Electronics Question 8.2:

a) $n_e := 1$ number of electrons collected

$n_o := 3$ number of incident photons

$$n := \frac{n_e \cdot 100}{n_o}$$

$n = 33$ quantum efficiency

b) $\lambda := 0.8 \cdot 10^{-6} \cdot \text{m}$

$$h := 6.626 \cdot 10^{-34} \cdot \text{J} \cdot \text{s}$$

$$c := 2.998 \cdot 10^8 \cdot \frac{\text{m}}{\text{s}}$$

$$f_c := \frac{c}{\lambda}$$

$$E_g := h \cdot f_c$$

$$E_g = 2.48 \times 10^{-19} \text{ J} \quad \text{Bandgap Energy}$$

c) $e := 1.602 \cdot 10^{-19} \cdot \text{C}$

$$\eta := 0.33$$

$$R := \frac{\eta \cdot e \cdot \lambda}{h \cdot c}$$

$$R = 212.904 \times 10^{-3} \frac{\text{A}}{\text{W}}$$

$$P := 10^{-7} \cdot \text{W}$$

$$I := R \cdot P$$

$$I = 21.3 \times 10^{-9} \text{ A} \quad \text{Photocurrent}$$