Numerical Problem

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$$\eta = 0.65 = 65\%$$

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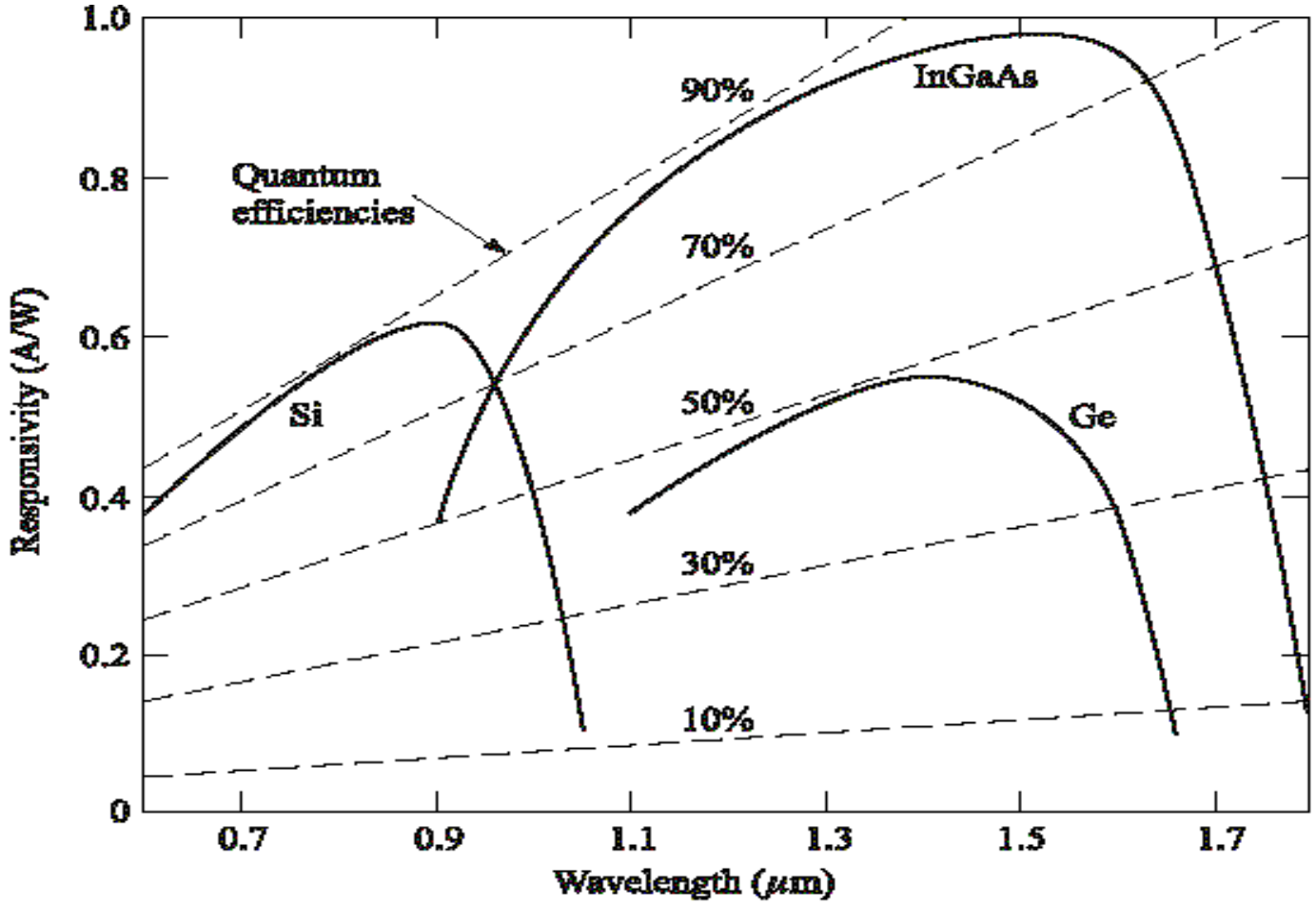
$$I_p = RP_0 = 6.5\mu A$$

Photodiode Responsivities



Numerical Problem

- In the above figure, for the wavelength range 1100 nm < λ < 1600 nm, the quantum efficiency for InGaAS diode is about 60 %. Calculate the responsivity in this wavelength.

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$$R = \frac{\eta q}{h\nu} = 4.83*10\text{^}5\lambda$$

$$R = 0.63 A/W$$

Numerical Problem

- When 3*10^11 photons each with a wavelength of 0.85 μm are incident on a photodiode, on average 1.2*10^11 electrons are collected at the terminals of the diode. Determine the quantum efficiency and responsivity of the photodiode at 0.85 μm.

Numerical Problem

- When 3*10^11 photons each with a wavelength of 0.85 μm are incident on a photodiode, on average 1.2*10^11 electrons are collected at the terminals of the diode. Determine the quantum efficiency and responsivity of the photodiode at 0.85 μm.

$$\eta = 0.4 = 40\%$$

$$R = \frac{\eta q}{h\nu} = 0.274 A/W$$

Numerical Problem

- A silicon APD has a quantum efficiency of 65 % at a wavelength of 900 nm. If the multiplication factor is 35 and the incident optical power is 0.5 μW, find the multiplied output photo current.

Numerical Problem

- A silicon APD has a quantum efficiency of 55 % at a wavelength of 900 nm. If the multiplication factor is 35 and the incident optical power is 0.7 μW, find the multiplied output photo current.

$$I_p = RP_0 = \frac{\eta q}{h\nu} P_0 = 0.279\mu A$$

$$I_M = MI_P = 9.765\mu A$$

Numerical Problem

- A Si pin photodiode has a quantum efficiency of 70% at a wavelength of 0.85 mm. Calculate its responsivity.

- Calculate the responsivity of a Germanium diode at 1.6 mm where its quantum efficiency is 40%.

- A particular photodetector has a responsivity of 0.6 A/W for light of wavelength 1.3 mm. Calculate its quantum efficiency.

Numerical Problem

$$R = \frac{\eta\lambda(\mu m)}{1.24} = \frac{0.7 \times 0.85}{1.24} = 0.48 \text{ A/W}$$

$$R = \frac{\eta\lambda(\mu m)}{1.24} = \frac{0.4 \times 1.6}{1.24} = 0.52 \text{ A/W}$$

$$\eta = \frac{R \cdot 1.24}{\lambda(\mu m)} = \frac{0.6 \times 1.24}{1.3} = 57\%$$