Unit 11 Introduction

A laser is a special kind of light source. It can produce highly directional light with high intensity within a very narrow range of wavelengths.

The special properties of a laser light beam include:

- Nearly monochromatic (single wavelength)
- Small in cross section, with a wide range of output powers
- Coherent with very little divergence (spreading) during propagation
- Continuous wave or pulsed (short bursts of light)
- Capable of depositing tremendous power per unit area on targets

These properties make lasers very useful in areas such as:

- Medicine
- Materials processing
- Measurement and inspection
- Military
- Information handling
- Entertainment
- Holography

In pulsed modes, lasers can produce pulses as short as one million-billionth of a second (10^{-15} sec) and powers per unit area on targets of trillions of watts per square centimeter (10^{12} W/cm^2). There are lasers that can produce several wavelengths in the output at the same time and, with appropriate tuning, produce individual wavelengths. Techniques are available to control the laser beam to make it suitable for specific purposes. *Q switching, mode locking,* and *frequency doubling* are a few of these techniques used to produce high intensity, pulsed laser beams which are useful in many applications.