UTILIZATION OF ELECTRICAL ENERGY

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Topics

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2. Nature of light
3. Terms used in illumination
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5. Electrical methods of producing light
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Topics

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Introduction

As we know that almost all human activities depends on light. Sun is a prime natural source of light but artificial lighting plays almost main role in our daily life. These artificial lights are produced by mechanical lamps and electrical lamps.

But due to poor performance the mechanical light are totally replaced by electrical lights. The electrical lighting are mainly used for decorative purpose, advertising, traffic control , medical field and street lighting etc.

Electrical Lighting

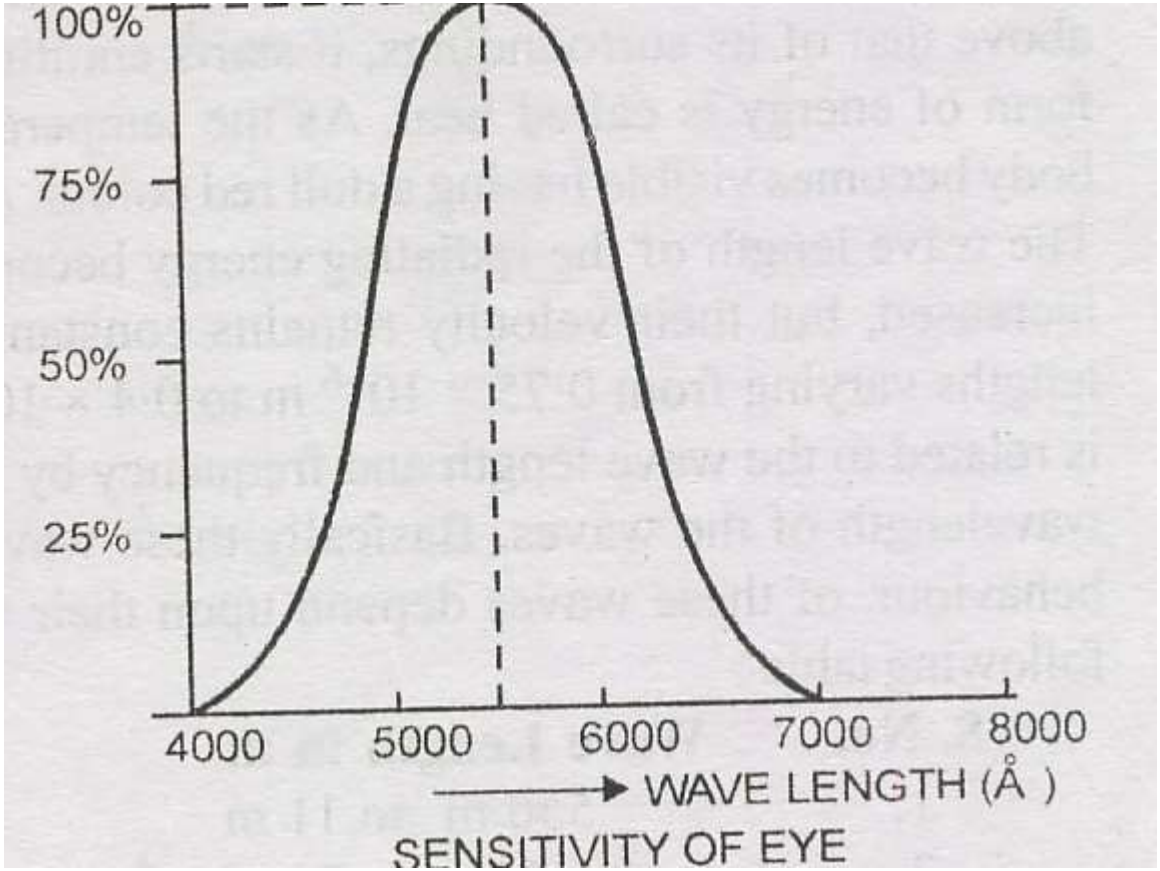
Electrical lighting has following advantages :

1. Cleanliness
2. Easy to control
3. Economical
4. Easy to handle
5. Steady output
6. Better reliability
7. Suitable for almost all purposes etc.

Sensitivity of Human Eye

As we know natural light consists of seven colors having different wavelengths. The average human eye is most sensitive to a wave length of 5500 ^{0}A.

The relative sensitivity of eye for a particular wave length is the visual effect produced by the light on the average human eye as compared with the effect of light having wave length 5500 ^{0}A on human eye.



Sensitivity of Human eye

This is also known as Relative luminosity Factor.

Terms used in Illumination

1. Light
2. Luminous flux
3. Lumen
4. Plane angle
5. Solid angle
6. Steradian
7. Candle power
8. Luminous intensity reduction factor
9. Glare
10. Lamp efficiency

light

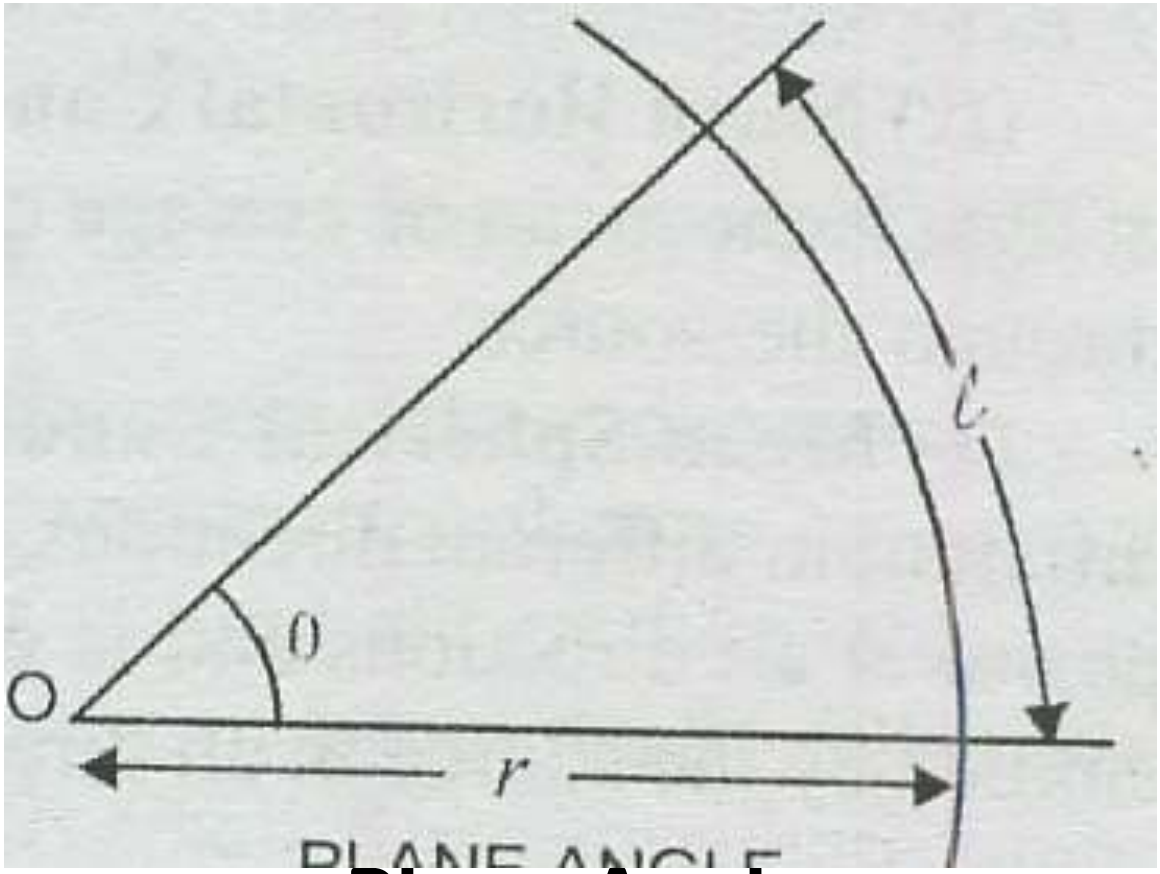
- That part of radiant energy from a hot body which produced the visual sensation on human eye is called light.

Luminous Flux

- The total quantity of radiant energy per second responsible for visual sensation from a luminous body is called Luminous Flux.
- It is represented as F of Ø and measured in lumens.

Lumen

- It is the unit of luminous flux. One lumen is defined as the luminous flux emitted per unit solid angle from a point source of one candle power.



Plane Angle

The angle subtended at a point by two converging lines lying in the same plane is called plane angle. It is measured in radians and equal to the ratio of the length of the arc too its radius,

$$\theta = \text{arc}/\text{radius} = l/r \text{ radians}$$

Steradian

- the unit of solid angle. One steradian is defined as the solid angle that is subtended at the centre of a sphere by its surface having area equal to radius square,

  ω = surface area/ $(\text{radius})^2$

  = r^2 / r^2 = 1 steradian

Candle Power

- The light radiating capacity of a source is called its candle power. The number of lumens given out by a source per unit solid angle in a given direction is called its candle power. It is denoted by C.P.

Total flux emitted = CP X solid angle

= 1 X 4π = 4π lumens

= 4π lumens

Luminous Intensity

- Luminous intensity in any particular direction is the luminous flux emitted by the source per unit solid angle in that direction.
- It is denoted by I and its unit is candela or candle power (CP) .
- Luminous intensity of source in a particular direction, $I = \phi / \omega$

Reduction Factor

reduction factor of a source of light is the ratio of its mean spherical candle power to its mean horizontal candle power.

Reduction factor = MSCP/ MHCP