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S.B.ARTS AND K.C.P SCIENCE COLLEGE,

VIJAYAPUR

DEPARTMENT OF PHYSICS

PROJECTS REPORT

2023-24

B.L.D.E.ASSOCIATION's

S. B. ARTS AND K. C. P. SCIENCE COLLEGE VIJAYAPUR

DEPARTMENT OF PHYSICS

B.Sc.VI Semester

Students Project List-2023-24

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4	U15KM21S0049	SHRUTI JETTEPPA ALOOR		
5	U15KM21S0053	MANJUNATH RAMANNA ANKALAGI	Attenuation of gamma rays in alluminium foils using GM Counter	
6	U15KM21S0054	SAHANA SHIVAPRAKASH GHANTI		
7	U15KM21S0055	SHIVASHARANAPPA		
8	U15KM21S0061	SAMARTH BASAVARAJ DOTIHAL		
9	U15KM21S0068	PREM RAJU CHAVAN	Determination of Fermi energy of good conductors	Dr.P. S. Patil
10	U15KM21S0074	VIJAYALAXMI SIDDAPPA MANGANNAVAR		
11	U15KM21S0082	VINAYAK SUNIL HUNDEKAR		
12	U15KM21S0091	SIRINA SULTAN UMARJI		
13	U15KM21S0099	AKSHITA WALIKAR	Determination of Fermi energy of good conductors	
14	U15KM21S0102	SRUSHTI		
15	U15KM21S0110	SIDDHARTH AKASHI		
16	U15KM21S0112	PRIYA SUNIL CHIKKANNAVAR		
17	U15KM21S0113	SHESHANK JAGADEESH YADAHALLI	Thermistor energy gap	Dr. Vani R. Desai
18	U15KM21S0117	SATTIGERI PAVITRA RAMESH		
19	U15KM21S0134	SWAPNA RAYAGOND MUCHCHANDI		
20	U15KM21S0138	NIRMALA YAMBATNAL		
21	U15KM21S0166	ANKITA VITHOBA GORANAL	Solar cell characteristics	
22	U15KM21S0185	SARPARAJ		
23	U15KM21S0207	JYOTI RAMESH BIRADAR		
24	U15KM21S0224	ASPAKALI KAMALSAB JAKATADAR		
25	U15KM21S0225	SHAFIYA RAMALI	Zener diode as a voltage regulator	Miss. Kavya Andewadi
26	U15KM21S0230	SOUMYA YELADAGI		
27	U15KM21S0231	PRAVEEN SIDDAPPA HUNASHYAL		
28	U15KM21S0232	SHAMEEM IQBAL PENDARI		
29	U15KM21S0233	SRUSHTI HORTI	Solar cell characteristics	
30	U15KM21S0240	SHREYA DENGI		
31	U15KM21S0244	SHRUTI		
32	U15KM21S0247	SACHIN SHRIMANT RATHOD		
33	U15KM21S0253	SHREYA RAJASHEKHAR	Characteristics of GM Counter	
34	U15KM21S0261	MADIVALAPPA BUDIHAL		
35	U15KM21S0266	GOVIND SINGE		
36	U15KM21S0277	AISHWARYA AHREESHAIL VAILI		

37	U15KM21S0279	RANJITA PAWAR	Zener diode as a voltage regulator	Smt. Vanishree Hiremath
38	U15KM21S0281	SUNITA BAGEWADI		
39	U15KM21S0284	RASHMI		
40	U15KM21S0290	MALLIKARJUN KALLAPPA TAMBAD		
41	U15KM21S0291	POOJA MASALI	Inverse square law	
42	U15KM21S0297	SNEHA SANAMAGOND		
43	U15KM21S0299	APARNA RAVI KANNUR		
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45	U15KM21S0310	SHRUTI	Thermistor energy gap	
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49	U15KM21S0337	SANDEEP LAXMAN RATHOD	Zener diode as a voltage regulator	Smt. Anjana R. Kenganal
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53	U15KM21S0359	POOJA MALLAPPA PATIL	Solar cell characteristics	
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55	U15KM21S0362	KAVYASHREE MAHANTESH		
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57	U15KM21S0367	SUSHMITA	Thermistor energy gap	
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69	U15KM21S0425	KARTIK VIJAYKUMAR SAYAGAVI	Zener diode as a voltage regulator	
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B.L.D.E. ASSOCIATION

SB ARTS AND KCP SCIENCE COLLEGE VIJAYAPUR

DEPARTMENT OF PHYSICS

A PROJECT ON

SOLAR CELL CHARACTERISTICS

UNDER THE GUIDANCE OF

PROF. SMT ANJANA KENGANAL
DEPT OF PHYSICS
S.B ARTS AND K.C.P SCIENCE COLLEGE

Submitted By

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CERTIFICATE

This is to certify that the project report entitled "Solar Cell Characteristics" has been carried out by Miss. Pooja Patil (U15KM21S0359), Mr. Rakesh Gugri (U15KM21S0360), Miss. Kavyashree (U15KM21S0362), Miss. Savita Bilijadar (U15KM21S366), Students of B.Sc 6th Semester , Department of Physics under my guidance. This project is submitted in partial fulfillment of requirement for the award of Bachelor's Degree in Physics during the academic year 2023-2024.

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DECLARATION

We hereby declare that, this project entitled "solar cell characteristics" under the supervision of prof Anjana Kenganal is being submitted to the Dept of Physics, S.B Arts and K.C.P Science College Vijayapur, affiliated to the RANI CHANNAMMA UNIVERSITY, BELAGAVI for the partial fulfilment of academic curriculum and also for the award of Bachelor's Degree in Physics.

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Date: 13/08/2024

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Additionally, we wish to express our thanks to lecturers, ***lab attenders (Basavaraj Hiremath & M.I Shiek)*** and classmates for their assistance and encouragement, which played a crucial role in helping us to complete this project within the stipulated time frame.

ABSTRACT

This project report details the solar cell characteristics. The report provides insights into the project's Introduction about solar cell, Aim of experiment, Apparatus required, Formulae used, nature of graph obtained, circuit diagram and experimental connections, procedure followed, observation, results and conclusions.

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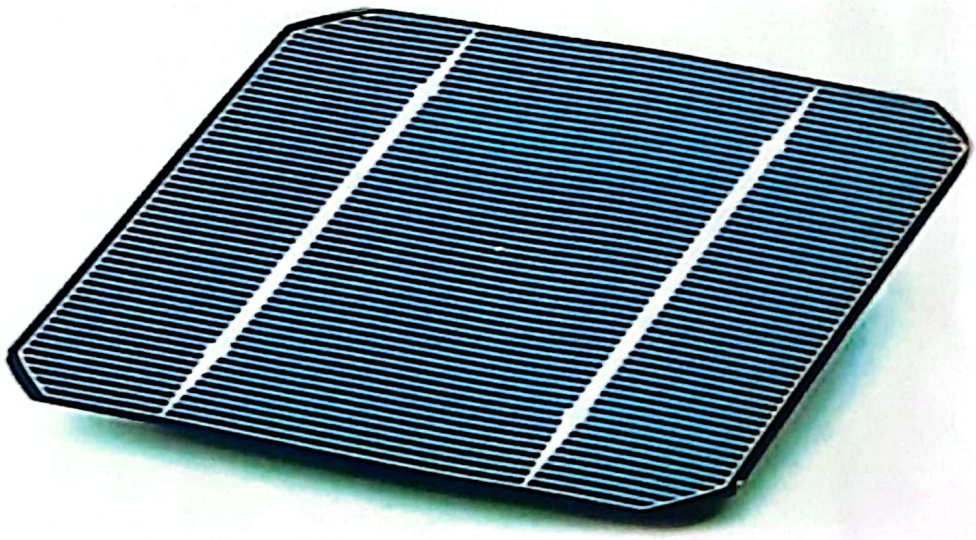
INTRODUCTION

Solar Cell:

A solar cell is also called a photovoltaic cell .it is an electronic device that converts the energy of light directly into electricity by means of photovoltaic effect.

- It is a form of photo voltaic cell, a device whose electrical characteristics (such as current, voltage or resistance) vary when it is exposed to light.
- Individual solar cell devices are often the electrical building blocks of photovoltaic modules known collegially as "solar panels".
- Almost commercial solar cells consist of crystalline silicon with a market share of 95%, cadmium telluride thin film solar cells account for the remainder.



Characteristics Of Solar Cell

The basic characteristics of solar cell are shot circuit current (Isc0, the open circuit voltage (Voc) the fill factor (FF)and solar energy conversion efficiency. The influence of both the diode saturation current density and of Isc on Voc, FF and efficiency is analyzed for ideal solar cells.

Theory of solar cells explain the process by which light energy in photons is converted into electric current when photons strike a suitable semiconductor device. The theoretical studies are practical use because they predict the fundamental limits of a solar cell and give guidance on the phenomena that contribute to losses and solar cell efficiency.

Solar cell efficiency vary from 6% amorphous silicon –based solar cells to 44% with multiple junction production cells and 44.4% with multiple assembled into a hybrid package. Solar cell energy conversion efficiencies for commercially available multi crystalline Si solar cells all around 14-19%.

Working And Application:

Working:

When sunlight strikes a solar cell, electrons in the silicon are rejected, which results in the formation of "holes" the vacancies left behind by the escaping electrons. If this happens in the electric field, the field will move electrons to the n-type layer and holes to the p-type layer.

Applications:

Assembles solar cells are used to make solar modules that generate electrical power for sunlight, as distinguished from a "solar thermal module" or "solar hot water panel". A solar energy generates solar power using solar cell.

Applications of solar cells as an alternative energy source for vehicular applications is growing industry electric vehicles are operate of solar energy and sunlight are commonly referred to as solar cars. these vehicles use solar panels convert absorbed light into electrical energy that is then stored in batteries.

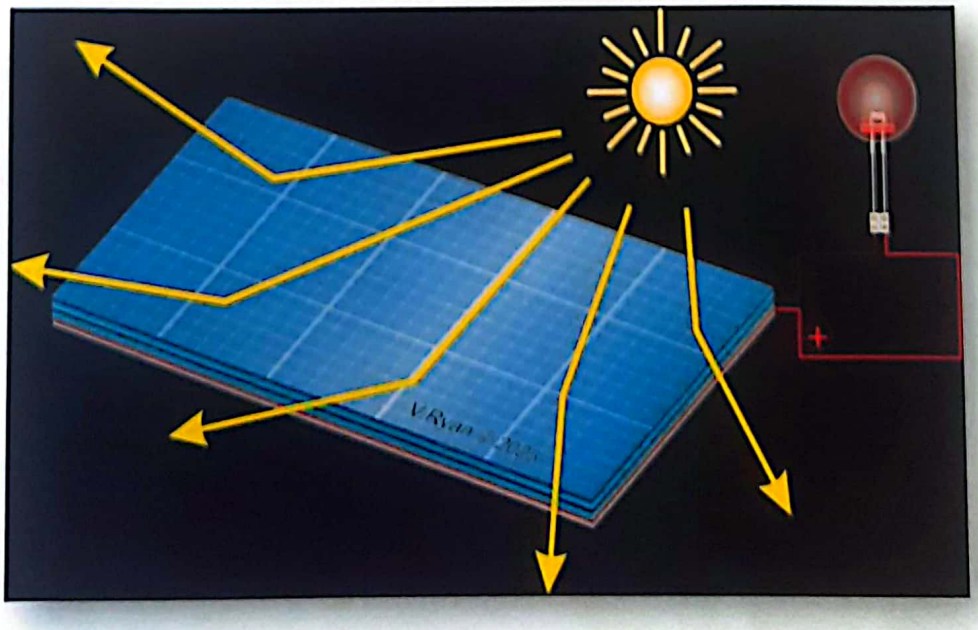
AIM

Study the characteristics of solar cell by finding open circuit voltage and short circuit current. Calculate the fill factor for a given distance between cell and source of light with help of voltage developed versus current graph.

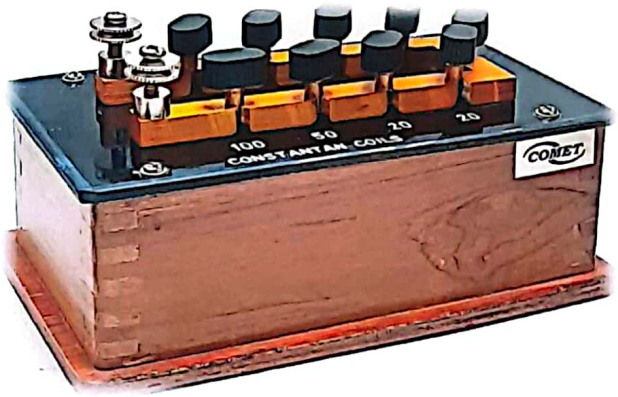
APPARATUS

1.40W, 230v bulbs, connecting wires.

2. Solar cell



3.Resistance box



4.Voltmeter (0-3 v)

5.Milliammeter (0-25 mA)

FORMULAE

1.Ideal power of the cell = $V_0 \times I_S$,

Where V_0 – Open circuit voltage

I_s – Short circuit current

2.Usefull power of the cell = $V_m \times I_m$,

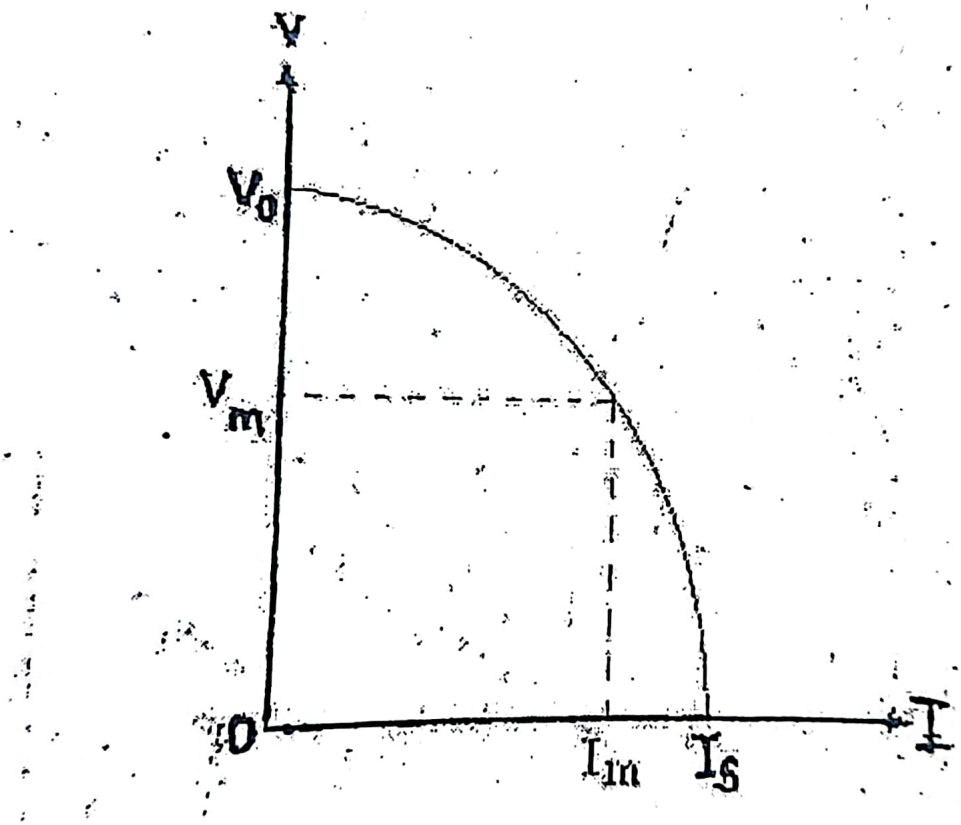
Where V_m – Voltage

I_m – Current

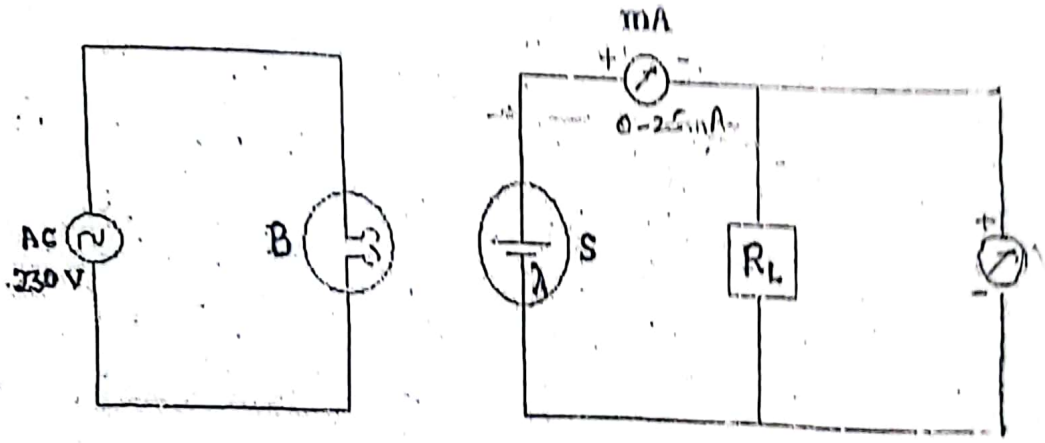
For the area of largest rectangle of V-I curve

3.Fill Factor = $\frac{\text{Useful power}}{\text{Ideal power}} = \frac{V_m \times I_m}{V_0 \times I_S}$

NATURE OF GRAPH



CIRCUIT DIAGRAM & EXPERIMENTAL CONNECTIONS



Where,B-Bulb, S-Solar cell, R_L-Load resistance, mA-Milliammeter &V-Voltmeter

PROCEDURE

1. Set up the circuit as shown in figure the solar cell power supply is connected to the bulb.
2. Place the solar cell at a particular distance from the variable light source
3. Vary intensity of the light source note down the voltage and current in the tabular column
4. Next note the short circuit current I_{sc} when the voltage across the solar cell is zero and open circuit voltage by removing the load resistance across the solar cell
5. Calculate power P=VI for each reading
6. Plot the graph between the voltage versus current mark the maximum part.
7. Repeat the experiment by changing the distance between the solar cell and light source.

OBSERVATION& TABULAR COLOUMN

1. Distance between lamp and cell, d= 16×10^{-2} m
2. Open circuit voltage, V_0 (when RL=∞) = 0.55 V
3. Shot circuit, I_s (When RL =0) = 8.5 mA

Resistance R_L in ohms	Voltage V in volts	Current I in mA
50	0.35	7.5
100	0.5	5
150	0.45	2.5
200	0.5	3
250	0.5	1
300	0.5	2
400	0.5	1.5
500	0.5	1.5
600	0.55	1
700	0.55	1

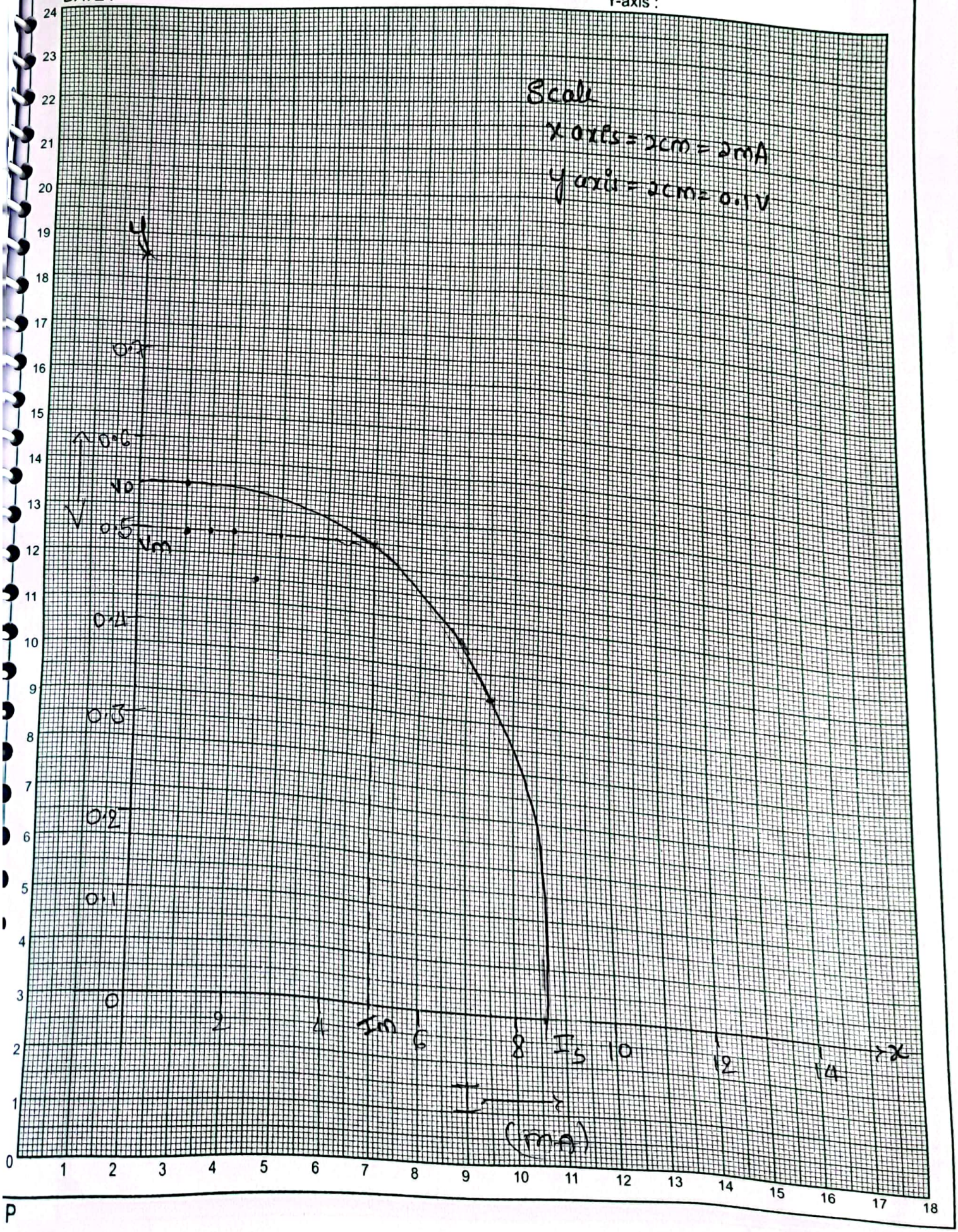
EXPERIMENT NO. :

DATE :

PAGE NO.

SCALE X-axis :

Y-axis :



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CALCULATION

1. Calculation Of Ideal Power:

From The Graph Of V-I: V_0 = 0.55v, Is = 8.5mA

Ideal power of the cell = $V_0 \times I_s$ = 4.675mW

2. Calculation Of Useful Power:

From The Graph Of V-I: V_m = 0.5 v, Im = 5mA

Useful power of the cell = $V_m \times I_m$

= 2.5mW

3. Calculation Of Fill Factor:

$$\text{Fill factor} = \frac{\text{Useful power}}{\text{Ideal power}} = \frac{V_m \times I_m}{V_0 \times I_S}$$

$$= \frac{2.5}{4.675}$$

$$= 0.53$$

RESULT

Fill Factor of The Cell = 0.53

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2. https://testbook.com/ias-preparation/solar-cell
3. https://www.youtube.com/watch?v=L_q6LRgKpTw