

CLEAN ENERGY

Aim: To draw the I-V characteristics of a solar cell to find out its efficiency factor

Apparatus Required

Solar cell

Light source

Ammeter

Voltmeter

Load resistance

Connecting wires

Theory: The maximum power generated $P_{max} = V_{mp} I_{mp}$

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

$$\eta = \frac{P_{max}}{A_c \cdot \Omega}$$

A_c - Area of solar cell

Ω - incident intensity

1) For distance ($x = 7\text{cm}$)

$$I_{mp} = 13\text{mA}$$

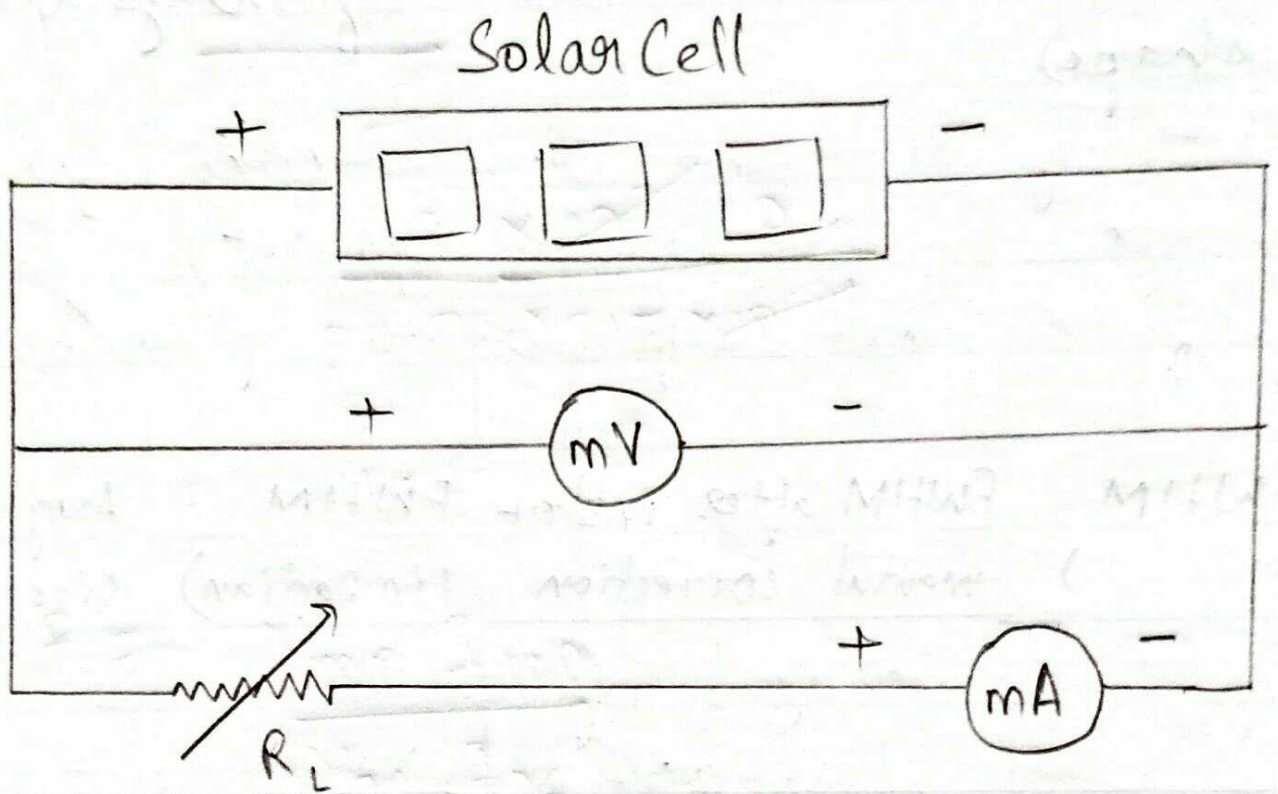
$$V_{mp} = 1550\text{mV}$$

$$P_{max} = 0.01705\text{W}$$

$$\Omega = 217\text{ W/m}^2$$

$$A_c = 22.75 \times 10^{-4}\text{ m}^2$$

Circuit Diagram:



Calculations :

$$\eta = \frac{P_{\max}}{A_c \Omega}$$

$$= \frac{9 \times 10^3 \times 10}{22.75 \times 217 \times 10^4}$$

$$= 1$$

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

$$= \frac{1500 \times 13.2}{9 \times 1000}$$

Load Resistance (Ω)	Intensity of Light		Power (W)
	Current (mA)	Voltage (mV)	
10	12	100	1.2×10^{-3}
22	12	300	3.6×10^{-3}
47	11	500	5.5×10^{-3}
56	11	600	6.6×10^{-3}
68	10	800	8×10^{-3}
82	9	900	8.1×10^{-3}
100	9	1000	9×10^{-3}
150	7	1200	8.4×10^{-3}
180	6	1300	7.8×10^{-3}
1000	1	1500	1.5×10^{-3}

Result : I-V characteristics of the solar cell were studied and max power generated FF and efficiency were calculated

For $a = 5 \text{ cm}$

$$\eta = 0.0182 \text{ } 1.82\% \text{ } \text{FF} = 5.24$$

Hfman
12/09/19

10
10

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Current (mA)

Voltage (mV)

