Experiment-5A

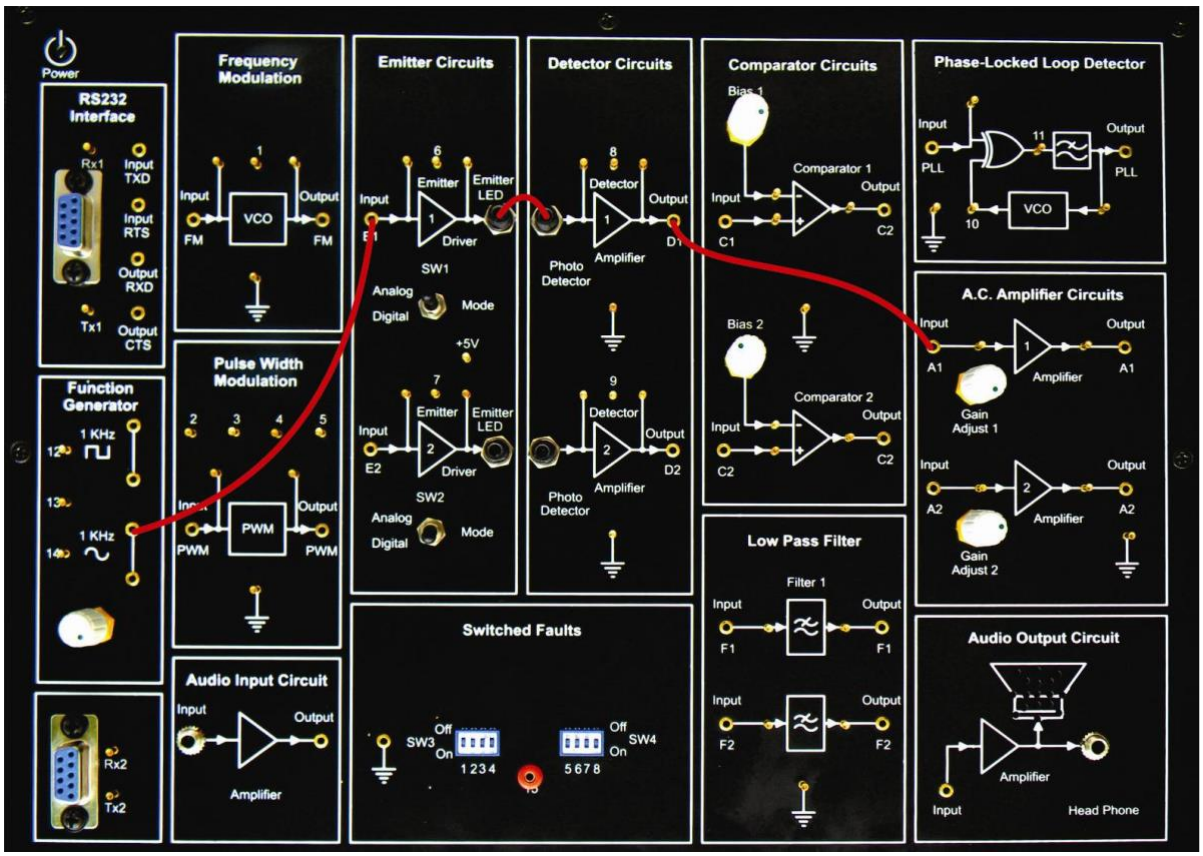
NAME-ANJALI MANTRI(U18EC125) DATE-01/02/2021

Aim: Setting up Fiber Optic Analog Link. Study of a 650nm fiber optic analog link in this experiment you will study the relationship between the input signal and received signal.

Equipments Required:

- Scientech 2502A Training platform with Power Supply cord
- Optical Fiber cable
- Cathode ray Oscilloscope with necessary connecting probe

Connection Diagram:



Procedure:

- Connect the Power Supply cord to Scientech 2502A.
- Ensure that all switched faults are ‘Off’.
- On the board, switch emitter l's driver to analog mode.
- Make the following connections as shown in next figure
  - Connect the 1 KHz, 1Vpp sine wave, output to emitter l's input.
  - Connect the Fiber Optics cable between emitter output and detectors input.
  - Detector l's output to AC amplifier 1 input.
- Switch ON the Power Supply of Scientech 2502 and Oscilloscope.
- Observe the input to emitter 1 with the output from AC amplifier 1 and note that the two signals are same.

Questions:

- What is the function of transmitter, optical fiber and receiver?
- What is meant by index profile?
- What is the working of LED in Emitter Circuit?
- What is the drawback of multimode Fibers?
- What is Fiber optics?

U18EC125
[signature]

PAGE NO.:
DATE: / /

(1) What is the f^n of transmitter, optical fiber and receiver?

Ans:- Transmitter:- The light source like an LASER or LED diode is used as transmitter. The main f^n of a light source like LASER / LED is to change electrical signal to light signal. These light sources are small semiconductor devices which efficiently converts electrical signal to light signal. These light source require connections of power supply and modulation circuitory.

Optical fiber:- An optical fiber is transmission medium within FOC system. Optical fiber is crystal clear and stretchy filament which transmits the light from transmitter end to receiver end. When the optical signal enters at the end of fiber then optical communication system transmits to the end of receiver using optical fiber.

Receiver:- A photo-detector can be used as a receiver. The main f^n of the receiver is to change an optical data signal back to an electrical signal. This is a semiconductor photodiode in photodetector in current FOC system. This is a small device generally fabrication jointly with electrical circuitory to form connections like power supply and signal amplification.

U18EC125
PAGE NO.:
DATE: / /

② What is meant by Index Profile?

Ans:- A refractive index profile is the distribution of refractive indices of materials within optical fiber. Some optical fiber has step index profile, in which the core has one uniformly distributed index and cladding has lower uniformly distributed index. Other optical fiber has a graded index profile, in which refractive index varies gradually as a fn of radial distance from fiber center.

③ What is the working of LED in Emitter Circuit?

Ans:- The working of LED depends on quantum theory. When LED is connected in forward bias, the current flows in forward direction. The flow current is because of movement of electrons in opposite direction. The recombination shows that electron move from conduction band to valance band. and they emit electromagnetic energy in form of photons. The energy of photons is equal to the gap between valance band and conduction band.

④ What is the drawback of multimode fiber?

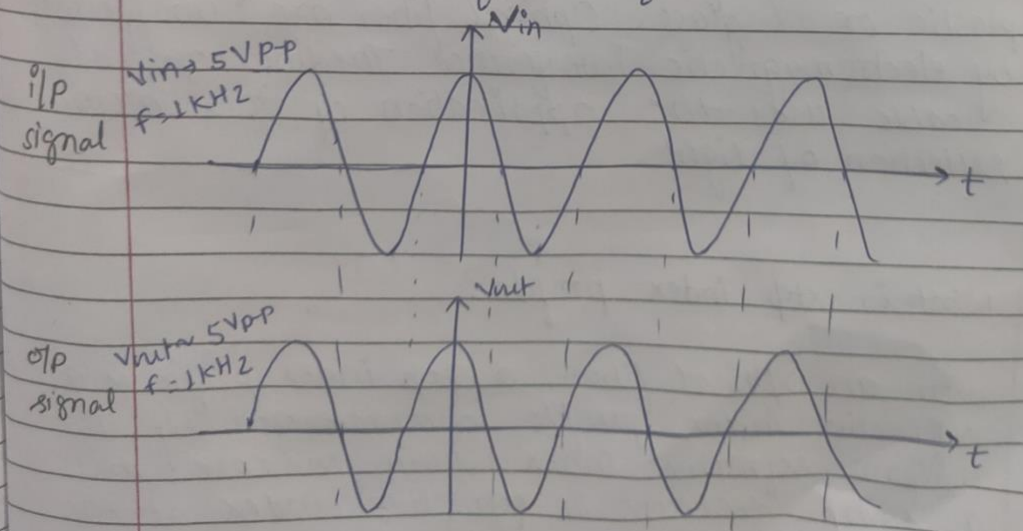
Ans:- (i) Multimode cables are more limited in both speed and distance.

(ii) The maximum speed of an OM4 multimode cable is 100G depending on distance, and only upto a

distance of 400 to 550 meters. for OM3 fiber the m distance is 300 meters At 2kms it is only capable transmitting 10mbit.

(5) What is fiber Optics ?

Ans:- fiber optics, the science of transmitting data, voice o images by the passage of light through thin, trans parent fibers. In telecommunications, fibes op technology has virtually replaced copper wire in long-distance telephone lines, and it is used t link computers within local area networks. fibe optics is also the basis of the fiberscopes used in examining internal parts of body or inspecting the interiors of manufactured structural product



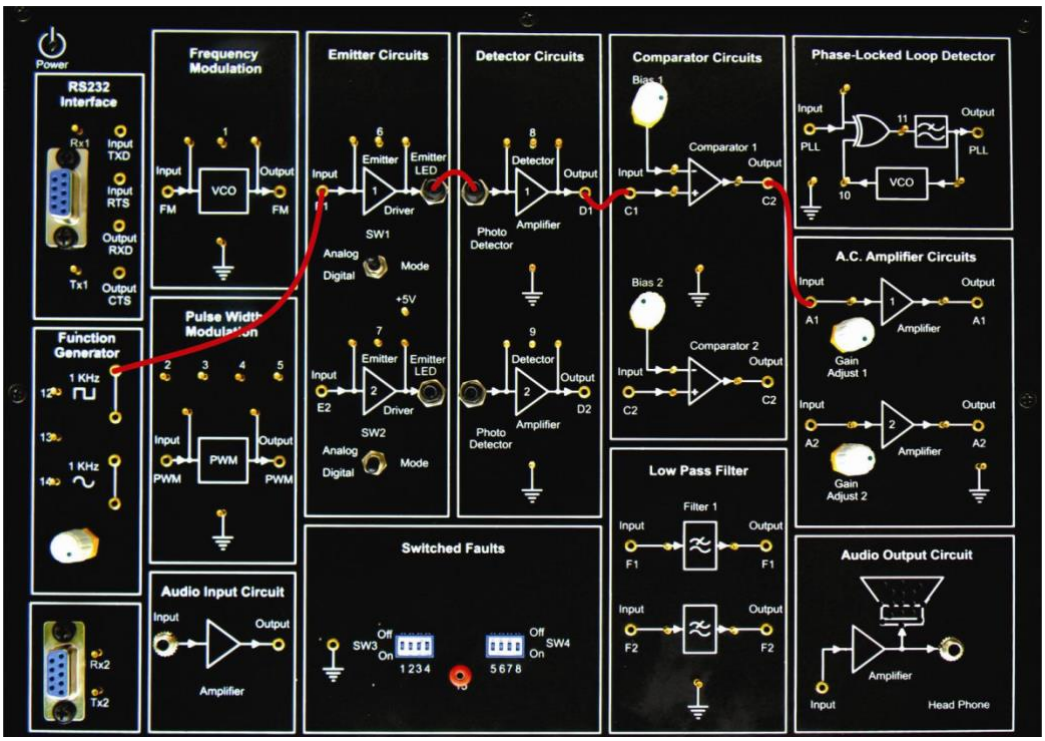
Experiment-5B

Objective: Setting up Fiber Optic Digital Link .Study of a 650 nm fiber optic digital link .In this experiment you will study the relationship between the input signal and received signal.

Equipments Required:

- Scientech 2502A Training platform with Power Supply cord
- Optical Fiber cable
- Cathode ray Oscilloscope with necessary connecting probe

Connection Diagram:

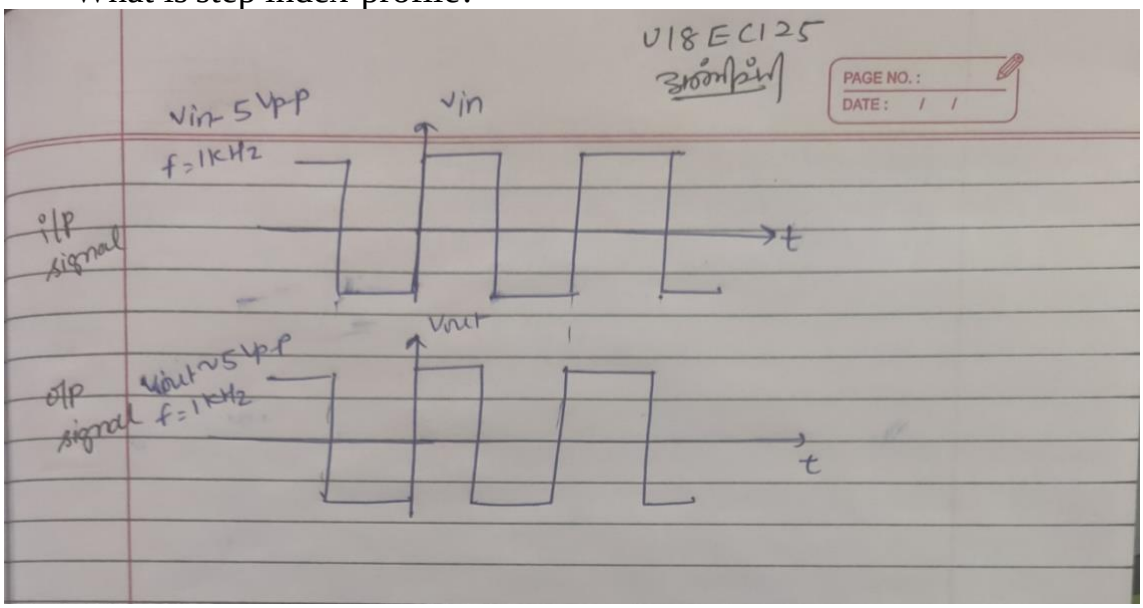


Procedure:

- Connect the Power Supply cord to the main the Power Supply to the board.
- Ensure that all switched faults are ‘Off’.
- Make the following connections as shown in next figure.
  - Connect the 1 KHz square wave output to emitter l's input.
  - Connect the fiber optic cable between emitter output and detectors input.
  - Detector 1's output to comparator 1’s input.
  - Comparator l's output to AC amplifier l's input.
- On the board, switch emitter 1's driver to digital mode.
- Switch ON the Power Supply of Scientech 2502 and Oscilloscope.
- Monitor both the inputs to comparator 1. Slowly adjust the comparators bias preset, until DC Level on the input (TP13) lays mid way between the high and low level of the signal on the positive input (TP14).
- Observe the input to emitter 1 (TP 5) with the output from AC amplifier 1 (TP28) and note that the two signals are same.

Questions:

- Why single mode Fibers are used for long distance transmission?
- What is optical Fiber?
- What is step index profile?



U18EC125
अंजलि

PAGE NO.:
DATE: / /

① Why single mode fibers are used for long distance transmission?

Ans:- Designed for long-distance communication, a single mode fiber cable allows light signal to travel more than 10 miles, a much longer distance than multimode. Single mode fiber also accommodate much higher BW than multimode.

② What is optical fiber?

Ans:- Optical fiber is the technology associated with data transmission using light pulses traveling along with a long fiber which is usually made of plastic or glass. Optical fiber are unaffected by electromagnetic interference. The fiber optical cable uses the application of total internal reflection of light.

③ What is step index profile?

Ans:- For an optical fiber, a step index profile is a refractive index profile characterized by a uniform refractive index within the core and a sharp decrease in refractive index at the core cladding interface so that the cladding is of a lower refractive index.