Experiment Details

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| Department Name | Department of Basic Science and Humanities |
| Class | FYBTech |
| Semester | 01 |
| Subject Name | Applied Physics |
| Experiment No. | 01 |
| Experiment Name | Inverse Square Law |

Version History

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| --- | --- | --- | --- | --- |
| Sr. No. | Version Number | Created By | Approved By | Date |
| 1 | v1.0 | Siddhi Patil | Dr. Tejaswini Desai | DD/MM/YYYY |
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AIM:

To verify inverse square law of intensity of light.

THEORY:

**Inverse square law-**Intensity of illumination at any point is inversely proportional to square of distance between the point and source.

Consider a point source S emitting light in all directions. Let f be the luminous flux (amount of light emitted per unit time.) Consider two spherical surfaces A and B Of radii R1and R2 respectively.

R1

R2

S

The illumination I1 at any point on the surface A is given by.

 ------------(1)

Similarly I2 for surface B

 ------------(2)

Dividing (1) by (2)



OR 

This is known as inverse square law.

**Photo cell**: In photocell light energy is converted into electrical energy. When light is incident on it, it emits photoelectrons, that are passed in external circuit and give current. This photocurrent is proportional to number of photons incident on photocell. i.e. intensity of illumination .

PRE TEST:

1. What is the unit of intensity of light?

i)ampere

ii)volt

iii)candela

iv)watts

1. What is light?

i)Particles

ii)Particular type of a rays

iii)Radiowaves

iv)Transverse Electromagnetic waves

1. What is speed of light in Vacuum?

i)3\*1010 m/s

ii)3\*109 m/s

iii)3\*108 m/s

iv)3\*1011 m/s

1. Definition of Intensity of illumination is

i) Energy incident per unit Time.

ii)Pressure per unit Time.

iii)Energy incident per unit Area per unit time

iv) Energy emitted per unit Area per unit time

1. What is relation between Intensity and Distance

i)Intensity decreases with square of the Distance

ii)Intensity increases as the Distance increases.

iii)No change in Intensity as Distance increases or decreases.

iv)None of the above.

PROCEDURE:

A source is placed at different distances from the photocell and current in ammeter is measured and graph of current (I) vs 1/d2 is plotted. The current is directly proportional to intensity of light.

I L

d is the distance between source and cell **I L 1/d2**

So graph of I vs 1/d2 is straight line.

**Observation Table**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Obs No** | **Distance between source & cell**  **d (cm)** | **Current (I)** | **d2** | **1/ d2** | **Id2** |
| **1** |  |  |  |  |  |
| **2** |  |  |  |  |  |
| **3** |  |  |  |  |  |
| **4** |  |  |  |  |  |
| **5** |  |  |  |  |  |
| **6** |  |  |  |  |  |

POST TEST:

1. A light bulb looks dimmer the further away it is because

i) Most people are near sighted.

ii) More light is absorbed by gas in between the bulb and the observer.

iii)**The same number of photons from the light bulb are spread out over a larger area.**

**iv)The light gets fainter with the age.**

1. **Intensity of illumination at any point is**

**i)Inversely proportional to distance between point and source.**

**ii)Directly proportional to distance between point and source.**

**iii) Inversely proportional to square of distance between point and source.**

**iv)Directly proportional to square of distance between point and source.**

1. **In photocell light energy is converted into**

**i)Solar Energy**

**ii)Nuclear Energy**

**iii)Chemical Energy**

**iv)Electrical Energy**

1. Photocurrent is proportional to

i)Intensity of light.

ii)Number of photons incident on photocell.

iii)Distance between source and photocell.

iv)None of the above

1. What is proportionality relation between Current and Intensity of light.

i)Inversely Proportional

ii)Directly Proportional

iii)Both Inversely and Directly proportional

iv)No relation

REFERENCES:

1. Concepts of Modern Physics by Sir Rthur Beiser
2. Concepts of Physics by H C Verma
3. Basics of quantum mechanics by Ajoy Ghatak and S.Lokanathan