**H.W: Question 1: Nd Glass Laser**

The length of the optical cavity of a Nd-Glass laser is 50 [cm]. The index of refraction is 1.5.

**Calculate:**

1. The basic frequency of the cavity.

2. The frequencies of the next 4 modes.

3. The difference between two adjacent modes.

**H.W: Question 2: Ruby laser**

The length of the optical cavity of a Ruby laser is 15 [cm]. The index of refraction is 1.76. The mirrors are coated at the ends of the Ruby crystal (Rod).

**Calculate** the difference between two adjacent modes.

**H.W: Question 3: Ar+ Ion laser**

The difference between adjacent modes in Ar+ Ion laser is 100 [MHz]. The mirrors are at the end of the laser tube. **Calculate:**

1. The length of the laser cavity.

2. The mode number of the wavelength 488 [nm].

3. The change in difference between adjacent modes when the tube is shortened to half its length.

**H.W: Question 4:**

The length of the optical cavity of a Nd-YAG laser is 30 [cm]. The length of the **laser rod** which makes the **active medium** is 10 [cm]. The **index of refraction** of the laser rod is 1.823. The rest of the cavity is **air** which has an index of refraction of 1.0.

**Calculate** the difference in frequencies between adjacent modes.

**H.W: Question 5: He-Ne laser**

The width of the fluorescence line of He-Ne laser is 1.5 [GHz]. The length of the optical cavity is 75 [cm]. **Calculate:**

1. The difference between adjacent longitudinal modes.
2. The approximate number of longitudinal modes.

**H.W: Question 6;** Calculate the ratio between spontaneous emission and stimulated emission for a working tungsten lamp

Where is the emitted light visible? with a temperature T=1727°C

**H.W: Question 7**: Find the wavelength at which the rate of spontaneous emission equals the rate of stimulated emission

At room temperature at the condition of thermal equilibrium?

**H.W: Question 8 ;** Explain mathematically that there is no generation of a laser beam when the thermal energy is

equal to photon energy?

Construction and Working of LASER

## Laser beam characteristics

## What type of laser is used in CD and DVD players? a) Semiconductor b) YAG c) Alexandrite

## What is the type of laser used most widely in industrial materials processing applications? a) Dye Laser b) YAG laser c) Ruby Laser d) Carbon Dioxide Laser

## What does the acronym LASER stand for? a) Light Absorption by Stimulated Emission of Radiation b) Light Amplification by Stimulated Emission of Radiation c) Light Alteration by Stimulated Emission of Radiation