Military Institute of Science and Technology

Department of Computer Science and Engineering

Course Title: Data and Tele- Communication Sessional

Course Code: CSE-306, Cr. Hr: 1.50

Level-3, Term-2

**Experiment No. 14**

**Name of the Exp: Fiber Optic Communication**

**Introduction :**

An optical fiber is a structure that is designed to guide light over a distance, or path that is not

necessarily straight. Optical fibers accomplish light confinement by the total internal reflection of the light that is coupled into the end of the fiber. Typical fibers for telecommunication or data transmission are made from high purity glass in round fiber geometry. They can also be made from plastics. Optical fiber does not necessarily need to be circular in geometry. Planar or flat slabs of fibers are used for a variety of applications.

In this experiment, a simple one way communication between digital transmitter and receiver circuits. via a fiber optic link will be observed. A digital signal will be sent directly through this communication system. In the second portion of the experiment, an analog modulating signal will be used to change the frequency of a digital signal, which is then used to switch a light source on and off. At the receiver, the incoming digital pulses are squared up and the original analog signal is extracted from the changing frequency of this digital signal.

**Procedure**:

(a) Digital Communication:

1) Connect power supplies to the MODICOM 6 board.

2) Ensure that all switched faults are off.

3) Switch EMITTER 1's driver to digital mode. It will ensure that fast changing digital signals applied to the driver cause EMITTER LED to switch quickly between on and off state.

4) Now complete the connection as shown in figure 1. Turn on the power.

5) The Function Generator block will w'-ork as the transmitter. The square wave output of this block will be applied to the input of Emitter circuit 1. Compare the output of Emitter circuit 1 with its input.

6) Monitor both inputs to comparatorl (t.p.l3&14).Slowly adjust the comparator's BIAS preset until the DC level on the (-) input (t.p.13) is midway between the high and low levels of the signal on the (+ ) input(t.p. 14). Explain the reason behind it.

7) Now observe the output of comparator and compare it with the original digital signal.

**b) Frequency Modulation:**

1) Connect power supplies to the MODICOM 6 board.2) Ensure that all switched faults are off.

3) Switch EMITTER 1's driver to digital mode. It will ensure that fast changing digital signals applied to the driver cause EMITTER LED to switch quickly between on and off state.

4) Now complete the connection as shown in figure 2. Turn on the power.

5) Turn the 1kHz preset on the Function Generator block to the fully clockwise position.,

6) Examine the output ofVCO. Explain.

7) Examine the output of the photo-detector. An APD is used as photo-detector in this board.

8) Monitor both inputs to comparator (t.p.l3&14). Adjust the comparator's BIAS preset until the DC level on the (-) input (t.p.13) is midway between the high and low levels of the signal on the (+ ) input(t.p.l4).

9) Now observe the output of Phase-Locked Loop Detector. Then observe the output of the ac amplifier. Adjust the Gain adjust 1 preset until the signals at t.p.28 and the original ac signal are equal in amplitude. Explain the function of the Phase-Locked Loop Detector in extracting the ac signal.

10) Now flex the fiber carefully and observe whether it affects the obtained output. The output amplitude is independent of the bend radius of the cable and of the length of the cable, provided that the detector's output is large enough to cross the comparator's threshold level.

**Report :**

1) Explain the working principle of an optical fiber.

2) Explain the function of LED in this experiment? Would it better if we have applied the analog signal directly to the LED?

3) Explain the function of the photodetector(PD). Name some other PDs which could have been used.

4) Give the explanations as demanded in different steps of procedure.