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**SCHOOL OF ELECTRICAL ENGINEERING  
FACULTY OF ENGINEERING  
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# **SKEE 3742 OPTICAL COMMUNICATION LABORATORY**

## **FIBER-OPTIC TRANSMISSION**

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# Optical Fiber

## Introduction

There are many active and passive components exist in fiber optic communications systems. Active components of optical transmitter (e.g., light sources), optical amplifier, and optical receiver (e.g., photodetectors) are required for transmitting, amplifying, and receiving optical signals, respectively. Active components used in fiber optic communications systems include, and optical amplifiers.

When light travels down optical fibers, some of the light is absorbed by the glass or plastic. This means that light coming out of the end of the fiber is not as strong as the light going into the fiber. When designing a fiber communications system, there is a need to know the size of this loss to calculate the maximum distance the signal will travel. Fibers also can be used to bend light. Although fibers are good at bending light, each time the fiber is bent, a little light is lost. How much of this light is lost depends on the different sizes of bends. Besides, when connecting two fibers together, the connectors and connection sleeve do not always align the fibers perfectly. Sometimes there is a gap between the fibers. This will influence the light transmission from one fiber to another.

The fiber optic receiver of a communication system is a decoder. It converts optical light which contains coded information into a usable output. The basic elements of all fiber optical receivers are shown in Figure 1. The most critical elements of a fiber optic receiver are the photo detector and the preamplifier.

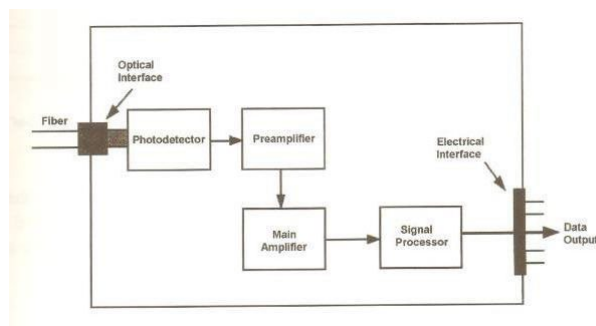


Figure 1: Basic elements of optical receiver

## Problem Statement

You will be given a fiber optic transmission kit and optical fibers of various lengths. You are expected to study various characteristics and performance of optical receiver and transmitter. You have to run several tests on the experimental fiber optic transmission setup to analyze the performance of the system.

In your report you must detail out the complete design with the aid of schematic diagram showing every connection made. You must include the result of your observation on the performance of the system for various fiber lengths from 1m to 10m, fiber bending 10mm to 100mm, and fiber gap from 0mm to 20mm. You should report the value and the shape of output signal at the receiver. Include the comment of your observation on the quality of sound and the waveform of received signal. Result from each case should be plotted into graphs and properly analyzed as to characteristic the behavior of the fibers of various lengths. Report may come along with graphs, diagrams, analysis, comments and etc.

## Trigger

1. Literature study on the characteristics of the components involved in fiber optic transmissions.
2. Awareness on the safety and accuracy issues in dealing with optical equipments.
3. Measurement of input power and output power using oscilloscope.
4. Analysis of results.