

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

When an electron meets a hole, it falls into a lower energy level, and releases energy in the form of a photon. When the electron can undergo the down-ward transition by itself, the photon emission process is called (**spontaneous / stimulated**) emission.

2. 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, E_g .

3. Calculate the NA (numerical aperture) of an optical fibre formed by a core with a refractive index $n_1 = 1.45$ and a cladding with a refractive index $n_2 = 1.42$. Indicate the acceptance angle of the fibre, ϕ_{max} , to air. The refractive index of air: $n = 1.000293$.**4. Fill the table indicating the color of light emitted by LEDs made from the following semiconductor materials.**

Semiconductor material	LED color
GaN	
InGaN	
GaAsP	

5. List three different types of optical amplifiers (OAs).

1. _____
2. _____
3. _____



6. A fibre optic has a core of Si_3N_4 with a refractive index: $n = 2.72$ for wavelengths of $0.4 \mu\text{m}$. Calculate the time required to send data at that wavelength along 1 km of that fibre optic.

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7. List three different applications of Laser diodes.

1. _____
2. _____
3. _____

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8. Write the Planck–Einstein relation.

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

Human eyes can detect lights of wavelength in the range of (250 nm to 820 nm / 450 nm to 650 nm).

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10. Could you describe the meaning of φ_{1c} in the following equation: $\varphi_{1c} = \arcsin\left(\frac{n_2}{n_1}\right)$?
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