Date 26/8/19

Expt. No. 5 Page No.

Clean Energy

Apparatus Required –
Solar cell (p-n junction diode), Light Source (100W bulb), Ammeter, Voltmeter, Load circuit and connecting wires.

SLO: To draw the I-V characteristics of a solar cell and to find out its efficiency and fill factor.

The max. power generated, $P_{max} = V_{mp} I_{mp}$ (where V_{mp} and I_{mp} are the current voltage values corresponding to maximum power)

$$FF = \frac{V_{mp} I_{mp}}{V_{oc} I_{sc}}$$

$$\eta = \frac{P_{max}}{A_c \Omega}$$ (where, A_c – Area of the solar cell, Ω – Incident intensity)

Observations –

1. For distance (x_1 = 7cm)

I_{mp} = 9mA V_{mp} = 1.141V P_{max} = 0.0721W

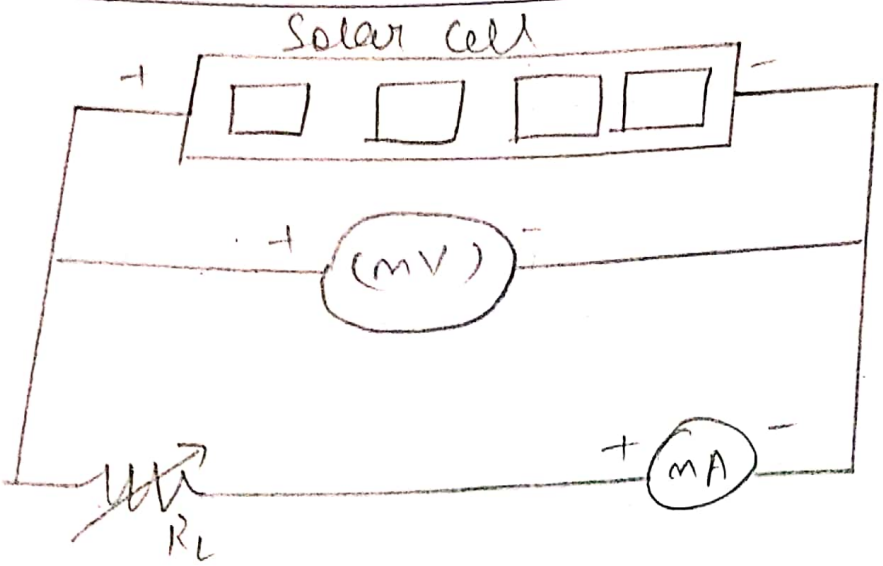
Ω = 217 W/m² A_c = 22.75×10^{-4} m²

Teacher's Signature : .....

Date.....

Page No.....

Expt. No.....



Study of I-V characteristics of a solar cell

Date.....

Expt. No..... Page No.....

Distance (A_1) = ~~5cm~~ 7cm

Intensity of light = 25

I_{sc} = 11.5 A

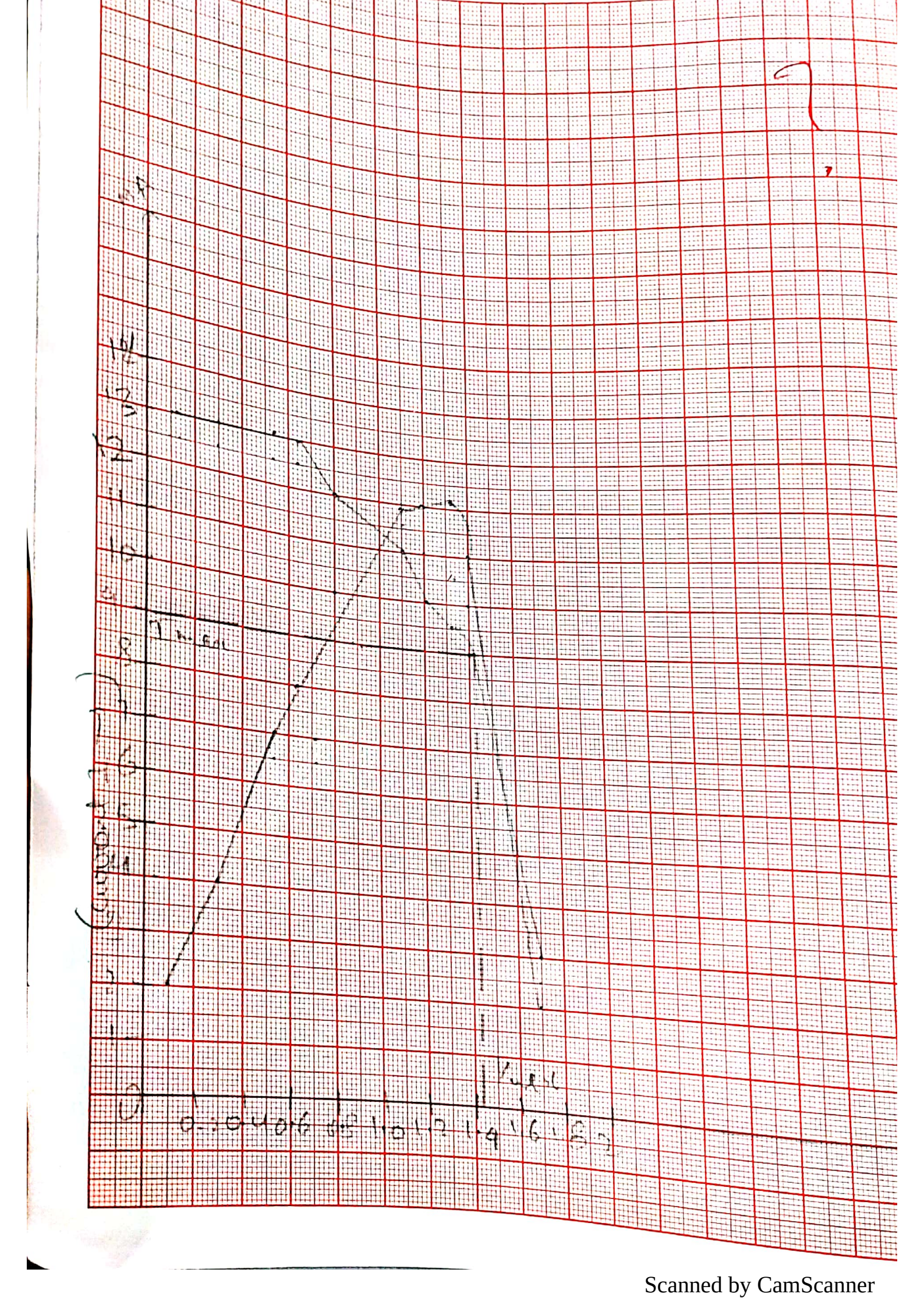
V_{oc} = 1.8 V

Load Resistance	Current (mA)	voltage (V)	Power (mW)	
10	~~11.5~~ 13	0.15	~~1.9x10^-3~~	0.002
22	13	~~0.4~~ 0.3	~~5.4x10^-3~~	0.004
47	13	0.55	~~6x10^-3~~	0.007
56	~~12~~ 13	~~0.55~~ 0.65	~~7.7x10^-3~~	0.008
68	~~10~~ 12	~~0.7~~ 0.8	~~7.5x10^-3~~	0.01
82	~~10~~ 11	~~0.9~~ 1.1	~~9x10^-3~~	0.019
100	10	1.2	~~1x10^-2~~	0.012
150	~~9~~ 9	~~1.3~~ 1.35	~~1.0x10^-2~~	0.0121
180	8	1.34	~~10.4x10^-3~~	0.011
1000	2	1.7	3.4x10^-3	0.003

$$FF = \frac{9 \times 10^{-3} \times 1.34}{11.5 \times 10^{-3} \times 1.8} = 0.58$$

$$\eta = \frac{0.0121 \times 100}{22.75 \times 10^{-4} \times 2172} = 2.45\%$$

Model graph



Expt. No..... Page No.....

~~Results~~ Results -

I-V characteristics of the solar cell were studied and the max. ~~power~~ power generated, FF and efficiency were calculated for two different source - cell distances.

For x_1 = 7cm Efficiency, η = 2.45% FF = 0.58

8/10

19BCE0811

8/9/19