Engineering Physics

(PHY1701)

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Module-7: Optoelectronic Devices & Applications of Optical fibers

Contents

- Introduction to Semiconductors,
- Sources-LED & Laser Diode,
- Detectors, Photodetectors- PN & PIN (AG 209, 235, 238),
- Applications of fiber optics in communication, and
- **Endoscopy***

*: Self Study

❖ Introduction to Fiber Optics, Ajoy Ghatak and K. Thyagarajan, Cambridge University Press, 2010 (AG)

Endoscopy

Endoscopy means *looking inside* and typically refers to looking inside the body for medical reasons using an **endoscope**, an instrument used to examine the interior of a hollow organ or cavity of the body

Endoscopy

An endoscope can consist of:

A rigid or flexible tube.

A light delivery system to illuminate the organ or object under inspection. The light source is normally outside the body and the light is typically directed via an optical fiber system.

A lens system transmitting the image from the objective lens to the viewer, typically a relay lens system in the case of rigid endoscopes or a bundle of fiber optics in the case of a fiberscope.

Endoscopy

An eyepiece → Modern instruments may be videoscopes, with no eyepiece, a camera transmits image to a screen for image capture.

An additional channel to allow entry of medical instruments or manipulators.

Endoscopy

Working principle of endoscopy:

- One of the two main endoscope cables carries light from a bright lamp in the operating room into the body, illuminating the cavity where the endoscope has been inserted.
- The light bounces along the walls of the cable into the patient's body cavity.
- The diseased or injured part of the patient's body is illuminated by the light shining in.
- Light reflected off the body part travels back up a separate fiber-optic cable, bouncing off the glass walls as it goes.
- The light shines into the physician's eyepiece so he or she can see what's happening inside the patient's body. Sometimes the fiber-optic cable is directed into a video camera (which displays what's happening on a television monitor) or a CCD (which can capture images like a digital camera or feed them into a computer for various kinds of image enhancement).