Objective / Aim of the Experiment

To measure the optical power emitted by the LED.

Equipment Required

Power Supply PSU or PS!
Testing Module MCM-40
Multimeter
Optical Power Meter

Theory

The commonest optical sources are light-emitting diodes(LED) and laser diodes (LD). Both these diodes can be used to generate radiations at different wavelengths, corresponding to the windows where fibers show the minimum attenuation.
The LED is a particular diode which emits light through process of recombination of the electron-hole pairs due to a forward bias of the junction The optical power emitted is a function of the forward driving current. At present the LEDs in the 1_{st} windows are made of gallium arsenide or of the ternary compound with aluminum (ALGaAs/GaAs), the LEDs in the 2_{nd} and 3_{rd} windows are made of indium gallium-arsenide-phosphide (InGaAsP/InP).
The most significant parameters of LED are:
Output wave length
Output spectral width
Output optical power: it ranges in some tens of ÂµW, and depends on the forward driving current.
Frequency response.

Figure1

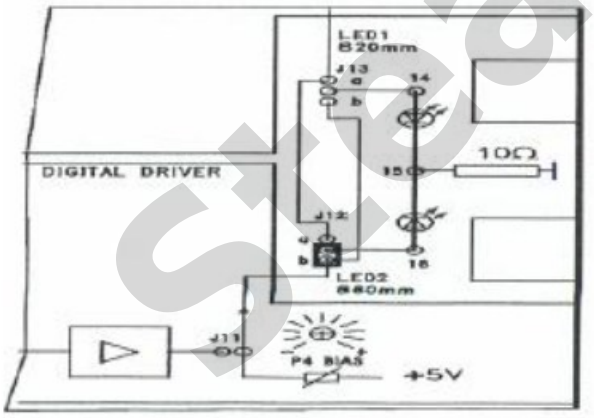
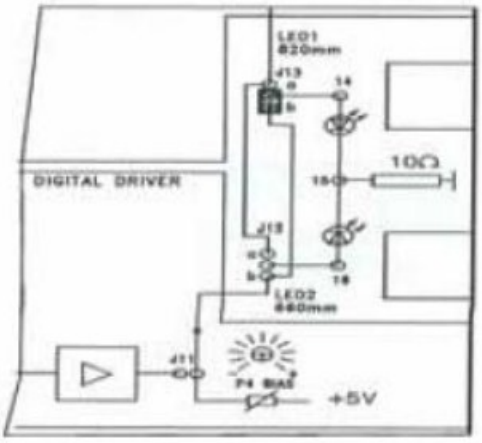


Figure 2



Procedure

Optical power emitted by LEDs

1. Power the module.
2. isconnect the jumper j11-j13 and connect the jumper j12b, so that the circuit can be arranged as shown in Figure 1. this configuration includes the LED at 660nm, forward polarized through the bias trimmer (p4).
3. Measure the voltage v_{10} across the resistor of 10Ω connected in the series of LED (between TP15 and ground). the forward current I_f crossing the Led in expressed by the following formula:
$I_f = V_{10} / 10$ [V_{10} in mv, I_f in ma]
Observe the intensity of the light emitted by the LED.
Power increase as current increase.

Characteristic Curves of LEDs

Disconnect the jumper j11-j12 and connect the jumper j13b, so that circuit can be arranged as shown in Figure 2. this configuration includes the LED at 820nm, forward polarized through the bias trimmer (p4)
Measure the voltage V_f across the LED (between TP14 and TP15) and the voltage V_{10} across the resistor of 10Ω connected in the series of LED (between TP15 and ground). the forward current I_f crossing the Led in expressed by the following formula:
$I_f = V_{10} / 10$ [V_{10} in mv, I_f in ma]
Connect the LED to optical power meter through cable3 (200/230)
Vary the BIAS trimmer P4 and measure V_f , V_{10} , I_f and optical power P_{out}
Plot the curve for the optical power of LED versus I_f and of I_f versus V_f
Change cable 3 with cable4 (50/125) and then with cable5 (10/125) and observe the readings of optical power.

Observation

S. No.	V_f (mV)	V_{10} (mV)	$I_f = V_{10}/10$ (mA)	P_{out} (dBm)

Result

Characteristic curves of LED source is observed.
By changing the fiber optic cables it was observed that the optical power decreases as the Numerical Aperture of the cable decreases