CHAPTER - 1

INTRODUCTION
Introduction

There has been an explosion of activity in the field of optical fibers during the last two decades. The phenomenon of transmission of optical waves through optical fibers has increased considerably. A new era of optical communications was launched during early 1970's when Kapron, Keck and Mavrre of the coming glass works, U.S.A. fabricated an optical fiber having an attenuation of about 20 dB per km. However it was only in 1977 that the first commercial optical fiber communication link was put to public use. Since then many Nations all over the world have been striving to update their communication systems using optical fibers. In our country also the department of Telephones and the Indian Railways are upgrading their communication systems using optical fibers. Optical fibers are preferred as transmission medium in communication systems because fiber optic systems offer greater information carrying capacity over longer repeater-less distances at the costs lower than conventional copper wire systems. In addition to the initial reduced system costs, the system capacity can be improved without adding fibers by upgrading the auto electronic devices in systems as needed. For example Lasers, that can be modulated at faster rates or that emit light over a narrow wavelength range can dramatically increase the information carrying capacity or bandwidth. Typical optical fibers are only a fraction of the size of a comparable copper wire cables. This makes them to use in areas of limited space, such as congested under ground conduits or large office buildings. Also since optical fibers are made from glass, a dielectric material, they are relatively unaffected by electro-magnetic radiation. This
property has encouraged the use of optical fibers in areas like aviation, military etc.

There has also been a tremendous advance in the components constituting a fiber optic communication system. Development of high purity optoelectronic materials allows the manufacturer to prepare high performance light emitting diodes, laser diodes, low loss optical fibers and highly sensitive optical detectors. In addition to optoelectronic integrated circuits, optical fiber, now form an important part of the newly emerging field of 'Photonics', in which the flow of photons is manipulated to achieve the desired task.

During the last one-decade or so, optical sensors have been developed based on optical fibers. The basic principle is to detect the variation in the wavelength, intensity or phase or polarization of an optical wave traversing through an optical fiber, due to the effect of measurand and relate to it quantitatively. Due to the absence of electro magnetic interference, greater sensitivity, easy to realize, and smaller in size, low cost optical fiber sensors are becoming very popular.

In the present work an attempt has been made to estimate iodine in iodine-salt solution. This has been done by removing the cladding portion in the middle of an optical fiber of known length. This portion where cladding has been removed called the 'sensing length' is exposed to common salt solution and iodine-salt solution. By varying PPM of potassium iodide (KI) in common-salt solution, the corresponding output power is
noted. A graph is drawn between PPM of KI and output power and there by the amount of iodine can be estimated. This method with slight modification can also be made use for on-line estimation of iodine in salt industry.

A part of the present work is published in journals and presented in National and International conferences as listed below.


