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.

1. 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.

1. Calculate the NA (numerical aperture) of an optical fibre formed by a core with a refractive index *n1* = 1.45 and a cladding with a refractive index *n2* = 1.42. Indicate the acceptance angle of the fibre, *φmax*, to air. The refractive index of air: *n* = 1.000293.
2. Fill the table indicating the color of light emitted by LEDs made from the following semiconductor materials.

|  |  |
| --- | --- |
| Semiconductor material | LED color |
| GaN |  |
| InGaN |  |
| GaAsP |  |

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

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A fibre optic has a core of Si3N4 with a refractive index: *n* = 2.72 for wavelengths of 0.4 µm. Calculate the time required to send data at that wavelength along 1 km of that fibre optic.
2. List three different applications of Laser diodes.

1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Write the Planck–Einstein relation.
2. 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**).

1. Could you describe the meaning of *φ*1c in the following equation:  ?