



# **TRINITY COLLEGE FOR WOMEN NAMAKKAL**

**Department of Physics**

**LASER AND SPECTROSCOPY**

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# What is Laser?

## Light Amplification by Stimulated Emission of Radiation

- A device produces a coherent beam of optical radiation by stimulating electronic, ionic, or **molecular transitions to higher energy levels**
- When they return to lower energy levels by stimulated emission, they emit energy.

## **What are characteristics of Laser?**

Lasers are essentially

- **highly directional,**
- **highly intense,**
- **highly monochromatic and**
- **highly coherent optical sources.**

Stimulated emission was postulated by Einstein as early as in 1917. In 1960, a solid state ruby laser is developed by Maiman on this principle.

# What is laser principle?

The principle of a laser is based on three separate features:

- a) stimulated emission within an amplifying medium,
- a) population inversion of electronics and
- c) an optical resonator.

# **What is Laser energy?**

**Laser, a device that stimulates atoms or molecules to emit light at particular wavelengths and amplifies that light, typically producing a very narrow beam of radiation.**

## What is the wavelength of laser?

Intermediate wavelengths From **380 to 740 nm**,

It produces visible (VIS) light from violet to red.

The longest wavelengths From **700 nm to 1 mm**,

It produces infrared (IR) light which, like UV, is invisible to the human eye.

**Based on their gain medium,**

**Lasers are classified into five main types:**

- **Gas Lasers**
- **Solid-State Lasers**
- **Fiber Lasers**
- **Liquid Lasers (Dye Lasers)**
- **Semiconductor Lasers (Laser Diodes)**

# **What are the applications of Laser?**

## **Applications in medicine**

- ❖ Cancer diagnosis**
- ❖ Cancer treatment**
- ❖ Dentistry**
- ❖ Cosmetic dermatology**

**such as scar revision, skin resurfacing,  
laser hair removal, tattoo removal.**



# **7 Top Applications of Lasers in Manufacturing**

- **Laser Marking**
- **Surface Texturing**
- **Laser Ablation**
- **Laser Drilling**
- **Laser Cutting**
- **Laser Welding**
- **Wire Stripping**
- **New Laser Applications**

# THANK YOU

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