



SNS College of Engineering

An Autonomous Institution

Accredited by NAAC-UGC with 'A' Grade,
Approved by AICTE, Recognized by UGC and Affiliated to Anna University, Chennai

Redesigning Common Mind & Business Towards Excellence



Build an Entrepreneurial Mindset Through Our Design Thinking Framework

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

COURSE NAME : 19EC602 – Microwave and Optical Engineering

III YEAR / VI SEMESTER

Unit IV – OPTICAL COMMUNICATION

Topic Optical Window and Attenuation

**Optical window and attenuation/ 19EC602/ Microwave and Optical Engineering/Mrs.D.Vishnu Priya
/ECE/SNSCE**



ATTENUATION

Attenuation is defined as the ratio of optical output power to the input power in the fiber of length L.

$$\alpha = 10 \log_{10} P_i / P_o \text{ [in db/km]}$$

where,

P_i = Input Power

P_o = Output Power, α is attenuation constant

The various losses in the cable are due to

- Absorption
- Scattering
- Dispersion
- Bending

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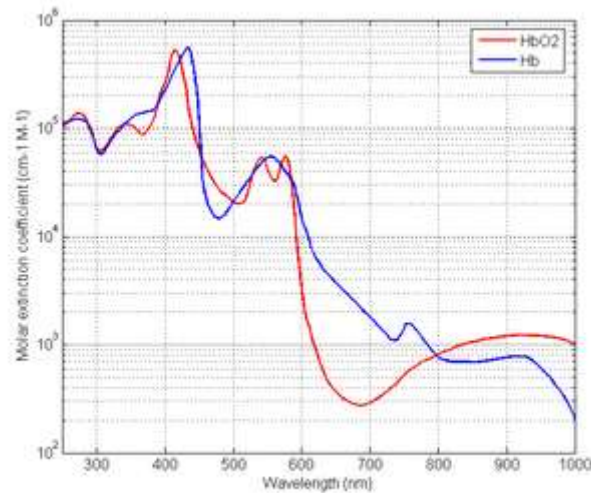


OPTICAL WINDOW

The optical window is the portion of the optical spectrum that is not blocked by the Earth's atmosphere. The window runs from around 300 nanometers (ultraviolet-B) up into the range the human eye can detect, roughly 400–700 nm and continues up to approximately 2 μm .

- Optical Window

OPTICAL WINDOW



- The **near-infrared (NIR) window** (also known as **optical window** or **therapeutic window**) defines the range of wavelengths from 650 to 1350 nanometre (nm) where light has its maximum depth of penetration in tissue.^[1]
- Within the NIR window, scattering is the most dominant light-tissue interaction, and therefore the propagating light becomes diffused rapidly.
- Since scattering increases the distance travelled by photons within tissue, the probability of photon absorption also increases.

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APPLICATIONS

- Fiber Optic Communication: Managing signal loss over long distances. Designing repeaters/amplifiers at specific intervals.
- Medical Imaging: In X-rays and CT scans, tissue attenuation helps differentiate between types of tissue and bone.
- Laser Systems: Protect internal optics while allowing laser beams to pass.
- Sensors and Detectors: Used in front of cameras, thermal detectors, and photodiodes to protect them from environmental exposure.

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Any Query????

Thank you.....

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