

Fibre Optics



GALGOTIAS
UNIVERSITY

Introduction of Fibre optics

Fibre optics is a technology related to transportation of optical energy (light energy) through glass/plastic media.

- Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths (data rates) than other forms of communication.
- Fibers are used instead of metal wires because signals travel along them with less loss and are also immune to electromagnetic interference.

GALGOTIAS
UNIVERSITY

- **Fiber optics** (optical fibers) are long, thin strands of very pure glass about the diameter of a human hair.
- They are arranged in bundles called **optical cables** and used to transmit [light](#) signals over long distances.
- Fiber Optics are cables that are made of optical fibers that can transmit large amounts of information at the speed of light.

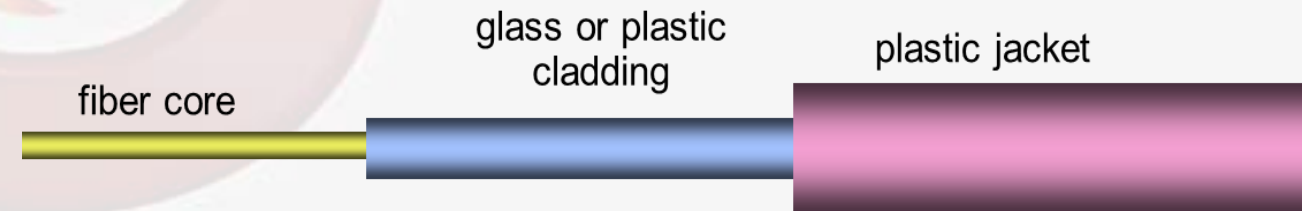
Fiber Optics has major characteristics:

- Extremely low attenuation (as low as 0.2 db/km)
- Are very flexible
- High capacity of transmitting information
- No signal leakage
- Much smaller in size

GALGOTIAS
UNIVERSITY

Optical fiber consists of three sections

- **Core**: It is an inner cylindrical material made up of glass or plastic.
- **Cladding**: It is a cylindrical shell of glass or plastic material in which Core is inserted.
- **Protective Jacket**: The Cladding is enclosed in polyurethane jacket and it protects the fiber from surroundings.



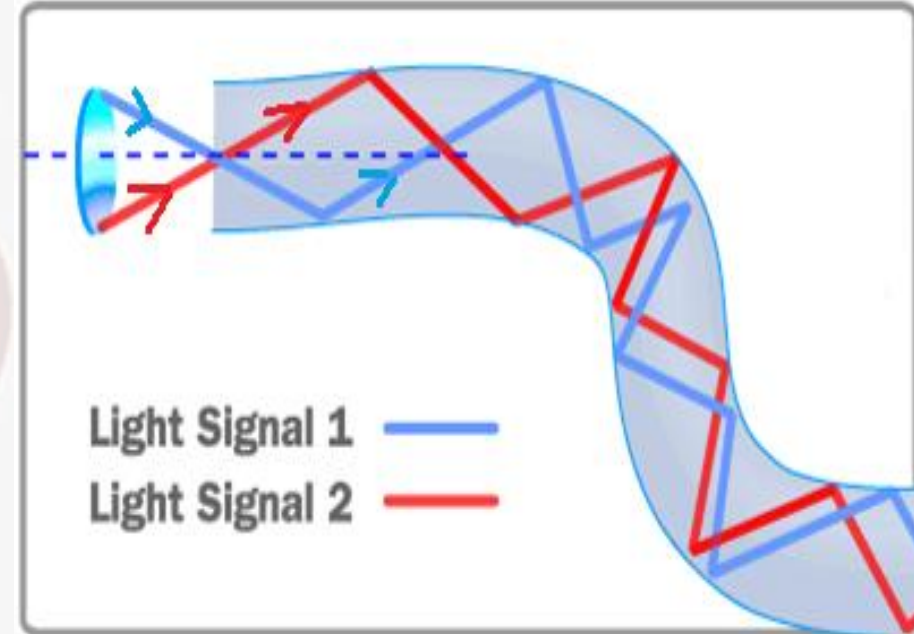
NOTE: The Refractive Index of core is slightly greater than the Refractive Index of Cladding. The normal standard values are 1.48 and 1.46 respectively.

How Does Optical Fiber Transmit Light??

Principle:

Optical fiber works on the principle of **Total Internal Reflection** (TIR). Once light ray enters into core, it propagates by means of multiple total internal Reflections at core-cladding interface.

- Because the cladding does not absorb any light from the core, the light wave can travel great distances.
- However, some of the light signal **Degrades** within the fiber, mostly due to impurities in the glass. The extent that the signal degrades depends on the purity of the glass and the wavelength of the transmitted light



GALGOTIAS
UNIVERSITY

References:

1. Arthur Beiser, S RaiChoudhury, ShobhitMahajan, (2009), Concepts of Modern Physics, 6th Edition, Tata-McGraw Hill. ISBN- 9780070151550.
2. Dr. N. Subrahmanyam, BrijLal and Dr. M. N. Avadhanulu (2010) A Text book of Optics, 24th Edition, S. Chand Higher Academy. ISBN 8121926114
3. B.K Pandey and S. Chaturvedi (2012) Engineering Physics, Cengage Learning, ISBN 9788131517611
4. B.B. Laud, Lasers and Non-Linear Optics (2011), 3rd Edition, New Ages International.
5. William Silfvast (2002), Laser Fundamentals, Cambridge University Press.