

Apparatus Required:-

- Solar cell (p-n junction diode)
- Light source (100 W bulb)
- Ammeter
- Voltmeter
- Load circuit
- Connecting wires

SLO:-

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

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

where V_{mp} & I_{mp} are the current & voltage values corresponding to maximum power.

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

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

$A_c \rightarrow$ Area of solar cell ; Ω - Incident intensity

Calculation :-

$$FF = \frac{13 \times 1200}{1700 \times 17} = 0.5397$$

$$V_{mp} = 1200 \text{ mV}$$

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

$$P_{max} = 15600 \text{ mW}$$

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

$$\eta = \frac{15600 \times 10^{-3}}{22.75 \times 10^{-4} \times 251} = 2.7319 \%$$

$$\Omega = 251 \text{ W/m}^2$$

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Distance (x) = 5 cm

LOAD RESISTANCE (Ω)	INTENSITY OF LIGHT & CURRENT (mA)	INTENSITY OF LIGHT & VOLTAGE (mV)	POWER (mW)
10	17	150	2550
22	17	350	5950
47	16.5	700	115050
56	16	800	12800
68	15	950	14250
82	14	1100	15400
100	13	1200	15600
150	10	1350	13500
180	8.5	1450	12325
1000	2	1650	3300

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

$$\Omega = 251 \text{ W/m}^2$$

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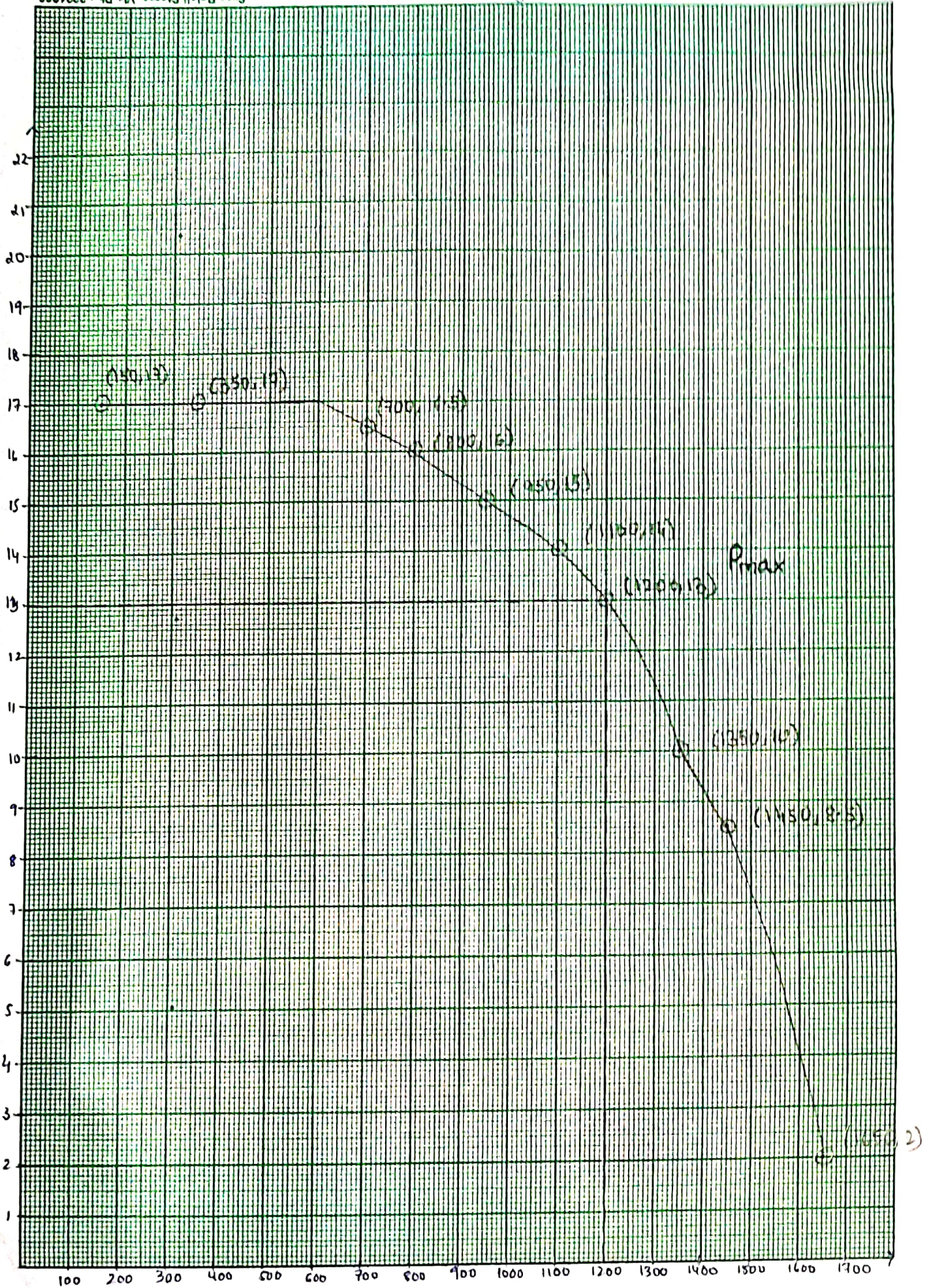
Scale:-

x-axis:- 1cm = 100mV

y-axis:- 1cm = 1mA

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current (mA) ↑



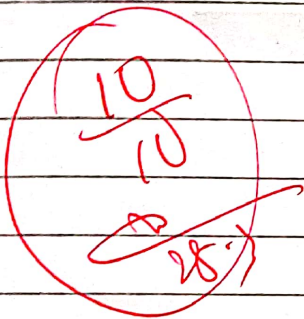
Voltage (mV) →

Result:-

I-V characteristic of solar cell were studied and the maximum power of generated, FF, and efficiency were calculated from 2 different sources.

Efficiency is 2.7319% & fill-factor (FF) is 0.5397 ✓

Maximum power (from graph) = 15600 mW ✓



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