DEVICES AND CIRCUITS LAB REPORT – 1

Experiment Name : Experiments on Solar Cell

Roll Numbers : 200020010 , 200020051

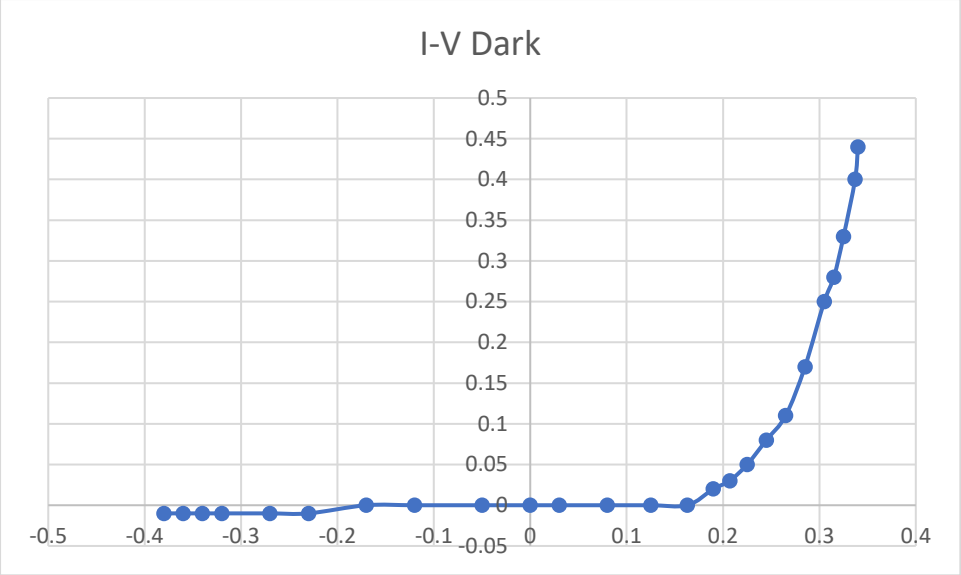
Observations :

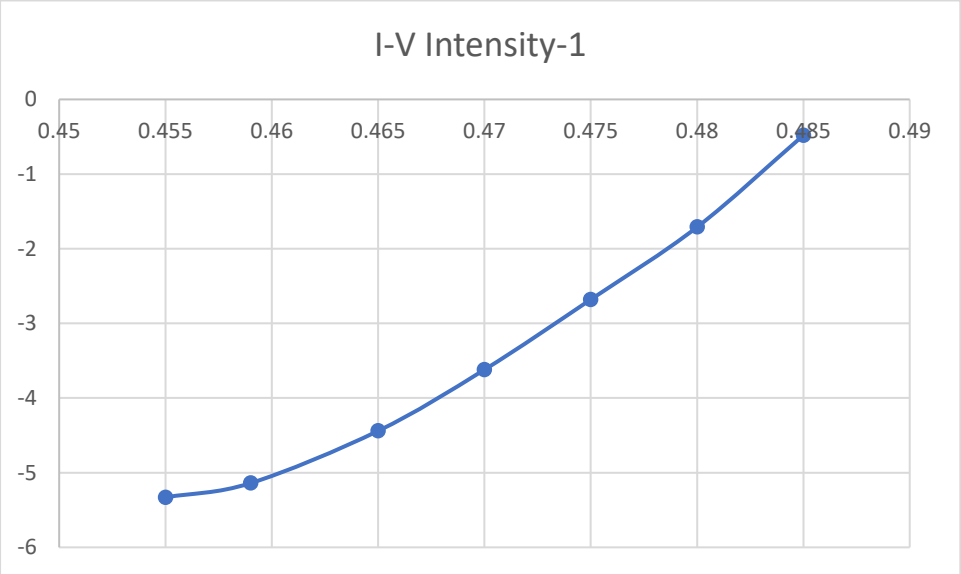
Measurement of I-V characteristics :

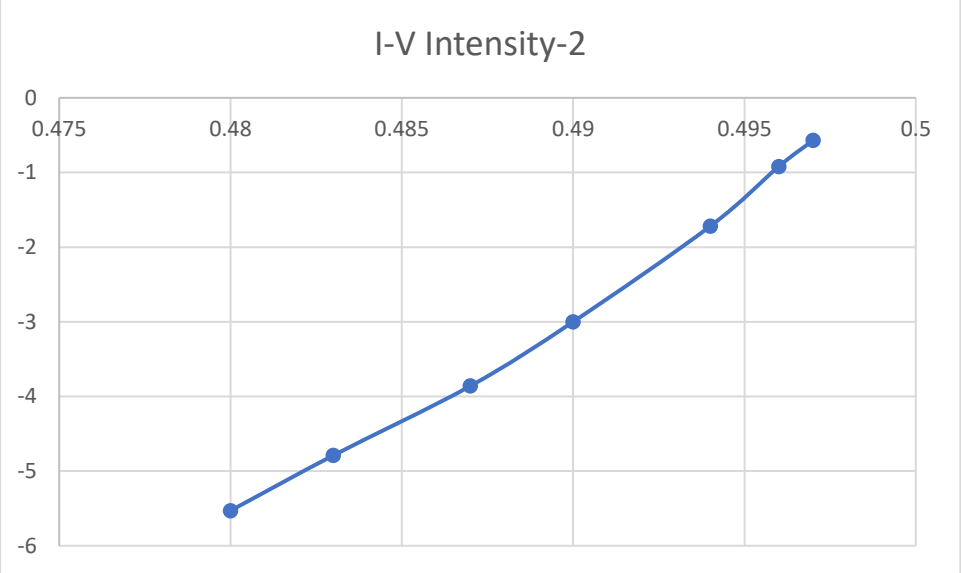
Potentiometer of 1k ohm :

Dark	Intensity I1	Intensity I2

V cell (in V)	I cell (in mA)	V cell (in V)	I cell (in mA)	V cell (in V)	I cell (in mA)
-0.38	-0.01	0.455	-5.33	0.48	-5.53
-0.36	-0.01	0.459	-5.14	0.483	-4.79
-0.34	-0.01	0.465	-4.44	0.487	-3.86
-0.32	-0.01	0.47	-3.62	0.49	-3
-0.27	-0.01	0.475	-2.68	0.494	-1.72
-0.23	-0.01	0.48	-1.71	0.496	-0.92
-0.17	0	0.485	-0.48	0.497	-0.57
-0.12	0				
-0.05	0				
0	0				
0.03	0				
0.08	0				
0.125	0				
0.163	0				
0.19	0.02				
0.207	0.03				
0.225	0.05				
0.245	0.08				
0.265	0.11				
0.285	0.17				
0.305	0.25				
0.315	0.28				
0.325	0.33				
0.337	0.4				
0.34	0.44				

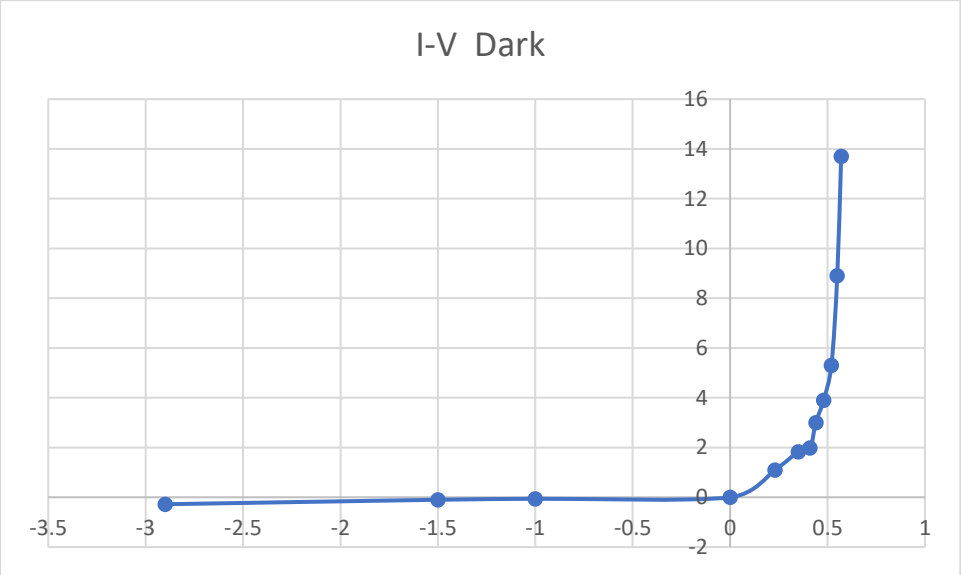

I-V Dark
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.5
-0.4
-0.3
-0.2
-0.1
0
0.1
0.2
0.3
0.4

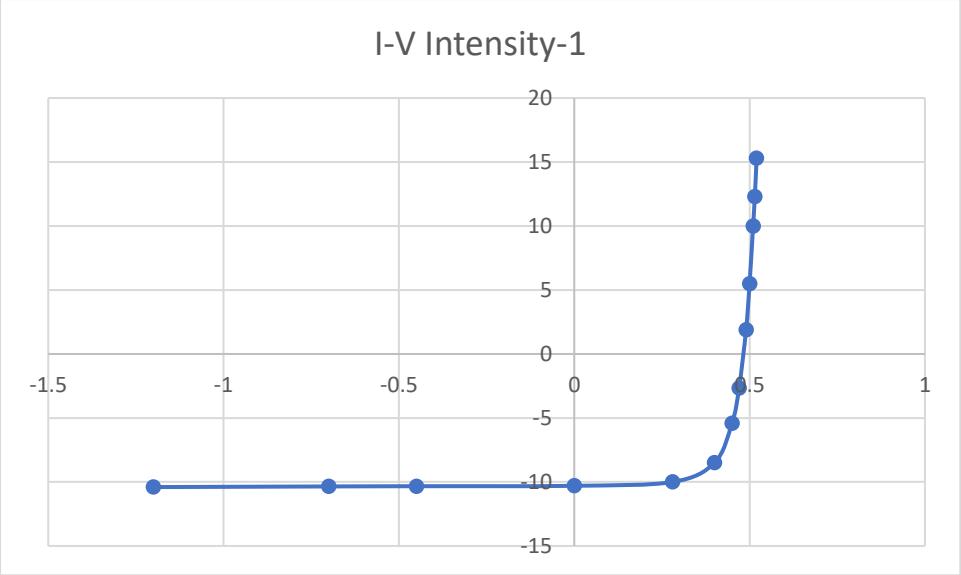

I-V Intensity-1
0
-1
-2
-3
-4
-5
-6
0.45
0.455
0.46
0.465
0.47
0.475
0.48
0.485
0.49

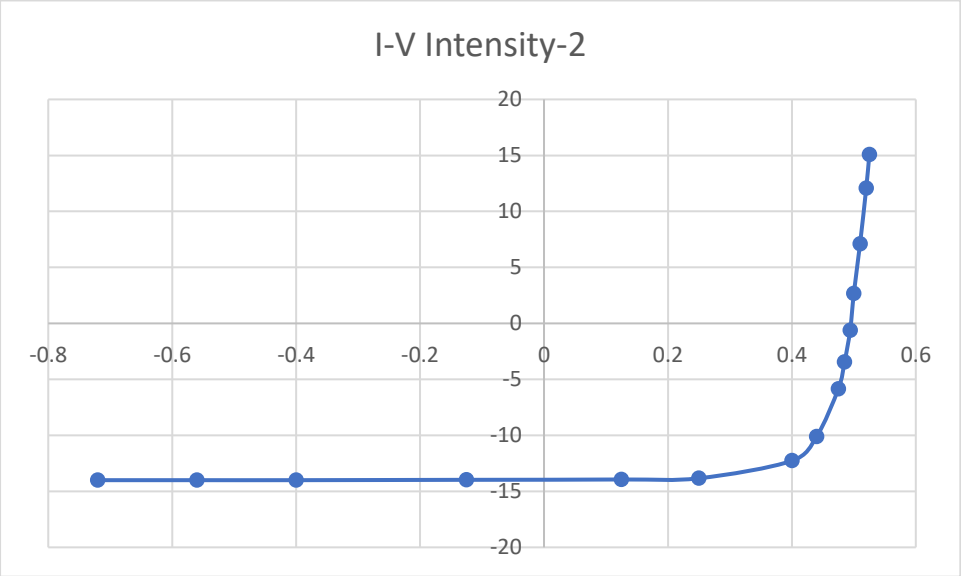

I-V Intensity-2
0
-1
-2
-3
-4
-5
-6
0.475
0.48
0.485
0.49
0.495
0.5

Potentiometer of 10k ohm :

Dark		Intensity I1		Intensity I2	
V cell (in V)	I cell (in mA)	V cell (in V)	I cell (in mA)	V cell (in V)	I cell (in mA)
-2.9	-0.28	-1.2	-10.4	-0.72	-14
-1.5	-0.1	-0.7	-10.35	-0.56	-14
-1	-0.06	-0.45	-10.33	-0.4	-14
0	0	0	-10.3	-0.125	-13.97
0.23	1.1	0.28	-10	0.125	-13.94
0.35	0.83	0.4	-8.5	0.25	-13.83
0.41	1.98	0.45	-5.4	0.4	-12.27
0.44	3	0.47	-2.65	0.44	-10.1
0.48	3.9	0.49	1.9	0.475	-5.84
0.52	5.3	0.5	5.5	0.485	-3.45
0.55	8.9	0.51	10	0.494	-0.62
0.57	13.7	0.515	12.3	0.5	2.67
		0.52	15.3	0.51	7.1
				0.52	12.08
				0.525	15.06





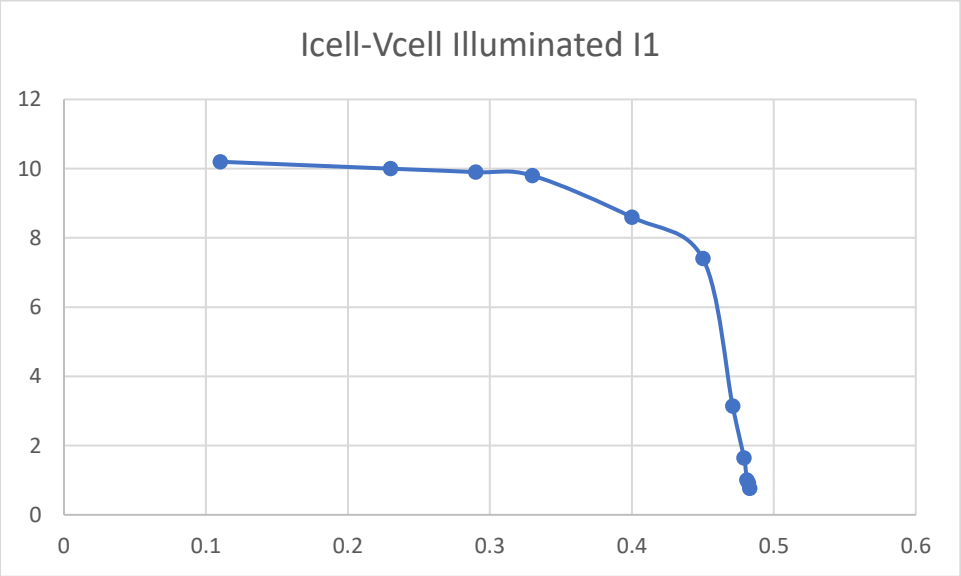


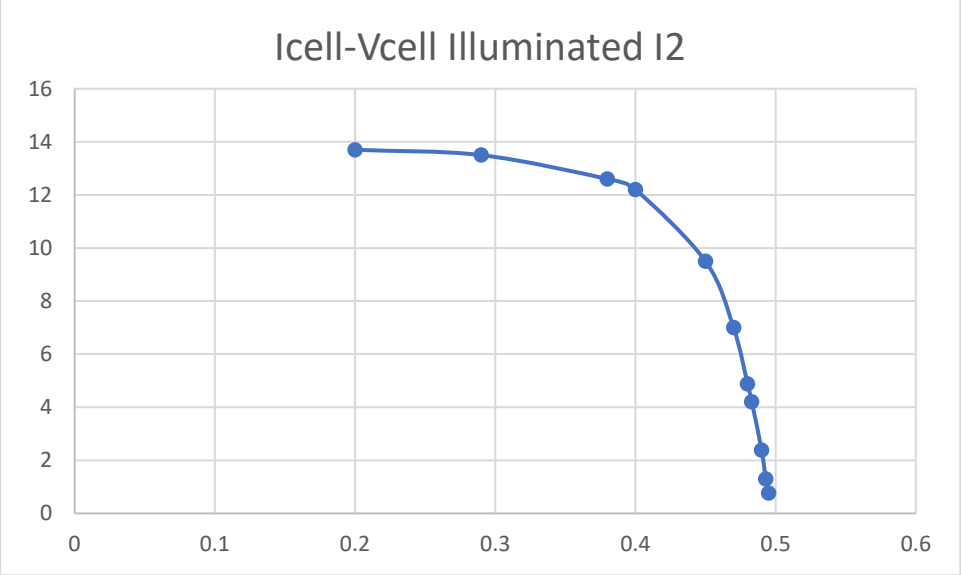
Iled of illumination-1(current got by connecting LED bank to the 12 V power supply)(120 ohm resistor)(green) = 45.1 mAmp

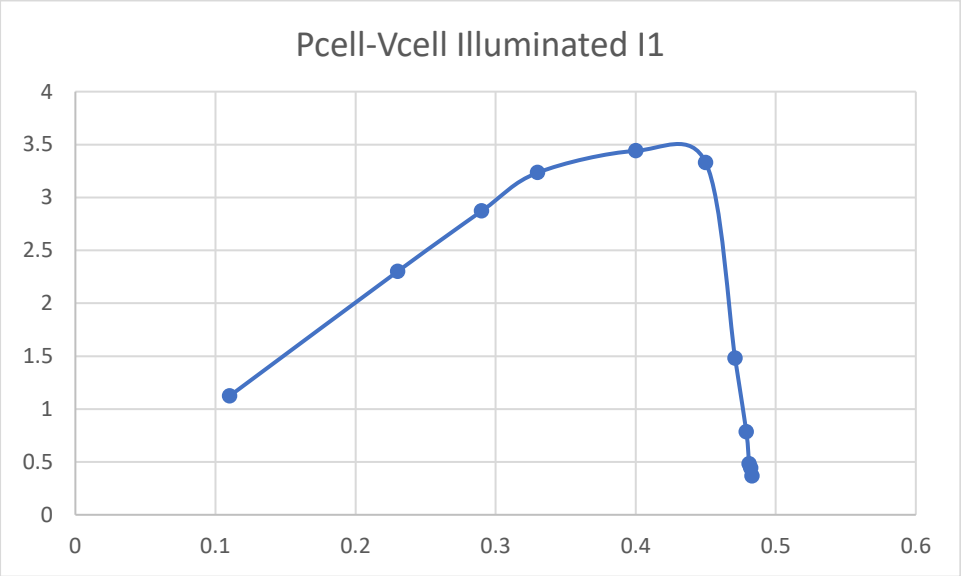
Iled of illumination-2(current got by connecting LED bank to the 12 V power supply) (82 ohm resistor) (Red)= 60.1 mAmp

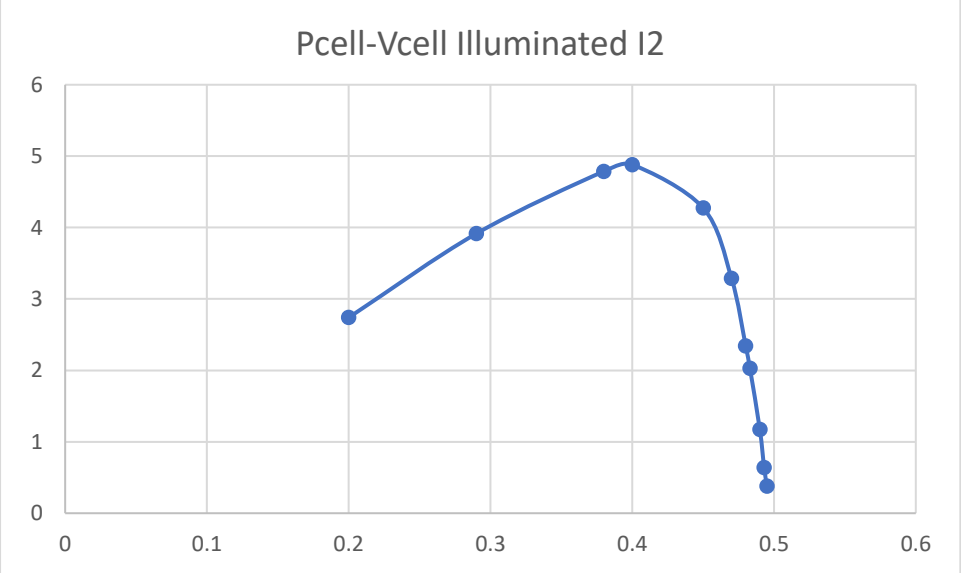
Solar cell as power source :

Illuminated I1		Illuminated I2	
V cell (in V)	I cell (in mA)	V cell (in V)	I cell (in mA)
0.11	10.2	0.2	13.7
0.23	10	0.29	13.5
0.29	9.9	0.38	12.6
0.33	9.8	0.4	12.2
0.4	8.6	0.45	9.5
0.45	7.4	0.47	7
0.471	3.14	0.48	4.88
0.479	1.64	0.483	4.2
0.481	1	0.49	2.39
0.482	0.92	0.493	1.3
0.483	0.76	0.495	0.77




Icell-Vcell Illuminated I2
16
14
12
10
8
6
4
2
0
0
0.1
0.2
0.3
0.4
0.5
0.6


Pcell-Vcell Illuminated I1
4
3.5
3
2.5
2
1.5
1
0.5
0
0
0.1
0.2
0.3
0.4
0.5
0.6


Pcell-Vcell Illuminated I2
6
5
4
3
2
1
0
0
0.1
0.2
0.3
0.4
0.5
0.6

From graphs :

For illumination 1 :

Vmp = 0.45

Imp = 0.0074

Isc =0.0102

Voc =0.49

FF = 0.679

For illumination 2 :

Vmp = 0.4

Imp = 0.0122

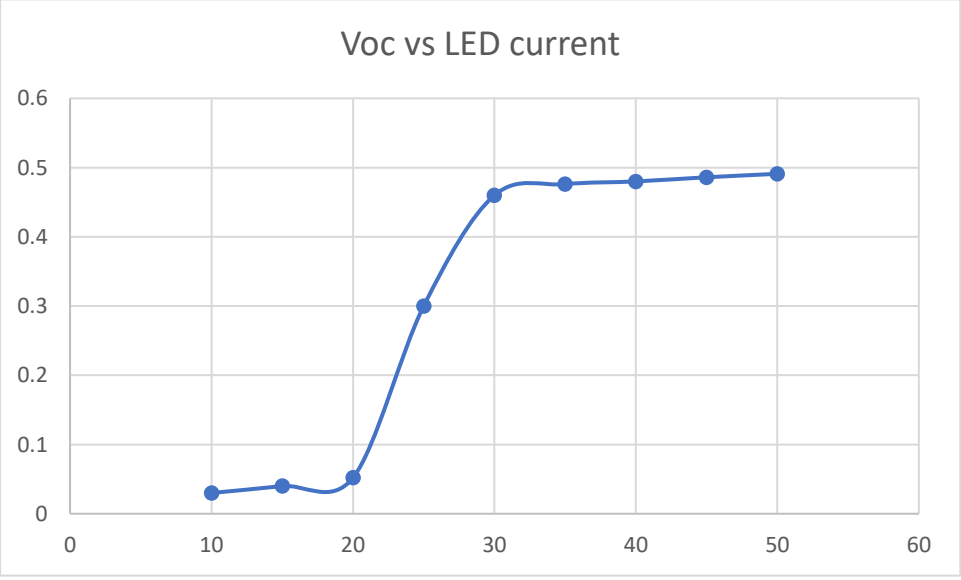
Isc =0.0138

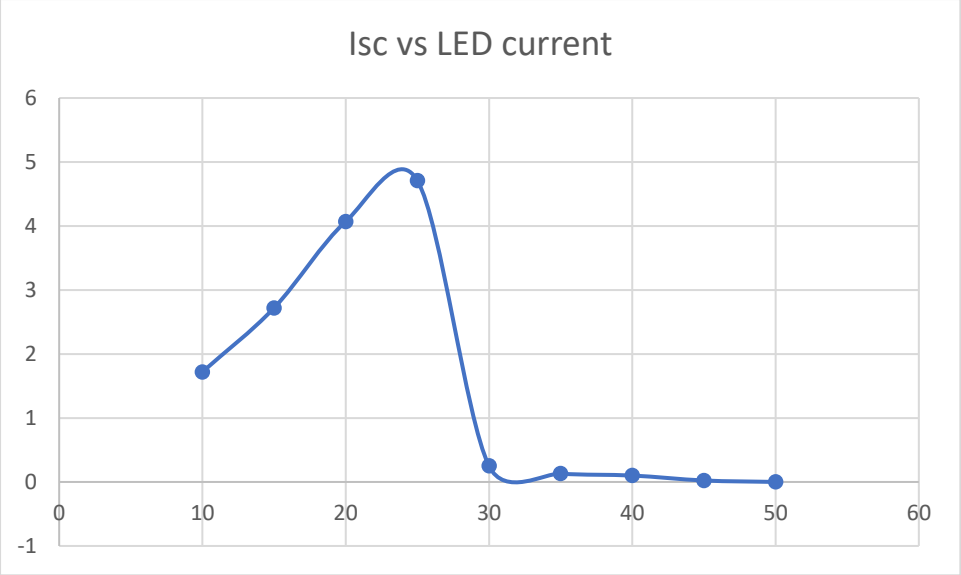
Voc =0.5

FF = 0.7507

Measurement of VOC and ISC at different illumination levels :

I led (in mA)	V oc (in V)	I sc (in mA)
10	0.03	1.72
15	0.04	2.72
20	0.052	4.07
25	0.3	4.71
30	0.46	0.25
35	0.476	0.13
40	0.48	0.1
45	0.486	0.023
50	0.491	0





Discussion :

200020051:

Today in lab2 we have done hardware exercise. This session helped me to understand the different behaviour of solar cells in different cases,when illumination got changed we got different I-V characteristics.

In our second lab we got good time to do all experiments and it was not like first lab and a small suggestion is to get the 5k ohm pot ,because 1k ohm pot will cover less region than required in plot and 10k ohm pot will cover more than required , which we don't needed.

200020010:

Today in lab2 we have done hardware excercise on solar cells. Today we learnt about I-V characteristics of Solar cells and .We got to know their behaviour in dark and also when they illuminated with different LED currents. By these experiment we also understood how solar cell can be used as power source . We got to know about new terms like Voc , Isc , Vmp , Imp. We also got to know how to handle devices and how sensitive and specific they are. We need to improve in hardware designing and try to do more quickly .As we are not aware of devices we need to practice more and try different circuit models and be perfect in execution.