

Schematic representation and Circuit of Solar cell

Study of V-I and V-R characteristics of a solar cell.

AIM: To study the V-I and V-R characteristics of a solar cell.

APPARATUS REQUIRED :

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

FORMULA :

A solar cell (photovoltaic cell) essentially consists of a p-n junction diode, in which electrons and holes are generated by incident photons. When an external circuit is connected through the p-n junction diode, a current passes through the circuit. Therefore, the device generates power when the electromagnetic radiation is incident on it.

The schematic representation of a solar cell and the circuit connections are shown aside. The voltmeter is connected in parallel with given solar cell through a plug key. A milliammeter and a variable resistor are connected in series to the solar cell through a key. The solar cell is irradiated by a filament bulb (60 W or 100 W). The resistance values are adjusted and variation of V-I & V-R graphs are plotted.

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Table for V-I and V-R characteristics

Intensity	Resistance (ohm)	Voltmeter Reading (V)	Ammeter Reading (mA)
Maximum	10	1.57	122.6
	22	2.83	122.1
	47	3.62	74.1
	56	3.63	63.3
	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

Intensity	Resistance (ohm)	Voltmeter Reading (V)	Ammeter Reading (mA)
Minimum	10	0.39	32.5
	22	0.77	32.2
	47	1.55	32.1
	56	1.84	31.9
	68	2.20	31.7
	82	2.61	30.5
	100	2.93	29.0
	160	3.43	22.8
	180	3.57	19.4

(1.1)

180

160

140

120

100

80

60

40

20

X' (0,0)

Y'

Scale : Along X :- 10 small boxes = 0.5 V
 Along Y :- 10 small boxes = 20 mA

(1.57, 122.6)

(2.83, 122.1)

(3.62, 74.1)

(3.63, 63.3)

(3.84, 55.2)

(3.90, 45.5)

(3.93, 35.2)

(3.94, 26.2)

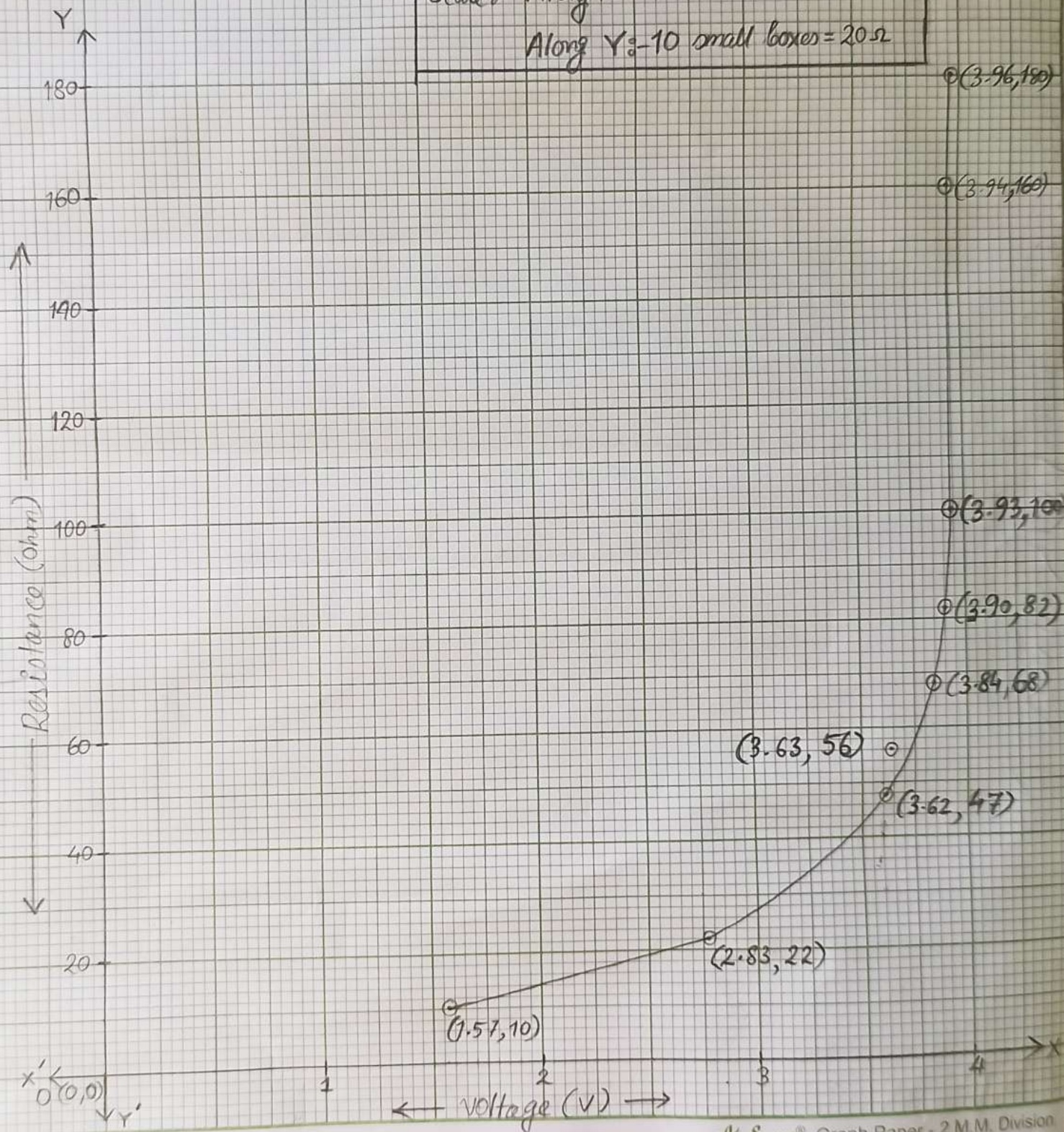
(3.96, 21.6)

Voltage (V)

V-I Graph for maximum Intensity of incandescent light

1.2

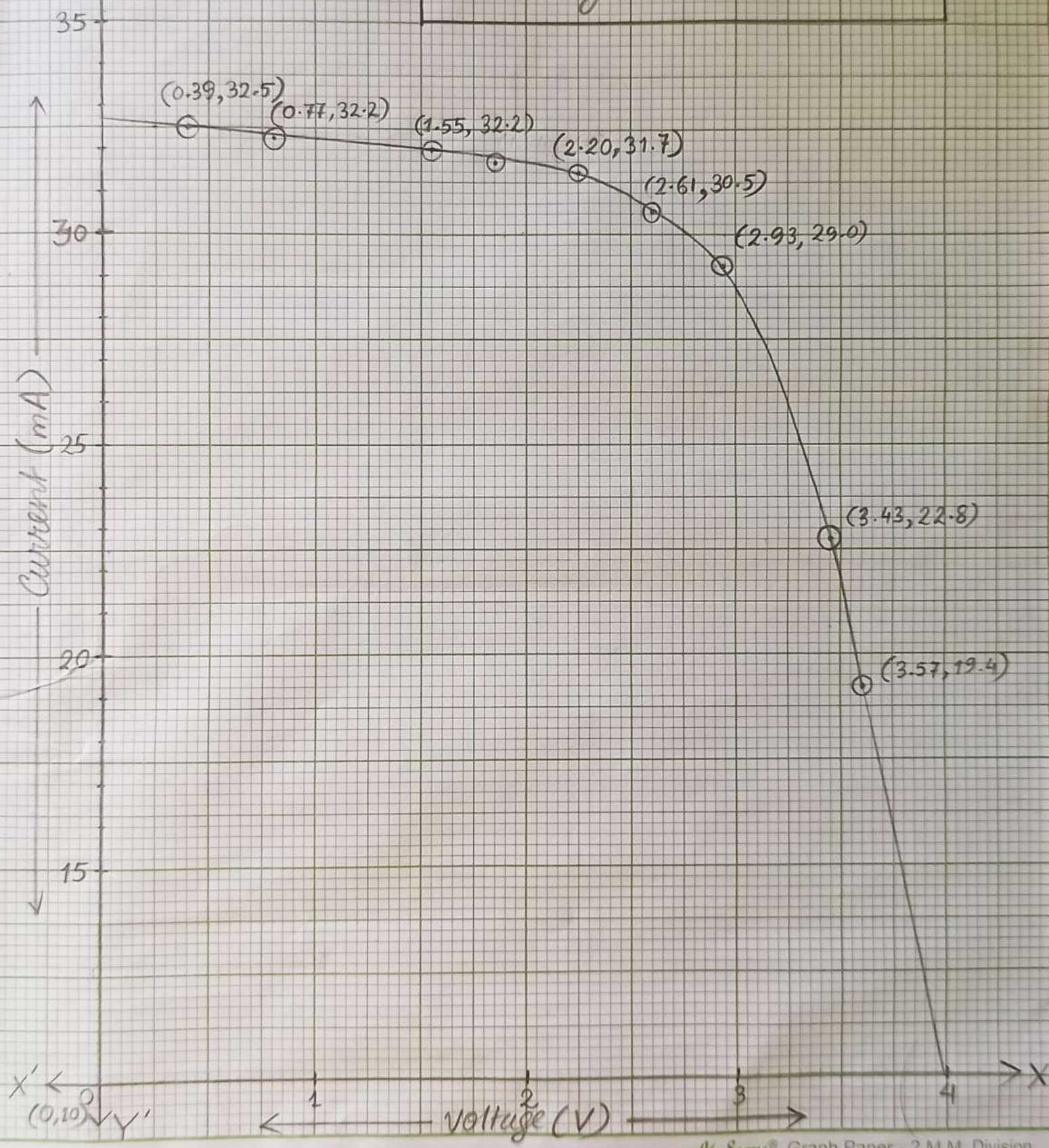
Scale:- Along X:- 10 small boxes = 0.5 V
Along Y:- 10 small boxes = 20 Ω



V-R Graph for maximum Intensity of incandescent light

2.1

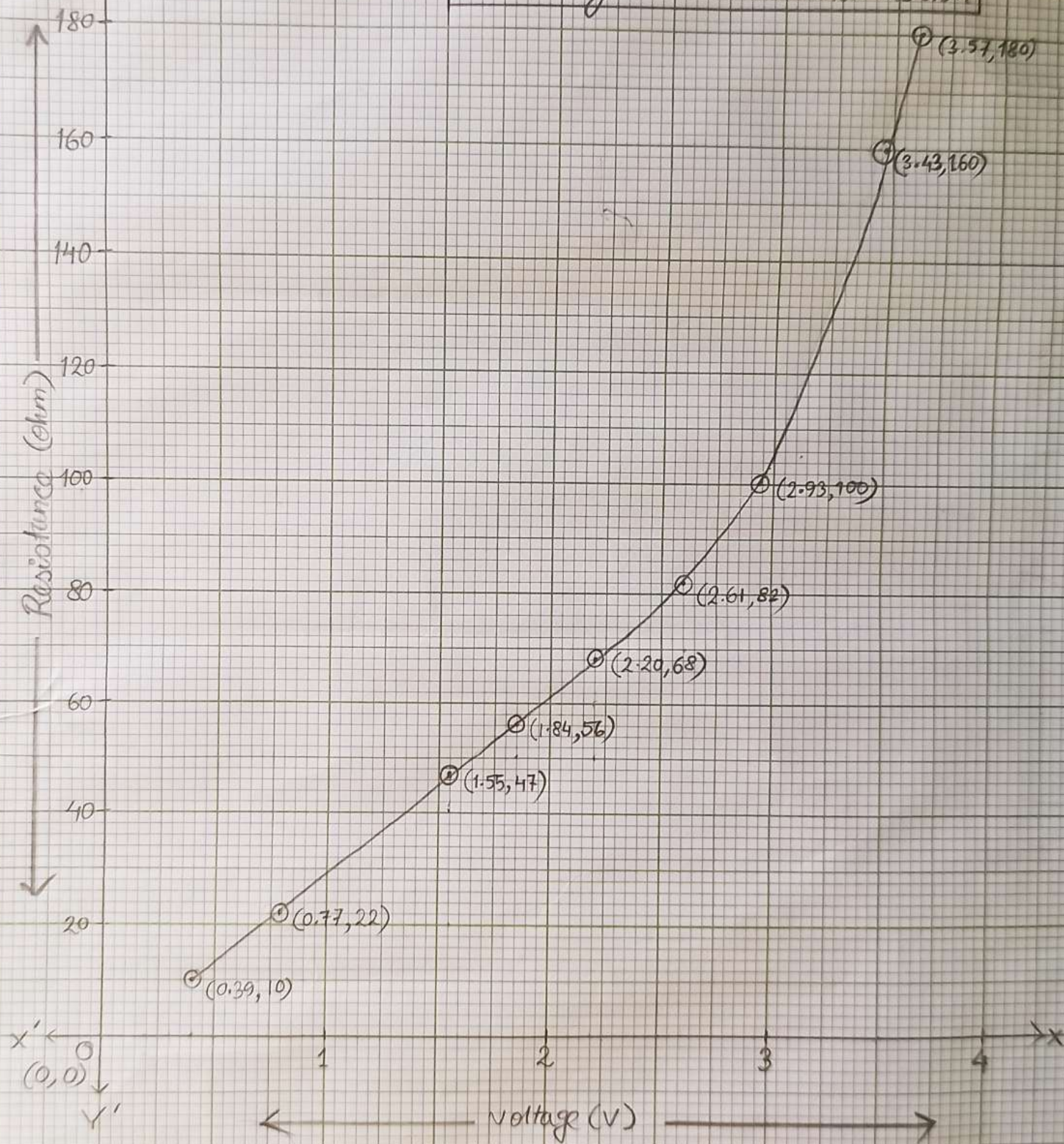
Scale :- Along X: 10 small boxes = 0.5 V
 Along Y: 20 small boxes = 5 mA



V-I Graph for minimum intensity of incandescent light

Q.2

Scale : Along X : 10 small boxes = 0.5 V
Along Y : 10 small boxes = 20 ohm



V-R Graph for minimum intensity of incandescent light

Results:-

The V-I and V-R characteristics of a solar cell for both maximum and minimum intensities of light are studied from the graphs.

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