PABNA UNIVERSITY OF SCIENCE AND TECHNOLOGY

Department of
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Faculty of Engineering and Technology

Lab Report

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Course Title: Microwave & Fiber Optic Communication Sessional

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Dept. of ICE

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Experiment NO: 01

Experiment Name: To study the fiber optic transmitter and receiver in communication

objective:

(I) To study and analysis of transmitting data using 'morse code' in fiber optic comm-unication system.

(II) To study application of optical fiber

(III) To study the fiber optic transmitter and receiver

Theory: The code in which a series of dashes and dots used to represent individual letters of the number and alphabet is called 'Morse code'. we will use the momentary switch to create the pattern used in morse code and operators pause breifly between letters so listeners don't hear everything run together In table 2.1 the morse code contains no lower case letters, punctuation or other specia

symbols. Early telegraph messages were short and simple no need for anything fancy.

Table-1.1 : Letters and Numbers

A(·–)	B(–···)	C(–·–·)	D(–··)
E(·)	F(··–·)	G(––·)	H(····)
I(··)	J(·–––)	K(–·–)	L(·–··)
M(––)	N(–·)	O(–––)	P(·––·)
Q(––·–)	R(·–·)	S(···)	T(–)
U(··–)	V(···–)	W(·––)	X(–··–)
Y(–·––)	Z(––··)		
0(–––––)	1(·––––)	2(··–––)	3(···––)
4(····–)	5(·····)	6(–····)	7(––···)
8(–––··)	9(––––·)		

Table-1.2: Punctuation

Full stop(·)	·–·–·–
comma(,)	––··––
Hyphen or Dash(–)	–····–·
Apostrope(')	·––––··
Interrogation mark(?)	··––···

Experimental Requirement:

1. Module KL-95001
2. 3-meter optical fiber
3. Ac to Dc power Adapter
4. Microphone - earphone set
5. 10 mm jumper
6. connecting lead

procedure:

1. place two module A & B on the work table separated by approximately 2.5 meters.
2. place the data transreceiver mode selector of each module in OFF position
3. Using connecting lead, connect the signal generator digital output to the momentary switch input located at the left side of PBI
4. with 10mm jumpers. connect the momentary switch output to the transmitter input and connect the receiver analog output

5. Refers to figure, loosen the enich nut on the TX1 Then insert an fiber of the 3-meter tip makes contact with the inter back wall and tighter the enich nut on the RX1 until the fiber tip makes contact with the interior back wall and tight the enich nut

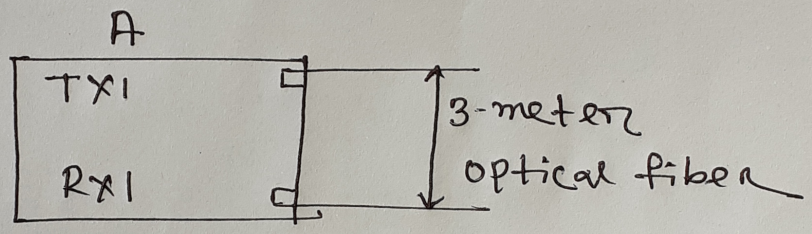
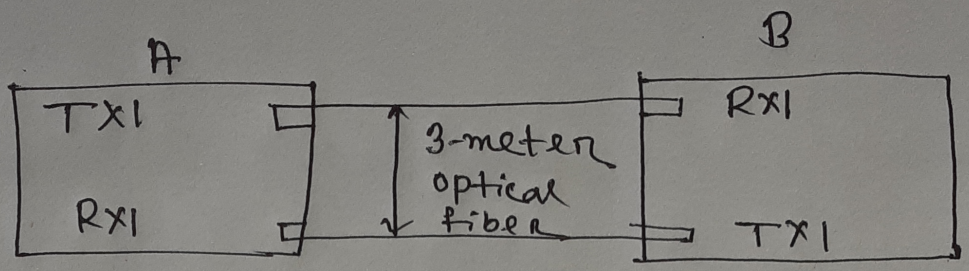


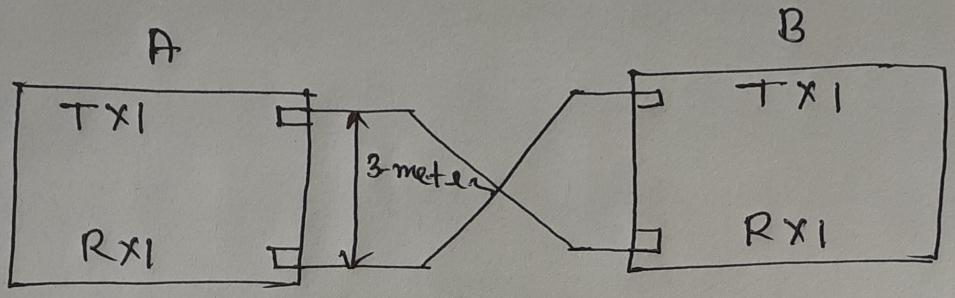
Figure - Optical fiber installed on module A

Module B:

6. Again repeat 3 and 4 procedure identify the 3-meter optical fiber originating from the transmitter of module A by the red light emitted by it free end and insert it in the receiver RX1 of module B as shown in figure following the same procedure



(1)



(2)

Figure: connection of two fiber optic communication system

7. then tune the receiver receive gain knob to the 3/4 position

8. Apply DC power to the power jack through the AC to DC power adapter

Experimental Table

Start our practical by sending the international distress signal SOS which is three dots, three dashes and three dots as shown in table-1.2

S	O	S
...	---	...

Experimental Table-1

Transmitted Alphabet	S	O	S
corresponding morse code	...	---	...

Receiving morse code	...	---	...
corresponding Alphabet	S	O	S

Experimental Table-2

Transmitted Alphabet	I	C	E
corresponding morse code	..	-.-.	.

Receiving morse code	..	-.-.	.
corresponding Alphabet	I	C	E

Result and discussion: From the experiment table we can see that the receiver morse code are exactly same as the transmitted morse code. So the information transmission is not changes or not affected by noise and the optical fiber communication system are working properly.

Precaution:

1. Every connection should be connected very carefully.
2. Don't overtighten
3. We should be careful to connet the Ac to Dc power adapter from the power jack in both module.

Experiment NO:02

Experiment Name: To study the audio signal to transmit through a fiber optic cable using light

Theory:

Fiber optics: Fiber optics as a technology and a field of study consists basically of light source as transmitter light sensitive elements such as receiver and optical light passes to reach the receiver given the common physical constant.

The working of optical fibre depends on the basic principles of fibre and interaction of light with matter. web star provide two widely accepted defination for light

1. Something that makes vission possible
2. sensative are used by simulation of the visual receptions.

Most fibre optic system uses infrared light between 800 nm to 1550 nm. This region often referred to as the new infrared

Mathematically $\lambda = \frac{c}{f}$

Light also exhibits some practical like properties A light particle is called a Photon. Individual unit off energy. The energy contained in a photon depends on its frequency

$$E = hf$$

Here, $h = 6.634 \times 10^{-34}$ j/s

It is commenced to define the index of refraction or due to refractive index of a medium to be the ratio

$$n = \frac{c}{v} = \frac{f\lambda}{f\lambda_n} = \frac{\lambda}{\lambda_n}$$

Here, λ = a wavelength of light in vaccum

λ_n = wavelength of light in medium

Apparatus Requirement:

1. Module KL-95001
2. 3-meter optical fibre
3. Ac to Dc power supply
4. Microphone Earphone set
5. 10 mm jumper
6. connecting lead
7. 3.54 audio interface lead

Procedure:

1. Place two module A and B separated by 4 to 4.5 meter
2. Place the data transmitter mode selecton if each module in off position.
3. Insert one wire of the 3.54 audio frequency interface lead into the earphone jack of the radio and insert the other wire the audio circuit
4. Looser the elinch nut on the receiver
5. Using a 10 mm jumper connect the receiver analog output to the SP input.
6. Adjust the receiving gain

Experimental Table:

Transmitted Radio signal	Received Radio signal	Audio output	Noise
Module A	Module B	clearly Heard	NO
Module B	Module A	clearly Heard	NO
Module A	Module A	clearly Heard	NO
Module B	Module B	clearly Heard	NO

Result and Discussion:

From the output there is no noise effect in both the two cases and the signal passed through the optical fibre and heard the audio signal

precaution:

1. Due to the over cost we will keep the module on the workaplace very safely
2. connection between two module by the fibre optic cable very carefully
3. Make sure that the interaction back to the fibre optic connect the TX1 and RX1
4. Do not overtight the nut during connection

Experiment NO: 03

Experiment Name: To study the loss of energy in the optical fibre at different transmission distance.

Theory: The active components used in fibre optic communication systems included light sources photo electron and optical amplifiers.

1. Basic requirement of light sources peak output power of light sources at waveguide 0.8, 5, 1.3 and 1.35 Hm

2. Adequate adapt power and high response speed

3. High reliability: To ensure a fibre optic system operating reliability a suitable and long lifetime of the light source

4. Narrow spectral width: Light source with narrow spectral is required to minimize dispostion

5. High coupling efficiency: High coupling efficiency is required for launching the output optical

power of light source into a fibre

6. Low temparature dependence

Apparatus required:

1. Module XL-95001
2. Linear optical power
3. 8-meter duplex optical fibre
4. 10-meter duplex optical fibre
5. Ac to Dc power adapter
6. 10 mm jumper
7. connecting lead

Procedure:

The purpose of the experiment is to show you that all the benifits of optical fibre they can loose energy over distance.

1. Place a module XL-95001 on the work table
2. Place the data transreceivers MODE selector in OFF position
3. Using the connecting loads, connect the signal generator analog input and CH1 input

4. Using a common jumper connect the receiver analog output to the input SP

5. Loosen the einch nut on the RX1. Insert either end of the 4-meter optical fiber into the RX1

6. Apply DC power supply to the power jack

7. Turn the signal generator frequency and amplitude knobs to wave at 500 Hz

8. With the oscilloscope measure and record the receive analog-1 output

Experimental data:

Fibre length (m)	Receive Analog (volt)	Sound
1	0.75	High
5	0.50	medium
10	0.20	Low

Result and Discussion:

In one of the fibre optic cable the receiver analog output is 0.75 volt where as input voltage is 1 V and input signal frequency is 500 Hz and audio signal sound too high and receiver analog 1 is 0.5V

precaution:

1. Due to the over cost we will keep the module on the work table very safely
2. connection between two module by fibre very safely
3. Make sure that interaction back of the fibre optic connect the TX1 and RX1
4. Do not over tighten the nut

Experiment NO: 04

Experiment Name: To Study the effect of fiber optic communication

Theory: the simplest configuration of optical fiber is shown in figure-1

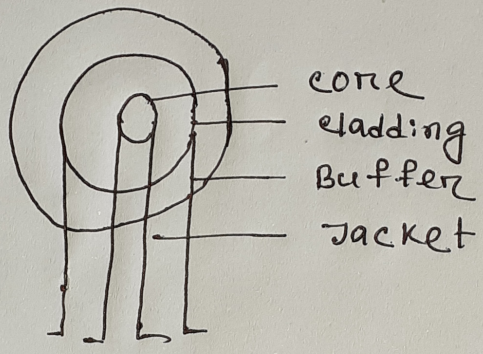


Figure-1: cross section of optical fiber

Fiber losses: Attenuation or loss of a light of a signal as it propagates along a fiber is an important consideration in the design of a optical communication system because its largely determines the maximum unamplified or repeater less separation between a transmitter or receiver an inline amplifier

Apparatus:

1. Module KL-95001
2. 1 meter optical fiber
3. Ac to Dc power adapter
4. 10 mm jumper
5. Black and white paper
6. Transparent plastic sheet
7. Light source
8. connecting lead

Procedure:

1. place module KL-95001 on the work table the module will be moved around during this activity
2. Using a 10 mm jumper connect the receiver analog 1 output to the Sp input
3. Unroll both 1-metre optical fibre
4. place the data transceiver mode selector on
5. Loosen the clinch nut on the RX1
6. Then the receiver gain knob clockwise to the maximum portion.

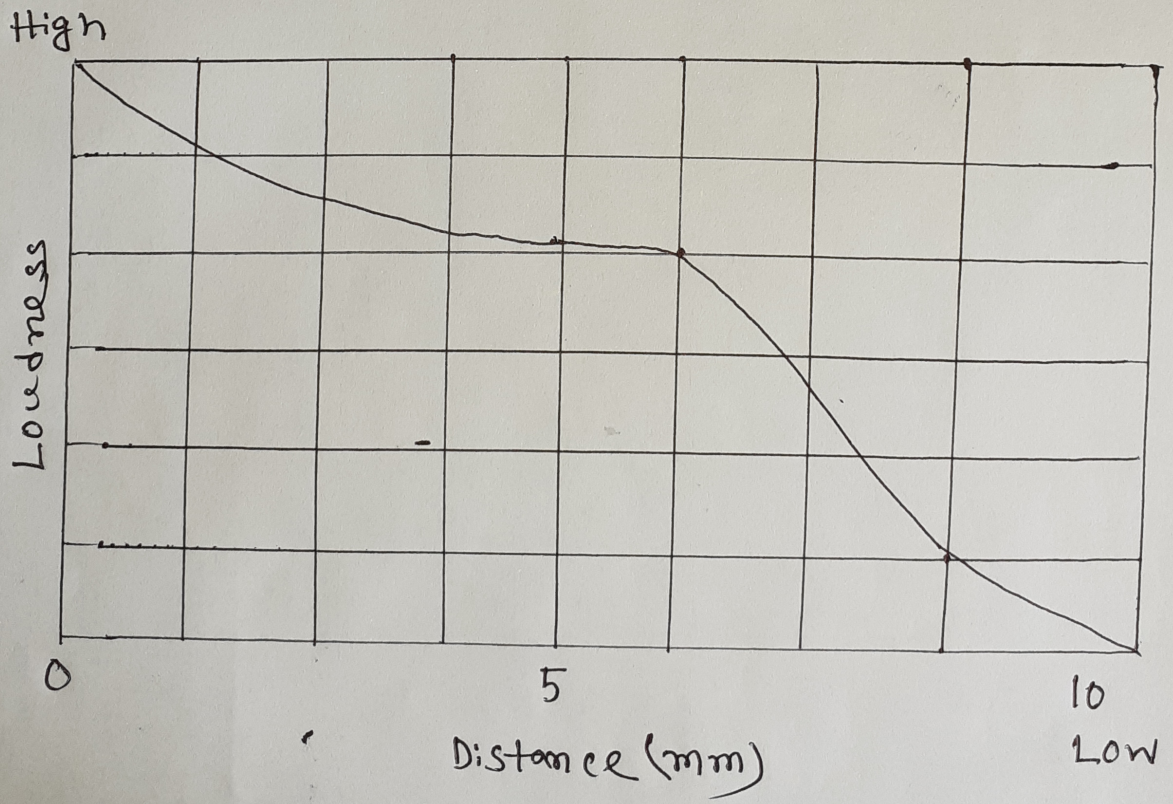
7. Move the optical fibre closer to the florescent light and then away from it

8. Unplug the Ac to Dc power adaptive cord where it connects to the module

9. Remove the connecting lead

10. Using Loosen the 8inch nut on the TX1. Insert other end of unused 1-meter optical fibre

Experimental Table:



(a) Data for procedure A

Frequency	Blinking LED
100 Hz	Blinking slowly
300 HZ	moderate blinking
500 HZ	Highly blinking

(b) Data for procedure B

paper	Reflection
White	Reflection of light
Black	Fully absorbed
Transparent	Refraction light

(c) Data for procedure C

Result and Discussion:

when the florecent light source close to the optical fiber then more light easily pass to the optical fiber and we heard loudly in the speaker but when the distance of light source to the optical fiber increase then the loudness is slower then after a distance we can not heard any sound.

Precaution

1. Due to over cost, we will keep the module over table very slowly
2. connection between two module by the fiber optic cable very safely
3. make sure that the interaction back to the fiber connect the TXI and RXI
4. Do not over tight the nut during connection