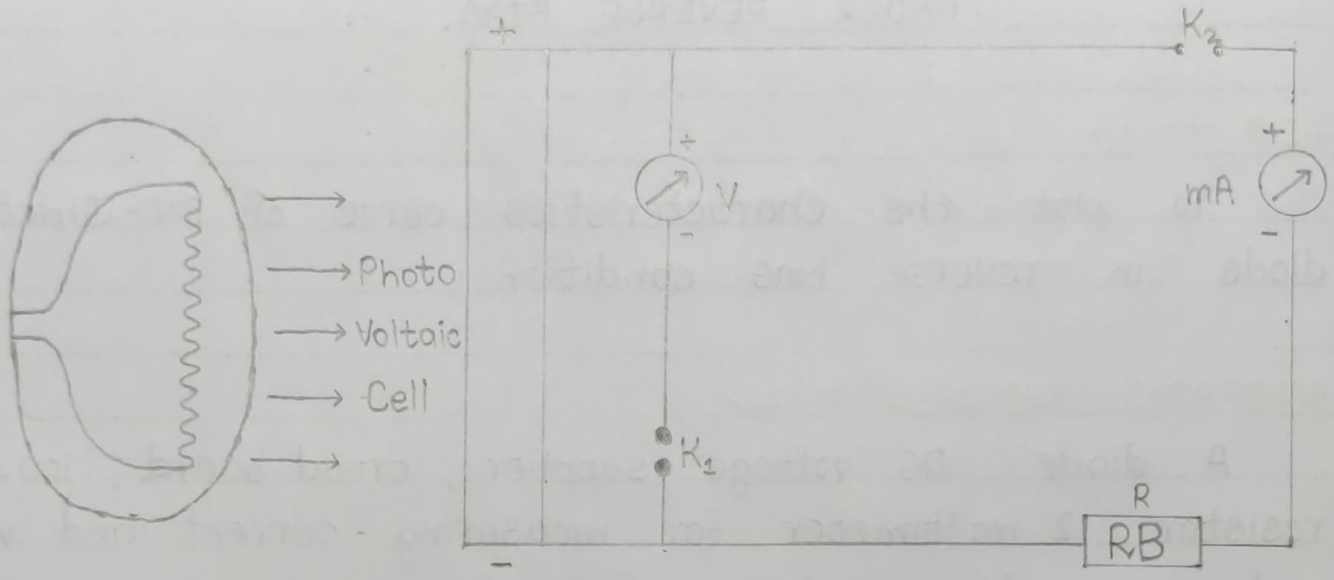
DIAGRAM ⟹



OBSERVATIONS ⟹

1) Maximum power (P_{max}) = 0.31443 W

2) Area of the solar panel = 0.324 m^2

3) Intensity of the light (I_o) = 597.13 W/m^2

4) Power of the bulb = 75 Watt.

5) Distance between solar panel and bulb = 10cm.

Intensity	Resistance	Voltmeter Reading	Ammeter Reading
	(ohm)	(V)	(mA)
	10	1.57	122.6

Date 12/01/2021

Expt. No. 11 Page No.

DETERMINATION OF EFFICIENCY OF SOLAR CELL.

AIM ⟹

To explore solar cells as renewable energy sources and test their efficiency in converting solar radiation to electrical power.

APPARATUS REQUIRED ⟹

Solar cell, voltmeter, milliammeter, a dial-type resistance box, keys, illuminating lamps, connecting wires, etc.

FORMULA ⟹

Efficiency of solar cell (η) = $\frac{P_{max}}{AI_o} \times 100$

where,

P_{max} = Maximum power - $I_{mp} \times V_{mp}$ (watt)

A = Area of the solar panel

I_o = Intensity of the light

= Power of the bulb / $4\pi d^2$

d = Distance between solar panel and bulb.

Teacher's Signature

	22	2·83	122·1
	47	3·62	74·1
	56	3·63	63·3
Maximum	68	3·84	55·2
	82	3·90	45·5
	100	3·93	36·2
	160	3·94	26·2
	180	3·96	21·6

CALCULATIONS ⟹

1) Maximum Power $= I_{mp} \times V_{mp}$

$= (94 \times 10^{-3}) \times 3.345$

$= 0.094 \times 3.345 \quad = 0.31443\ W$

2) Intensity of light $(I_o) = \dfrac{\text{Power of bulb}}{4\pi d^2}$

$= \dfrac{75}{4 \times 3.14 \times (10 \times 10^{-2})^2}$

$= \dfrac{75}{0.1256} \quad = 597.13\ W/m^2$

3) Area of solar panel $(A) = 7.2 \times 4.5$

$= 32.4 \times 10^{-2} \quad = 0.324\ m^2$

4) Efficiency of solar cell $(\eta) = \dfrac{P_{max}}{AI_o} \times 100$

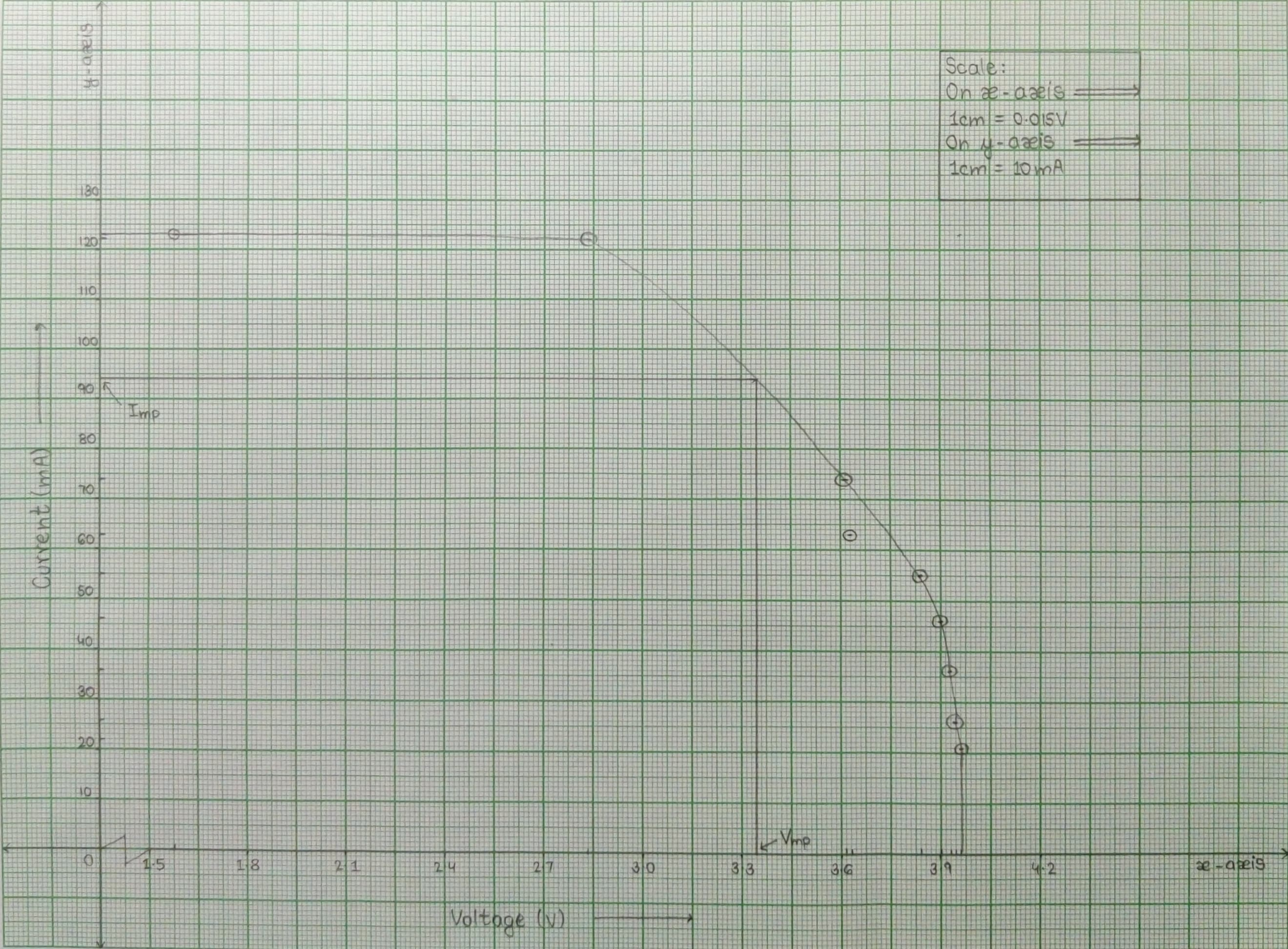
$= \dfrac{0.31443}{0.324 \times 597.13} \times 100$

$= 0.1625 \times 100 \quad = 16.25\ \%$

RESULT ⟹

The efficiency of the solar panel is : $\eta = 16.25\ \%$

Teacher's Signature _____


Scale:
On x-axis
1cm = 0.015V
On y-axis
1cm = 10mA
y-axis
180
120
110
100
90
80
70
60
50
40
30
20
10
0
Current (mA)
Imp
Vmp
1.5
1.8
2.1
2.4
2.7
3.0
3.3
3.6
3.9
4.2
x-axis
Voltage (V)