



SNS COLLEGE OF ENGINEERING

Coimbatore-641 107

(An Autonomous Institution)

Accredited by NBA & NAAC with 'A' Grade

Approved by AICTE, New Delhi & Recognized by UGC

Affiliated to Anna University, Chennai

DEPARTMENT OF PHYSICS

COURSE NAME :23PYT201 –ENGINEERING PHYSICS

I YEAR / I SEMESTER

UNIT 2 – LASER AND FIBER OPTICS

TOPIC 3 – TYPES OF LASERS – Nd YAG LASER



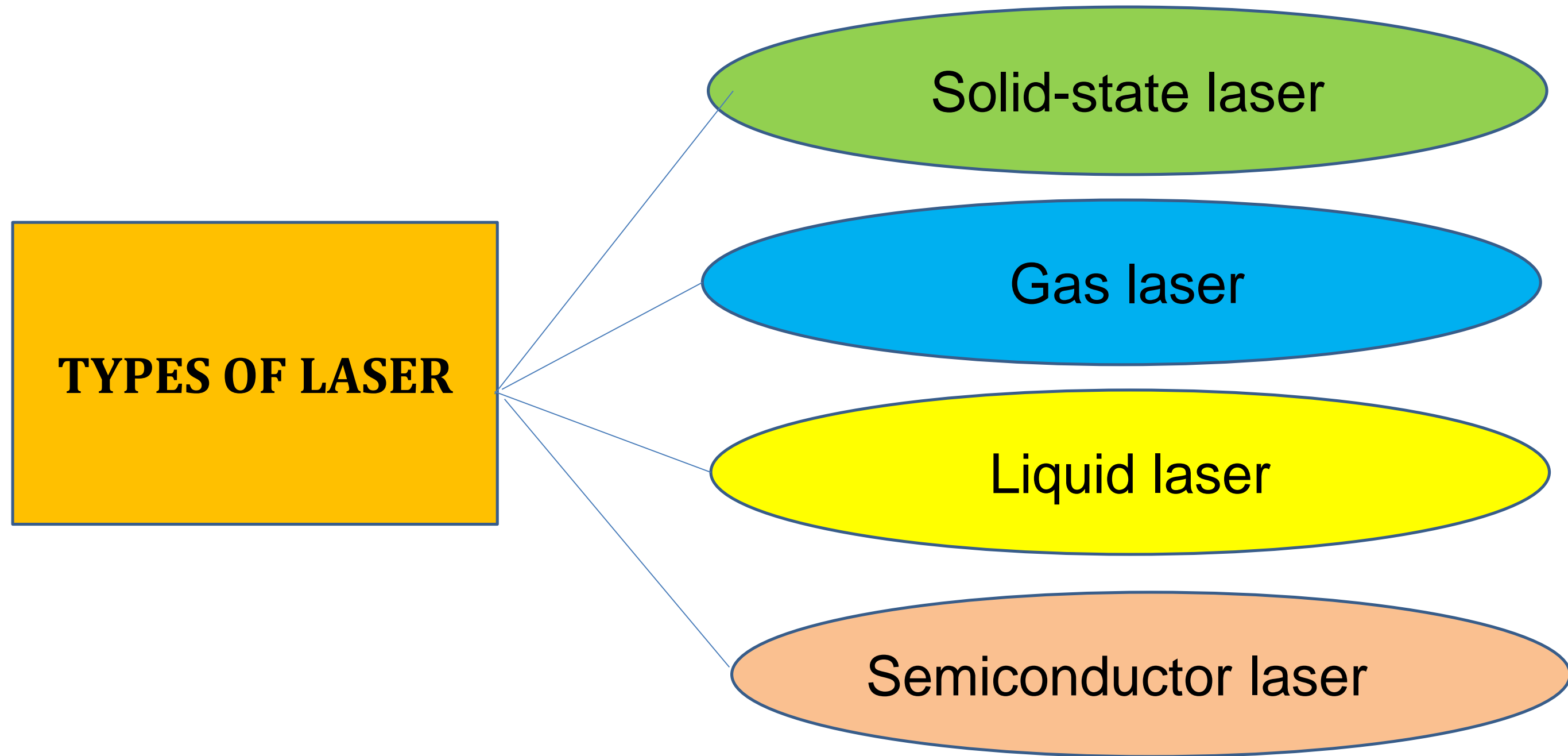


Learning outcomes

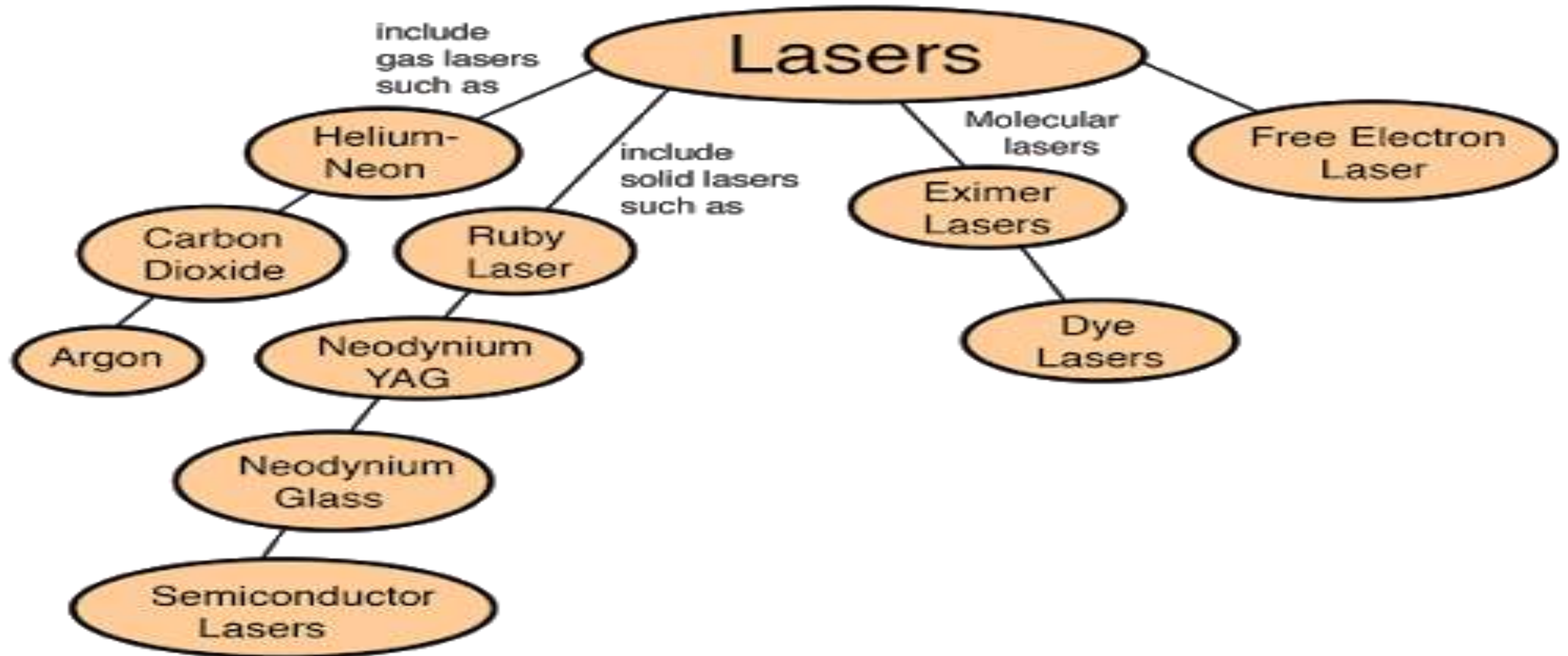
Students able to

1. Understand the types of Lasers and its examples.
2. Identified to Nd-YAG laser working function and its applications





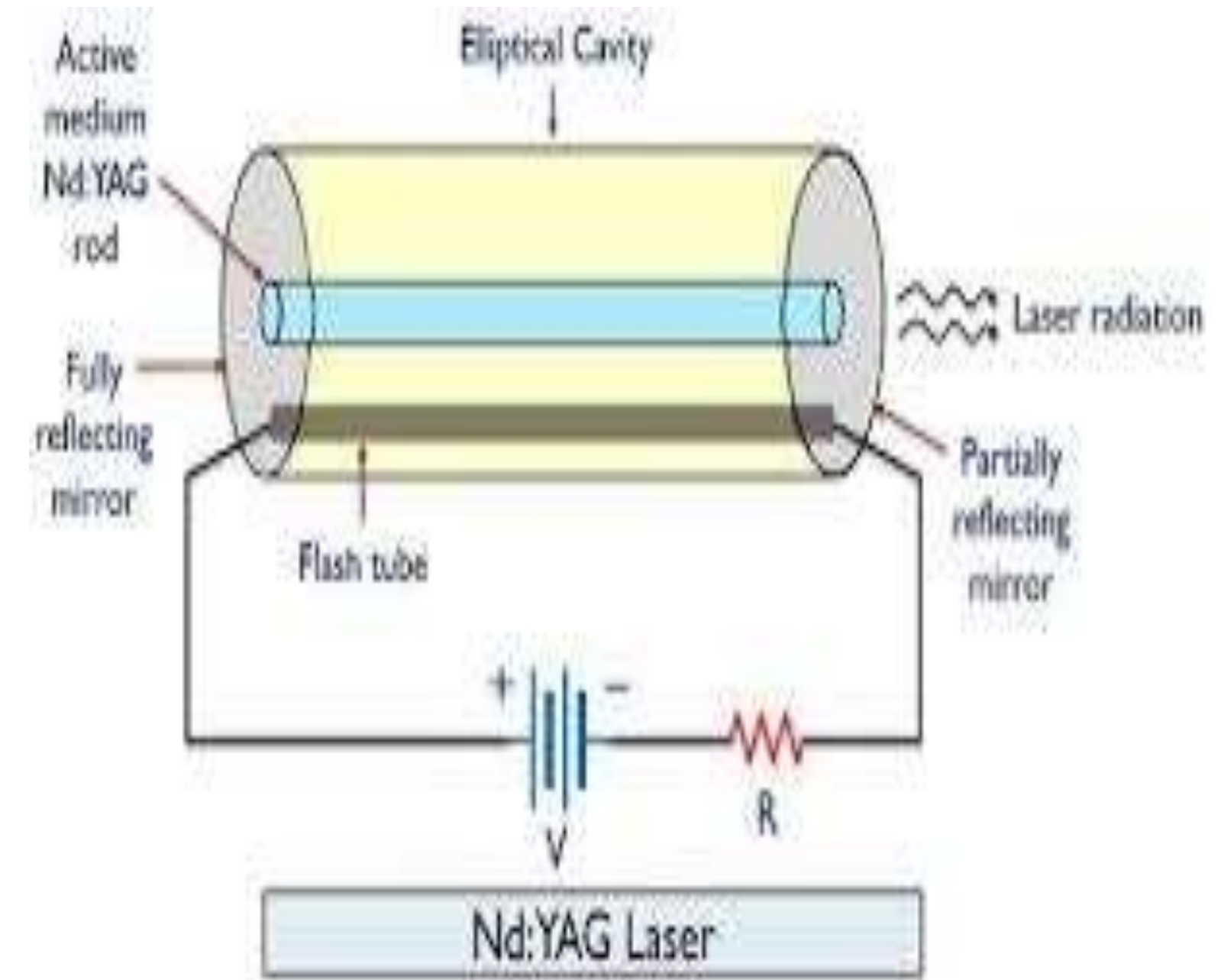
EXAMPLES OF DIFFERENT TYPES OF LASER



Nd-YAG Laser

Principle:

- The active medium is Nd-YAG rod. It is optically pumped by krypton flash tubes and neodymium ions are raised to excited levels.
- During the transition from metastable to ground state, the laser beam of wavelength $1.064\mu\text{m}$ is emitted.





Construction:



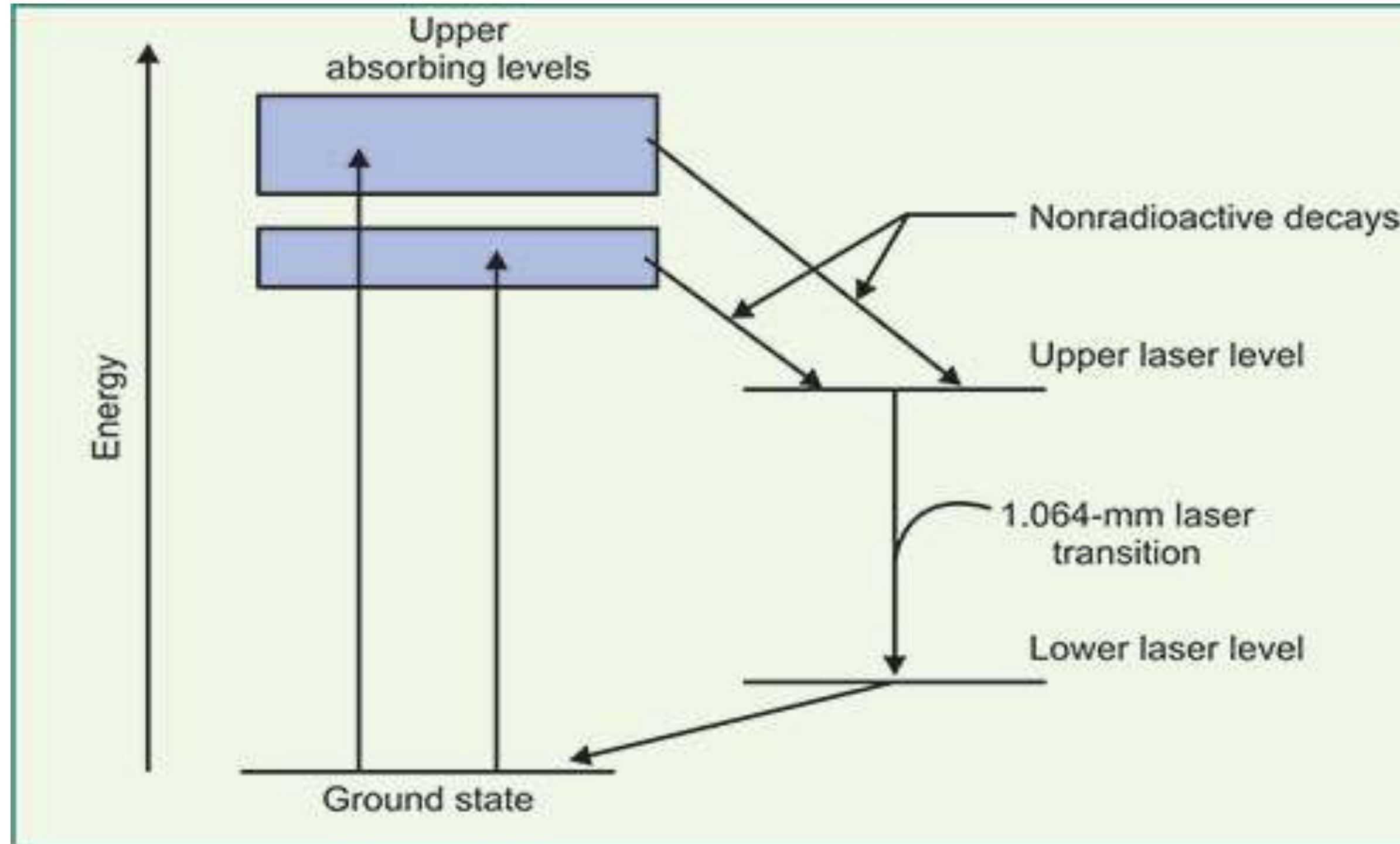
- It is a four level solid state and doped insulator laser.
- Nd stands for Neodymium (Nd^{3+}) and YAG stands for Yttrium Aluminum Garnet ($\text{Y}_3\text{Al}_5\text{O}_{12}$).
- In which Y^{3+} are replaced (doped) by Nd^{3+} ions.
- The Neodymium ions act as active centre. The pumping method is optical pumping using Krypton flash lamp.
- In elliptical cavity, it consists of Nd-YAG rod and krypton flash lamp.
- There are two mirrors at each end of Nd-YAG rod one is partially reflect and other one is fully reflecting mirror. It act as optical resonator.



Working:

- When the power is given to the flash tube, the Nd^{3+} atoms are pumped by a Krypton flash lamp from the ground state to higher energy state (E1 and E2).
- But the higher energy states are unstable, therefore the atoms are transferred to metastable (E4) states by non-radioactive transition.
- The transition E4 to E1 the laser output $1.069 \mu\text{m}$ is emitted.

Energy Level Diagram



ASSESSMENT

- What is ND YAG laser used for?
- What is YAG laser for face?
- What is the best facial laser treatment?





Application of Nd –YAG laser:

It is used in transmitting signals to a longer distance.

It is used in long haul communication system.

It is also used in the endoscopic application.



References



- <https://images.app.goo.gl/ZsGZU31vsnv2mMo29>
- <https://images.app.goo.gl/iPupvmhpgqUqQ3R5r6>
- <https://images.app.goo.gl/1wkAF3QMTE9m9Wqt8>
- <https://images.app.goo.gl/2SaPCsKyDFY6Fr5w8>

Thank You