1. Modify the following text so that the statement is true.

When the electron concentration is much larger than the holes concentration the semiconductor is called (n-p) type.

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2. Consider a light wave traveling in a medium of pure Si. The wavelength of the light is 2.15 µm and the refractive index at this wavelength is 3.45. Calculate the phase velocity of the light wave.

$$v = \frac{c}{n} = \frac{3 \cdot 10^8 \text{ m/s}}{3.45} = 8.7 \cdot 10^7 \text{ m/s}$$

---

3. Consider a ray of light traveling in a medium of refractive index n1= 1.43 becomes incident on a second medium of refractive index n2= 1.45. Calculate the incident angle to have TIR.

$$\varphi_{1c} = \arcsin\left(\frac{n_2}{n_1}\right) = \arcsin\left(\frac{1.43}{1.45}\right) = 80.47\ ^{o}$$

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4. Calculate the range of wavelengths not absorbed by Silicon (Si). The bandgap of Si = 1.11 eV.

$$\lambda < h\frac{c}{\text{Eg(Si)}} = \frac{1.24 \text{ eV}\mu\text{m}}{1.11 \text{ eV}} = 1.127 \text{ µm}$$

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5. Fill the table indicating the color of light associated to the wavelength values

wavelength	color
400 nm	blue
550 nm	green
600 nm	orange
700 nm	red

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6. List three basic parameters of fibre optics that justify its application in data transmission systems.

1. High Bandwidth
2. Low cost and weigh
3. Low attenuation and dispersion

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7. Modify the following text so that the statement is true.

Laser diodes are based on the (**stimulated** / ~~spontaneous~~) emission principle.

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8. Fill the table indicating one application for each one of the optoelectronic devices cited on the first row.

wavelength	application
LEDs	Lighting
Solar cells	Generation of electric energy
Laser diodes	Optical data storage
Photodiodes	Light sensing

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9. Modify the following text so that the statement is true.

The electrical conductivity of a metal material (**decreases** / ~~increases~~) with increasing temperature

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10. Modify the following text so that the statement is true.

A photon is absorbed by a semiconductor if the photon energy is (**greater** / ~~lower~~) than the band gap of the material, Eg.

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